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Editorial

STEPHEN LIEBER

Chief Executive Officer | Alliance for Smart Healthcare Excellence | USA | Editor-in-Chief IT

Digital Transformation & Interoperability

Digital transformation reshapes healthcare systems across the world, enabling more proactive, data-driven and personalised approaches to care. Such technologies as AI, cloud computing and digital therapeutics promise to optimise operations, support clinical decision-making and expand access to care. However, true transformation requires more than innovation — it demands a shift in leadership culture, investment in digital skills and a renewed focus on patient-centred outcomes.

Interoperability serves as the backbone of this shift. Without seamless data exchange across platforms, regions and care settings, digital advancements remain siloed and underused. From vendor-neutral pharmacy systems to cross-border health technology assessments, integrated frameworks are essential to ensure consistency, safety and value. Interoperability also empowers patients and professionals alike by enabling real-time collaboration, informed choices and coordinated care delivery.

This issue features perspectives on AI, cloud integration, digital upskilling, phygital care models, patient inclusion and regulatory frameworks. It explores how leadership, innovation and interoperability can converge to build resilient, equitable and sustainable health systems fit for the digital age.

Everton Santos and Spencer Corbett examine how global healthcare systems are prioritising AI, cloud, and digital technologies to enable more intelligent and patient-focused care.

Emma Scatterty illustrates how Scotland fosters digital skills in health and care through inclusive leadership, collaborative networks and accessible training.

Chrystalla Charalambous discusses how digital therapeutics enhance healthcare access, personalise treatments, and reduce costs, while underlining the need for clear regulations, education and trust to support wider adoption.

Crystal Broj presents how AI-driven “phygital” command centres are redefining healthcare by blending digital innovation with human-centred care to optimise operations, support clinicians and deliver seamless, personalised experiences across the entire patient journey.

Thierry Godelle outlines how the EAHP’s Special Interest Group is advancing vendor-neutral interoperability in European hospital pharmacies to boost efficiency, safety and patient-centred care.

Anca del Río stresses the need for health systems to integrate technology, data and talent, while promoting innovation, interoperability, and adaptive policies to create resilient, patient-centred care models.

Márcio Silva explores how digital transformation and interoperability are reshaping hospital management and patient care.

Dr. Katarzyna Zarychta reflects on how the digital age challenges mental health while offering innovative tools like apps and teletherapy, and calls for systemic reform and inclusive care.

Prof. Simona Agger Ganassi highlights the need for healthcare systems not to respond to emergencies after they occur but to improve their level of emergency preparedness to be better prepared for future challenges.

Dr. Quoc Duy Vo argues that AI can help resolve tensions between professional, managerial and market logics in healthcare by optimising workflows and resource use.

Robert S. Greene, Nicola Bedlington and Lydia Makaroff advocate for patient organisations to foster diverse, equitable and inclusive leadership to truly reflect and effectively serve all communities.

Susana Álvarez Gómez explains how Regulation (EU) 2021/2282 unifies EU health technology assessments to improve access, transparency and national decision-making.

David L. Schreiner reflects that a meaningful leadership legacy is built through values-driven actions, authentic relationships and a consistent commitment to positively impacting others.

I hope the insights and experiences shared in this issue will inspire reflection, spark new ideas and support your efforts in promoting digital transformation and interoperability in healthcare. As always, we warmly welcome your thoughts, questions or suggestions — your feedback is invaluable in shaping future editions.

Happy reading!

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Susana Álvarez Gómez, Spain

Susana Alvarez Gómez is a Family and Community Medicine specialist and Medical Inspector at the National Institute of Social Security. With over 30 years of experience, she has worked in various roles across public and private healthcare. A prolific author, she has participated in over 120 congresses and published 70 articles and book chapters. Susana collaborates with universities and is a member of The American College of Healthcare Executives.

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Nicola Bedlington, Austria

Nicola Bedlington was the first Secretary General of the European Patients' Forum (2006–2019) and founding Director of the European Disability Forum (1996–1999). She worked for the European Commission on disability policy (1991–1996) and led an OECD initiative on education for sustainable development. In 2020, she founded Millwater Partners, advising on health, sustainability and patient engagement. She works with patient organisations, medical societies and industry on patient engagement and advocacy.

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Crystal Broj is the Enterprise Chief Digital Transformation Officer at the Medical University of South Carolina (MUSC), a role she has held since 2022. She leads the university's digital transformation efforts across healthcare, research and academic operations, delivering innovative solutions that drive value and impact. A 2024 Global CDO 100 Award winner and frequent speaker at national leadership events, Crystal previously held key digital leadership roles at NorthShore and AADE.

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Dr. Chrystalla Charalambous, Cyprus

Dr. Chrystalla Charalambous holds a PhD in Molecular Genetics from the University of Glasgow and an MBA from Cyprus Business School. With 18 years of experience in a multinational pharmaceutical company, she has held roles from medical advisor to General Manager, leading teams across two countries. In 2023, she founded her own healthcare consultancy, focusing on strategic guidance, market analysis and regulatory insights to help clients bring innovative healthcare products to market.

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Anca del Río is a thought leader in digital public health and health systems innovation. A sociologist and health economist specialised in digital transformation, she brings 15+ years of experience with WHO, EIT Health, the European Commission and innovation ecosystems. A HIMSS Changemaker, Stanford-trained need-led innovator and former COVID-19 frontliner, she plays a pivotal role in advancing the WHO's Strategic Partners' Initiative for Data & Digital Health and serves on global advisory boards.

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Thierry Godelle, France

Thierry Godelle is an accomplished professional with 27+ years of experience in strategic consulting and technological product development. An engineer with an INSEAD MBA, he worked at KPMG, Mitchell Madison and GE Healthcare, where he served as MRI General Manager for Emerging Markets and Chief Strategy and Marketing Officer for Europe. Since 2018, he's been advising MedTech and e-health firms on go-to-market strategy, team structure and growth, with operational support to drive real results.

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Robert S. Greene, Netherlands

Robert Greene, a British-Dutch citizen, is a passionate patient advocate and speaker, committed to promoting patient-centered healthcare. Inspired by his own experience with chemotherapy side effects in 2012-2013, he raises awareness of patient involvement and fosters collaboration among stakeholders. Robert founded the HungerNdThirst Foundation and serves on influential boards, including the ASCO Foundation Grants Selection Committee and the GSK Health Advisory Board.

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Maria Kofidou, Germany

Maria Kofidou has been the CEO of Düsseldorf Congress GmbH since 2019 and has extensive experience in venue management. Prior to joining the Düsseldorf Congress, she held various senior management positions within the international trade fair and event industry. Maria is known for her strategic leadership skills and maintains a clear focus on implementing sustainable and forward-thinking business models. Under her leadership, Düsseldorf Congress has established itself as a pioneer in sustainable event planning.

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Lydia Makaroff is Chief Executive of the Multiple Sclerosis International Federation, a global network supporting people affected by MS. With a PhD in immunology and a Master's in Public Health, she has worked across national and international charities focused on cancer and neurological conditions. Based in Cambridge, UK, and originally from Australia, she supports global advocacy, research and fair access to care, with a focus on amplifying voices of people with lived experience.

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Chryssa Paraskevopoulou is Group Dose Management & Radiation Protection Manager at Affidea, where she also serves as Group Radiation Protection Lead and Consultant Medical Physicist. With a background in Physics and an MSc in Medical Physics, she has worked for over 19 years at Hygeia Hospital as Medical Physics Expert and Radiation Therapy Services Coordinator. She is also Radiation Protection Expert at Mitera Hospital and co-owner of a radiation services company.

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Emma Scatterty, Scotland

Emma Scatterty is at the forefront of developing digital leadership across Scotland's health and social care workforce. Through her role in Scotland's Digital Capabilities Programme, she helps equip leaders with the skills needed to navigate and lead in the digital age. She oversees tailored training initiatives that empower individuals and teams to deliver impact. Emma holds an MSc in Human Resource Management and a Postgraduate Certificate in Leading Digital Transformation in Health and Care.

Dr. David L. Schreiner, USA

Dr. David L. Schreiner is the Past President and CEO of Katherine Shaw Bethea Hospital and author of the best-selling book, "Be the Best Part of Their Day: Supercharging Communication with Values-Driven Leadership." He continues to coach and consult leaders, passionately guiding them to build impactful, meaningful legacies through genuine, values-driven leadership.

Márcio Silva, Brasil

Márcio Silva is an experienced business consultant and entrepreneur specialising in operational optimisation and growth strategies in the healthcare and service sectors. With a strong background in financial analysis and process management, he supports businesses in achieving efficiency and scalability. His results-driven approach and deep expertise in finance, marketing and innovation make him a trusted advisor for companies seeking sustainable growth and impactful market presence.

Dr. Quoc Duy Vo, Switzerland

Dr. Quoc Duy Vo is Head of the Radiology Department at Ensemble Hospitalier de la Côte (EHC) in Morges, Switzerland. A board-certified radiologist, he specialises in breast and musculoskeletal imaging. Dr. Vo holds a Master of Advanced Studies in Strategic Management of Health Institutions from the University of Geneva and a Doctorate in Management Science. His research focuses on institutional logics, radiology business models and AI in radiology.

Dr. Katarzyna Zarychta, Malta

Dr. KaT Zarychta, a Business Development Leader in Biomedical and Medical Devices, has 20+ years of global experience. She holds a PhD from Sorbonne Paris University, dual Master's in Physics and Biomedical Engineering and completed executive programmes at Harvard. An EU Commission Expert Advisor, she specialises in market access, commercialisation and funding, driving sales growth and AI-driven diagnostics adoption across Europe, APAC and the Middle East.

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Spotlight

CCD Congress Center Düsseldorf – A Hub for Research, Innovation and Networking

The CCD Congress Center Düsseldorf is a premier venue for medical congresses, offering flexible spaces that adapt to diverse event needs. It seamlessly connects conferences with trade exhibitions and provides excellent accessibility via an international airport and high-speed rail links. Committed to sustainability, the CCD holds Green Globe certification and promotes eco-friendly event planning. Its reputation for hosting top-tier medical events solidifies its role as a hub for research, innovation and networking.

MARIA KOFIDOU

CEO | Düsseldorf Congress GmbH | Düsseldorf, Germany

key points

- CCD Düsseldorf offers flexible spaces for diverse medical congress formats.
- The venue integrates conferences with trade exhibitions seamlessly.
- CCD prioritises sustainability with Green Globe certification.
- Excellent accessibility via airport and high-speed rail enhances convenience.
- CCD is a hub for research, innovation and top-tier medical events.

Medical congresses are far more than just a series of lectures: they share knowledge, drive innovation and strengthen networks. They serve as catalysts for research and practice, hubs for personal exchange and focal points for interdisciplinary collaboration. The CCD Congress Center Düsseldorf provides the ideal space for these needs: flexible, sustainable and optimally accessible.

Spaces That Adapt, Conferences with Impact

From focused expert seminars to large plenary sessions and interactive poster presentations, the CCD offers versatile spaces tailored to diverse event formats. Conferences with accompanying trade exhibitions can be seamlessly integrated within the CCD, creating a smooth transition between scientific exchange and presentation areas. Its direct connection to the Messe Düsseldorf exhibition grounds opens additional possibilities: if required, exhibition spaces can be extended by incorporating adjacent halls as additional congress venues. This approach ensures tailored event spaces that adapt to the needs of organisers rather than vice versa.

Sustainability as a Responsibility

A modern congress centre must not only be technologically advanced but also meet its ecological responsibilities. The CCD is committed to sustainable event planning, boasting Green Globe certification, resource-efficient concepts and partnerships with local suppliers. Thanks to its excellent public transport connections, many participants can travel in an environmentally friendly manner—making a small but significant contribution to future-oriented congresses.

Seamless Accessibility

Convenient access is a key success factor for international events. Düsseldorf provides the perfect conditions: an airport with direct connections to over 160 destinations worldwide, high-speed ICE train links to numerous European cities and a dense network of hotels close to the CCD. Organisers can fully concentrate on their congress while all logistical aspects are seamlessly handled.

Shaping the Future with the Best Conditions

The congress landscape is evolving—new formats, sustainable concepts and interactive event structures are becoming increasingly important. The CCD embraces these challenges with flexibility, technical excellence and close connections to science and industry. More than just a venue, the CCD is a catalyst for future innovation.

> "From focused expert seminars to large plenary sessions and interactive poster presentations, the CCD offers versatile spaces tailored to diverse event formats."

Setting New Standards in Congresses

The CCD's reputation as a premier location for medical congresses is evident from past events:

- **EANM Congress (2018):** Nuclear medicine at the highest international level.
- **AAD Congress:** Germany's largest continuing education event in ophthalmology.
- **German Pulmonology Congress (2023):** New insights into respiratory medicine and ventilation therapy.
- **German Rheumatology Congress (2024):** Professional exchange on innovative treatment approaches.

Each of these events has reinforced the CCD's reputation as a premier congress venue in the healthcare sector.

Your Next Congress at CCD Düsseldorf

The CCD Congress Center Düsseldorf combines modern infrastructure with sustainable solutions and an unbeatable location. This is ideal for those seeking a venue that seamlessly integrates science, practice and exchange.

Conflict of Interest

Spotlight articles are the sole opinion of the author(s), and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

Cover Story

KLAS Insights 2025: How Global Healthcare is Investing in AI, Cloud and Digital Transformation

Global healthcare is accelerating digital transformation, with AI and analytics now the top IT investment priority. The 2025 KLAS report reveals strong momentum in EHR modernisation, cloud adoption and cybersecurity, while digital health evolves through AI integration. Infrastructure upgrades and consulting support are enabling smarter, data-driven care across 39 countries, highlighting regional differences but a shared commitment to innovation.

EVERTON SANTOS

Vice President | International | KLAS Research | Salt Lake City, USA

SPENCER CORBETT

Insights Director | KLAS Research | Vineyard, Utah, USA

key points

- AI and analytics top global healthcare IT investment priorities in 2025.
- EHR modernisation remains central to digital transformation strategies.
- Cloud adoption is accelerating, with hybrid models still the most common.
- Cybersecurity and interoperability are key to infrastructure upgrades.
- Consulting support is rising as a strategic driver of digital health success.

KLAS's third annual Global HIT Trends 2025 report offers a detailed snapshot of how healthcare organisations across 39 countries, excluding the United States, are reshaping their information technology strategies. Based on interviews with 174 healthcare providers, the report identifies core areas of investment, emerging technology trends and evolving operational needs. As the global healthcare environment grapples with resource constraints and growing demand, this research provides timely insights into how digital tools, particularly artificial intelligence (AI) and cloud computing, are being leveraged to meet modern challenges. These insights illustrate a growing commitment across global health systems to use technology not only for innovation but also as a solution to long-standing issues such as clinician burnout, data fragmentation and care coordination.

AI and Analytics Take Centre Stage

Artificial intelligence and analytics have become the focus of global healthcare IT investments. While data analytics once played a secondary role to traditional digital infrastructure, 2025 marks the year it surpasses all other categories in strategic importance. This shift reflects a move beyond standard business intelligence toward advanced use cases that integrate AI technologies into clinical and administrative workflows.

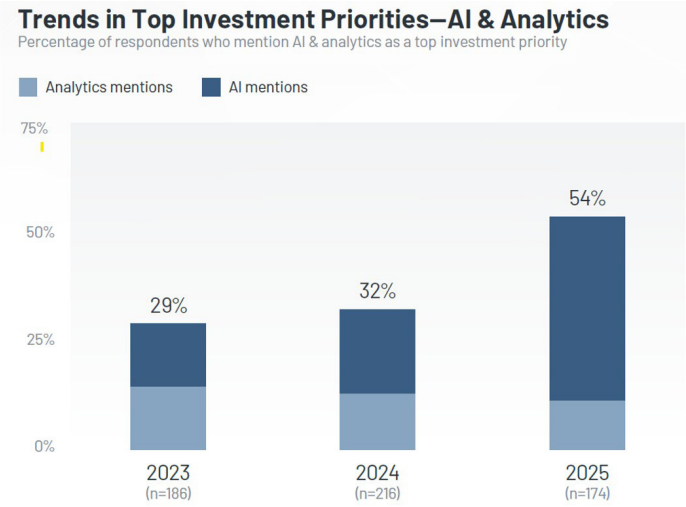

Figure 1. AI & Analytics as a Top Investment Priority. Source: KLAS

AI applications span ambient speech for easing documentation tasks, generative AI models that assist with diagnostics and tools for radiology and workflow automation. The enthusiasm for AI is broad, yet its deployment remains in early stages. Organisations are currently focused on testing solutions and building governance frameworks. Regions such as Asia and Canada show the most comprehensive strategies, with more than 70% of respondents naming analytics as a top investment area. Elsewhere, such as in Europe and the Middle East, efforts are narrower but deeply targeted toward specific operational gains.

Different geographies are moving at varied paces, influenced by local infrastructure readiness, regulatory environments and workforce expertise. In the UK, for example, ambient speech technology has been identified as particularly valuable for improving clinician satisfaction and reducing documentation time. In Latin America, the primary emphasis remains on general AI strategies and the continued use of business intelligence (BI) tools to enhance reporting and operational efficiency. Meanwhile, respondents in the Middle East and Africa prioritise BI analytics with a growing interest in broader AI applications, especially in countries such as Saudi Arabia and the UAE.

EHR and Digital Transformation Still Core to Strategy

Despite the surge in AI interest, electronic health records and digitalisation initiatives remain vital components of healthcare strategies. A significant number of providers are transitioning from paper records or considering a replacement of their current EHR platforms. For many, optimising existing systems is key to increasing organisational efficiency and preparing for further digital transformation.

These efforts are particularly prominent in Asia, Europe, Latin America and Canada, where EHR investments are often tied to broader goals such as interoperability, patient engagement and data integration. In some cases, digitalisation efforts are not only about technology but also about streamlining operational processes and aligning with national healthcare frameworks.

Nearly a quarter of respondents focused on EHR investments are either at the stage of leaving paper-based systems behind or are in the process of evaluating a change in EHR platform. This transition signals a wider desire to align with modern standards of care delivery and data governance. Digital transformation, as noted in the report, often encompasses not only new implementations but also optimisation of current systems to drive added value from existing digital assets.

Infrastructure, Cybersecurity and Interoperability Underpin Modernisation

Modernising IT infrastructure continues to be a cornerstone of healthcare transformation. In Asia and Latin America, where digital ecosystems are still maturing, there is a strong emphasis on upgrading systems to accommodate cloud computing and AI capabilities. Priorities include enhancing network capacity, modernising servers, implementing business continuity solutions and laying the groundwork for medical Internet of Things deployments.

Cybersecurity is another high-priority area, especially in Asia, where respondents cited a rise in impactful cyberattacks. Across all regions, security investments aim to protect expanding digital environments and comply with regulatory requirements. Interoperability also remains essential, with nearly half of the mentions focusing on connecting external systems through national health record integrations and health information exchanges. Due to regional government initiatives, Europe, the Middle East and Oceania are especially active in these efforts.

The focus on interoperability indicates a broader move toward connected care, where data moves with the patient across different points of service. Respondents in many regions mentioned the importance of harmonising data flows not only within organisations but also across regional and national boundaries. In some areas, interoperability efforts are tied directly to government incentives or mandates, which are accelerating the pace of integration across systems.

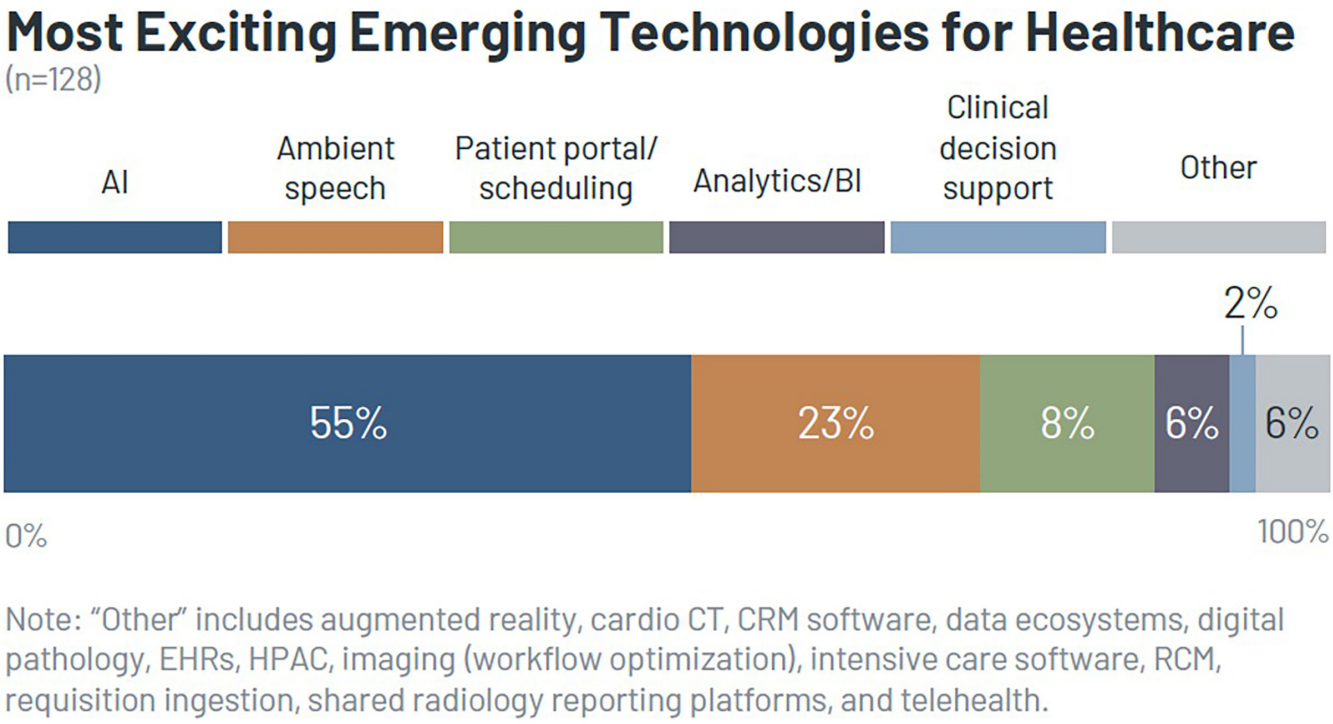

Figure 2. Most Exciting Emerging Healthcare Technologies Identified by Respondents. Source: KLAS

Cloud Adoption Gains Ground, With Regional Nuances

Cloud technology adoption has advanced significantly in the past year, with many organisations moving from planning to deployment. Hybrid models are currently the norm, but interest in fully cloud-native solutions is increasing. This shift is primarily driven by the need to support AI and other advanced technologies, which often require scalable, cloud-based infrastructures.

Organisations continue to grapple with decisions regarding the right mix of private and public cloud services. Many deployments still feature a hybrid architecture, particularly where data sovereignty laws are strict or existing infrastructure investments remain in place. As maturity increases, more providers are moving critical applications, such as EHR and ERP systems, into cloud environments to fully capitalise on the benefits of elasticity, security and availability.

> "AI and analytics have become the focus of global healthcare IT investments."

Microsoft Azure remains the leading cloud platform across most regions, particularly in Asia and Canada, where integration with Microsoft Office 365 supports broader enterprise strategies. AWS is gaining traction in Europe following sovereign cloud developments, and Google Cloud has seen a rise in consideration, especially in Asia and Canada, due to its capabilities in AI and predictive analytics. Meanwhile, private cloud usage has declined, especially in Latin America and Europe, as public options become more attractive and compliant with local regulations.

Digital Health Evolves Through AI Integration

While many organisations no longer list digital health as a top standalone investment, it is undergoing a transformation. New approaches integrate AI capabilities into virtual care, patient engagement and data management tools. This evolution reflects a broader shift in how digital health is conceptualised—no longer as a separate initiative but as a core component of AI-driven healthcare.

The Middle East stands out for its adoption of generative AI within digital health strategies. In many other regions, existing patient portals and virtual care platforms are being enhanced with machine learning tools to improve accessibility and engagement. As digital health merges with AI, its role becomes even more critical in supporting sustainable, data-driven care delivery models.

Digital health is also becoming more embedded in the broader narrative of patient-centric care. For example, the use of generative AI is contributing to more personalised patient experiences through smart triage, symptom checkers and predictive communication strategies. Although fewer respondents list digital health as a standalone top priority, its integration with emerging technologies ensures its continued influence on healthcare service delivery.

> "Consulting is increasingly viewed not only as a temporary support mechanism but as a strategic partner in long-term transformation."

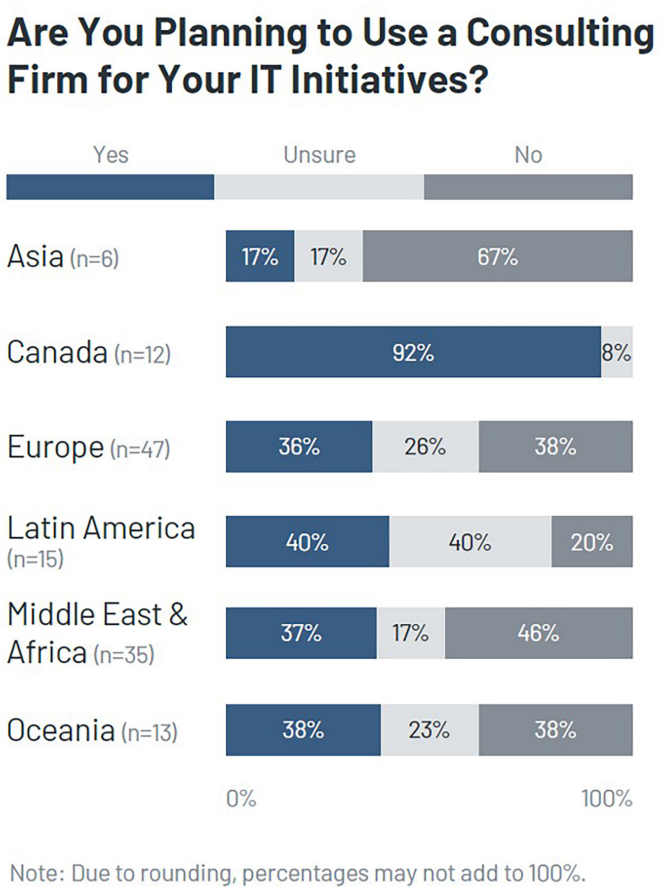

Figure 3. Interest in Consulting Engagements by Region. Source: KLAS

Imaging and Clinical Systems Remain High-Value Focus Areas

Imaging technologies continue to be key investment areas, particularly in Canada and Oceania. Solutions such as PACS (Picture Archiving and Communication System), RIS (Radiology Information System) and digital pathology are common priorities. Some healthcare providers are incorporating AI into imaging workflows, enabling faster and more accurate diagnostics. However, analytics still serves as the foundation for many of these imaging strategies.

Additional focus areas include clinical systems such as decision support tools and laboratory information systems. These are essential for enhancing diagnostic capabilities, streamlining care pathways and ensuring data-driven decision-making. The alignment of these systems with overarching digital strategies further highlights their strategic value.

Many organisations also consider how imaging data can be better integrated into longitudinal patient records. This includes applying AI algorithms to image archives to identify patterns that could assist in early disease detection. The convergence of imaging and AI, while still in early stages, offers promising prospects for both clinical and operational improvements.

Consulting Support Rises in Strategic Importance

Healthcare organisations increasingly seek external consulting services to support their digital transformation journeys. Interest in consulting has risen significantly, especially in Canada, where the number of organisations open to working with advisory firms has nearly doubled over the past year. The most commonly sought services include IT strategy, implementation support and healthcare management consulting.

Deloitte leads in global consideration, followed by EY, KPMG and PwC. These firms are often engaged in projects involving EHR implementation, AI strategy,

cloud migration and cybersecurity. In Latin America, FOLKS has gained recognition, while Oceania has seen growing consideration for PwC. Conversely, some regions, such as Asia, continue to show limited interest in consulting, preferring to manage transformation initiatives internally.

Consulting is increasingly viewed not only as a temporary support mechanism but as a strategic partner in long-term transformation. Projects include advisory services focused on cloud transition, AI governance and benefit realisation for digital initiatives. Organisations in regions such as the Middle East and Europe are especially active in pursuing these partnerships, particularly for complex ERP and EHR implementations.

Conclusion

The Global HIT Trends 2025 report from KLAS reveals a healthcare sector amid profound technological transformation. AI and analytics are now at the core of investment decisions, but they are not displacing traditional priorities—instead, they are becoming embedded within them. Infrastructure upgrades, cloud strategies and consulting support are all converging to enable more adaptive, efficient and intelligent healthcare systems.

The regional diversity in approaches underscores a global commitment to innovation, even as each healthcare system charts its own course. Together, these efforts mark a shift toward smarter, data-driven healthcare that is better equipped to meet the demands of both clinicians and patients in a rapidly evolving world. As global health systems continue to modernise, the combined influence of AI, cloud and digital platforms will define the next era of healthcare delivery.

Disclaimer

KLAS is an independent and unbiased research firm in healthcare IT as such KLAS and its management team aim to maintain the highest level of impartiality in the healthcare industry and they do not endorse any vendor or consulting firms listed in the report. KLAS data and reports are a compilation of research gathered from websites, healthcare industry reports, interviews with healthcare, payer and employer organisation executives and managers, and interviews with vendor and consultant organisations.

Conflict of Interest

None

references

KLAS (2025) Global HIT Trends 2025: Interest in AI Rapidly Expanding Across All Regions (accessed: 18 April 2025). Available from klasresearch.com/report/global-hit-trends-2025-interest-in-ai-rapidly-expanding-across-all-regions/3450

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Building Digital Skills and Leadership in Scotland

Scotland is equipping its health and care workforce with digital skills through a national framework, accessible training platforms and strong cross-sector collaboration. The strategy includes peer learning networks, digital champions and leadership programmes that empower staff to lead change. This inclusive, people-centred approach ensures digital transformation meets real workforce and citizen needs.

EMMA SCATTERTY

Digital Leadership Specialist Lead | Digitally Enabled Workforce Team | NHS Education for Scotland | Edinburgh, Scotland

key points

- Scotland uses a national framework to boost digital skills across the health and social care sectors.
- Training resources are free, virtual and tailored to support a diverse, dispersed workforce.
- Peer learning and collaboration are central to Scotland's digital leadership strategy.
- Digital Champions play a key role in supporting colleagues and promoting a culture of learning.
- Leadership programmes empower staff to drive digital change within their teams and organisations.

Emma Scatterty is the Digital Leadership Specialist Lead at NHS Education for Scotland, where she works to enhance digital capabilities within Scotland's health and social care workforce. As part of the Digitally Enabled Workforce team, she leads initiatives that promote digital leadership, encourage peer learning and provide accessible training resources. During the session "Looking Forwards: Skills for Scale" at the EHTEL 2024 Symposium (EHTEL 2024a, b), Scatterty shared valuable insights on how Scotland prepares a future-ready workforce by focusing on people, collaboration and inclusive digital development. As a follow-up, HealthManagement.org interviewed Scatterty on further implications for Scotland's activities.

Q.: What are the key challenges Scotland's Digital Capability Programme faces when finding and addressing the gaps in digital skills in health and social care, and how do you plan to overcome them?

A.: NHS Education for Scotland is the delivery partner commissioned by the Scottish Government and COSLA (Convention of Scottish Local Authorities) to deliver a programme of work aimed at growing the digital, data and leadership capabilities at all levels of our workforce across Scotland. Firstly, this is a hugely diverse workforce, encompassing health, social work, social care, housing and third- and independent sector staff with a range of skill needs according to sector, role and profession.

However, what we know about digital capabilities is that most skills are applicable across roles, and only a small percentage of specialist skills are role-specific. We have therefore designed a Digital and Data Capability Framework (NHS Education for Scotland 2025a) which outlines the digital skills, knowledge and behaviours that *everyone* needs to do their job and deliver safe and good-quality care and support. This is a key starting

point for individuals to benchmark themselves across different capability areas. Once they understand the areas they would like to develop, they can access free, quality-assured training materials on our Digital and Data Resource Hub (NHS Education for Scotland 2025b) and Learner Pathways site (NHS Education for Scotland 2025f), which have been specially curated to support this large and varied workforce.

Building networks has also been instrumental in our approach to encourage knowledge sharing. As one example, our KIND (knowledge, information and data workforce) network brings together approximately 3700 members working in these areas. It's an engaged community which allows individuals and teams across the sector to collaborate, share learning and support each other to learn new skills. Over 2000 members are

> "People are ultimately at the heart of delivering and receiving health and care services."

Q.: Collaboration is important in your approach. How do you work with different organisations in the sector to coordinate efforts and avoid repeating work in digital, data and leadership skills development?

A.: From the moment the Digital Capabilities Programme was founded, we have worked tirelessly to build relationships with organisations across the sector to not only understand the needs of the workforce but also to see where we can coordinate efforts. We conducted a critical piece of user research (NHS Education for Scotland 2025e) to discover existing levels of digital literacy across the sector, levels of access to digital devices and services, current issues in accessing digital learning platforms and, ultimately, how users want to learn. Twenty-eight interviews, two focus groups and over 3000 survey responses were analysed, revealing key themes such as a desire for outcomes-based training, the need to embed a digital learning culture in organisations and the importance of peer learning.

One of the key outputs from this research was the development of the Digital and Data Resource Hub (NHS Education for Scotland 2025b), a brilliant example of collaboration in action. It brings together a whole host of fantastic free resources already available and developed by others. Crucially, it makes these easy to find and relevant for users by mapping them against different capability areas and levels of competence.

subscribed to the weekly email updates, and typically around 1000 members will join sessions run by the network each month, demonstrating that not only is membership high, but participation is too. Sessions include both structured training and informal events, shaped around the community's needs. Members also contribute daily to the chat thread, raising questions, providing support to others and sharing their weekly achievements, as well as celebrating those of others. We also run communities of practice for both Digital Leaders and Digital Champions.

Q.: With health and social care workers spread out across different locations, how do you make sure that resources for digital skills development are accessible and engaging for all professionals, no matter where they are?

> "A digital champion is someone willing to share their skills to help others use digital tools and technologies."

A.: Our team is known as the Digitally Enabled Workforce team, and we very much work in a way that is true to our vision. All of our resources and training programmes are delivered virtually, which for the most part means they are accessible at any time of day, from any location and from any device to support Scotland's geographically dispersed workforce. Importantly, registration and access to our resources are open to anyone, the formats are varied to suit different learning styles, and many live events are recorded for wider sharing. However, we also recognise the importance of creating connections and meaningful collaborative

experiences for learners, so we provide a plethora of opportunities for people across Scotland (and beyond!) to join interactive learning sessions and networks – from discussion forums to facilitated peer support groups, to technical training sessions to 'Question & Answer' sessions with subject matter experts. This approach also contributes to our wider goals of reducing duplication of efforts and getting people working together to bring about digital transformation across the sector.

Q.: Can you share any success stories about how your work has positively impacted health and care delivery in Scotland?

A.: Our guiding principle is that all individuals can lead when given the opportunity and support, regardless of role or seniority. We are always inspired by what the participants of our digital leadership programmes achieve in terms of bringing about change in their own teams and organisations. Currently, our core Digital Health and Care Leadership Programme sees 240 aspiring leaders every year through a journey of identifying and delivering a digital improvement project, whilst building their skills, knowledge and networks along the way. You can read more about the projects on our site (NHS Education for Scotland 2025f). These range from improving citizen access to information, exploring telecare solutions that help people to stay independent at home for longer, making referrals to health services easier and more accessible, as well as projects focused on staff information, training and improving access to data and systems. Our mantra is people, processes and then technology. People are ultimately at the heart of delivering and receiving health and care services. So we put people first, making sure that we understand their role, learning needs and challenges, then design learning opportunities to address those needs and meet those challenges.

Q.: Can you explain the role of Digital Champions in health and social care and how they help create a culture of ongoing digital learning and change?

A.: In simple terms, a digital champion is someone willing to share their skills to help others use digital tools and technologies. We know that Digital Champions have a huge role in supporting the workforce to develop their digital skills – our user research (NHS Education for Scotland 2022) pointed to a strong desire for local support (complementing more structured training). We know this is most commonly delivered by digital champions, many of whom are not formally recognised or supported.

One of the reasons Digital Champions are so effective is that they are often trusted colleagues, which goes a long way in building people's confidence and helping them adapt to new technologies and ways of working. Digital champions do not need to be technical experts; their strength lies in their ability to relate to and support others with patience and enthusiasm.

We are invested in getting Digital Champions the support, learning resources and recognition they need to carry out this crucial role. So, we're currently working with people across the sector to help organisations build and grow their own digital champion networks. You can learn more about this work on our Digital Champion Networks site (NHS Education for Scotland 2025c).

Q.: Looking to the future, what do you see as the next big step in digital health and care in Scotland, and how are you going to help the workforce get ready for it?

"No single piece of technology is going to be our panacea."

A.: There is no doubt that the advancement of technology is moving exponentially; if we just take a moment to look at the way AI has developed over a relatively short period of time, it serves as a prime example.

However, we always stress that, whilst we do need to be horizon scanning and looking to the future to see what technology will help us solve both our current and future challenges, the key principles as to how we approach issues remain the same. In fact, we need to always start with our people, including staff, service users and all citizens, really understanding their needs, and then looking at the process improvements and technology that can really answer these issues.

Health and care are extremely complex, so no single piece of technology is going to be our panacea. It's going to be about working collaboratively and openly, looking beyond our own teams, departments and organisations. We shall do it in a way that fosters skills growth, permission to test and innovate, and, crucially, an ability to pivot and adapt in an ever-changing world.

Yes, AI might be the next step, but this just makes it even more important that the fundamentals are in place, including clarity of roles and responsibilities, records management, information governance, visible leadership and accountability. If these are in place, this will support the greater collaborative working we need to be able to provide a truly integrated, supportive health and social care system.

Conflict of Interest

None

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Digital Therapeutics: Transforming Healthcare Through Innovation and Addressing Key Gaps

Digital therapeutics (DTx) use software-driven treatments to improve healthcare access, personalise care, reduce costs and boost patient engagement. However, regulatory and capacity gaps hinder widespread adoption. Addressing these challenges requires clear standards, education for healthcare providers and patients, improved accessibility and strong data security measures to build trust and drive integration into mainstream healthcare.

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key points

- Digital therapeutics provide software-driven treatments for chronic diseases and mental health.
- They enhance access, personalise care and lower costs through data-driven healthcare solutions.
- Regulatory gaps and unclear approval processes hinder widespread digital therapeutics adoption.
- Limited awareness among providers and digital literacy issues slow healthcare system integration.
- Clear standards, education and strong data security are vital for the trust and adoption of DTx.

In the rapidly evolving landscape of healthcare, digital therapeutics (DTx) have emerged as a revolutionary approach to treating, managing and even preventing a range of diseases. These technology-driven solutions combine clinical evidence with software-based interventions to deliver personalised care directly to patients, often bypassing traditional barriers to access. However, as groundbreaking as digital therapeutics are, their integration into mainstream healthcare systems faces significant challenges. This article explores what digital therapeutics are, how they are disrupting healthcare, the regulatory and capacity gaps that hinder their adoption and actionable steps to address these challenges.

What Are Digital Therapeutics?

Digital therapeutics, as defined by the Digital Therapeutics Alliance, are health software intended to treat or alleviate a disease, disorder, condition or injury by generating and delivering a medical intervention that has a demonstrable positive therapeutic impact on a patient's health (Digital Therapeutics Alliance n.d.). Unlike general wellness apps, DTx products are clinically validated, evidence-based tools that require regulatory approval to ensure their safety and efficacy. These solutions can operate independently or alongside traditional treatments to improve health outcomes.

Digital therapeutics are defined by several key characteristics. They are delivered through mobile apps, wearables or connected devices and target specific conditions such as chronic illnesses, mental health disorders and neurological conditions. To confirm their effectiveness, DTx undergo rigorous clinical trials and must be approved by regulatory bodies to ensure their claims regarding efficacy, risk and intended use are reliable.

How Digital Therapeutics Are Disrupting Healthcare

Digital therapeutics are disrupting healthcare in several transformative ways:

1. Increasing Access to Care. DTx solutions provide accessible treatment options for patients who may not have easy access to traditional healthcare providers. For instance, patients in rural areas or underserved communities can now receive mental health support or chronic disease management through mobile apps. This remote accessibility is particularly important for individuals who would otherwise face significant barriers to in-person care.

One such example is the BlueStar application by Welldoc, a DTx for individuals aged 18 years and older with Type 1 or Type 2 diabetes. By providing tailored guidance driven by artificial intelligence, BlueStar collects and analyses health data to provide precision, real-time feedback and intelligent coaching driven by more than just blood glucose levels. The interventions have been shown to significantly lower blood glucose (A1C) levels, with published results in various clinical journals demonstrating the application's effectiveness.

2. Personalised Treatment. Unlike the traditional "one size fits all" pill solutions we are used to, DTx leverage data analytics and hence can offer tailored interventions. These products adapt to the needs of individual patients based on their behaviour, progress and preferences, ensuring that treatments are more suited to each person's unique situation. This personalised approach enhances patient engagement and compliance, as interventions are more relevant to their daily lives.

3. Cost Reduction and Enhanced Healthcare System Capacity. DTx can significantly reduce healthcare costs by minimising the need for expensive hospital visits, diagnostics and invasive treatments. For example, digital therapeutics for mental health, such as cognitive behavioural therapy (CBT)-based apps, are often more affordable than traditional therapy sessions. By reducing the economic burden and, in most cases, minimising the resources needed (eg precious doctors' and nurses' time), DTx help significantly reduce the pressure on healthcare systems, making them a major driver of cost savings.

4. Increased Patient Engagement. DTx solutions encourage patients to stay committed to their treatment plans by providing real-time feedback, progress tracking and gamified elements. This interactive approach helps maintain patient motivation, leading to better patient adherence. A prime example is Kaia Health's digital therapeutic for chronic pain management, which uses AI to guide users through physical therapy exercises. It tracks patient movements via smartphone cameras, ensuring adherence and treatment effectiveness while reducing the need for in-person physiotherapy sessions.

> "DTx represent a great example of how even a strictly traditional field like healthcare can be disrupted by innovative solutions."

The Regulatory Gaps in Digital Therapeutics

Despite their promise, the widespread adoption of DTx is hindered by significant regulatory gaps across the globe.

1. Lack of Uniform Standards. Unlike traditional pharmaceuticals, there is no universal regulatory framework for digital therapeutics. For example, in the United States, the FDA has issued guidelines for digital health products, but many developers find the pathway for DTx approval unclear. Similarly, the European Union's Medical Device Regulation (MDR) governs DTx, but the process is often cumbersome and not tailored to software-driven solutions. In other regions, such as Asia and Africa, regulatory frameworks are still in their infancy or nonexistent, further complicating adoption.

2. Challenges in Proving Efficacy. DTx products must undergo rigorous clinical trials to demonstrate their efficacy. However, the clinical trial process for software-based solutions is still evolving, leading to uncertainty for developers. These trials differ significantly from traditional pharmaceutical trials, posing unique challenges in terms of methodology, data collection and validation of results.

3. Data Privacy and Security. DTx solutions rely heavily on patient data, raising significant concerns about data privacy and compliance with regulations such as GDPR and HIPAA. Reaching a balance between innovation and the secure handling of sensitive

information is critical to ensuring user trust and safeguarding patient confidentiality.

The Capacity Gaps: End Users and Healthcare Providers

In addition to regulatory hurdles, capacity gaps among both end users (patients) and healthcare providers also impede widespread adoption.

1. Patient Adoption. Many patients lack the digital literacy or access to the necessary technology to use DTx effectively. This is especially true for older adults or individuals in low-income communities who may not have access to smartphones or reliable internet connections.

2. Healthcare Provider Reluctance. Doctors are often hesitant to recommend DTx due to limited awareness or understanding of how it works. Concerns about liability, the reliability of software-based treatments and insufficient training on integrating DTx into their practice also contribute to their reluctance. This creates a barrier to effective implementation within clinical settings.

Bridging the Gaps: Steps Forward

Addressing these challenges requires coordinated efforts from regulators, developers and healthcare systems.

1. Developing Clear Regulatory Frameworks. Governments and regulatory bodies should collaborate to create clear, globally harmonised standards for the evaluation and approval of digital therapeutics. These frameworks should be designed to accommodate the unique aspects of software-based treatments while ensuring patient safety.

2. Promoting Education and Training. Enhancing adoption requires comprehensive education for both patients and healthcare providers. Developers should focus on creating user-friendly interfaces and providing tutorials to help patients effectively utilise their solutions. Additionally, medical institutions and organisations should implement training programmes for clinicians to ensure they understand and can confidently recommend digital therapeutics products.

3. Improving Accessibility. Making DTx affordable and accessible is critical to bridging the digital divide. Public-private partnerships can play a key role in subsidising costs for underserved communities, ensuring that the benefits of DTx are not limited by socioeconomic factors.

4. Building Trust. To address privacy concerns, developers must prioritise data security and transparency. Clear communication about how patient data is used and protected will help build trust among users, which is critical for widespread adoption.

Conclusion

DTx represent a great example of how even a strictly traditional field like healthcare can be disrupted by innovative solutions. DTx have the potential to democratise access to care, improve patient outcomes, reduce healthcare costs and alleviate the strain on healthcare personnel. However, their widespread success depends on overcoming regulatory uncertainties, addressing capacity gaps and building trust among all stakeholders.

By bridging the gaps that exist today, we can unlock the full potential of DTx and ensure that these solutions benefit patients around the world, regardless of their financial status or geographic location.

> "DTx solutions provide accessible treatment options for patients who may not have easy access to traditional healthcare providers."

Conflict of Interest

None

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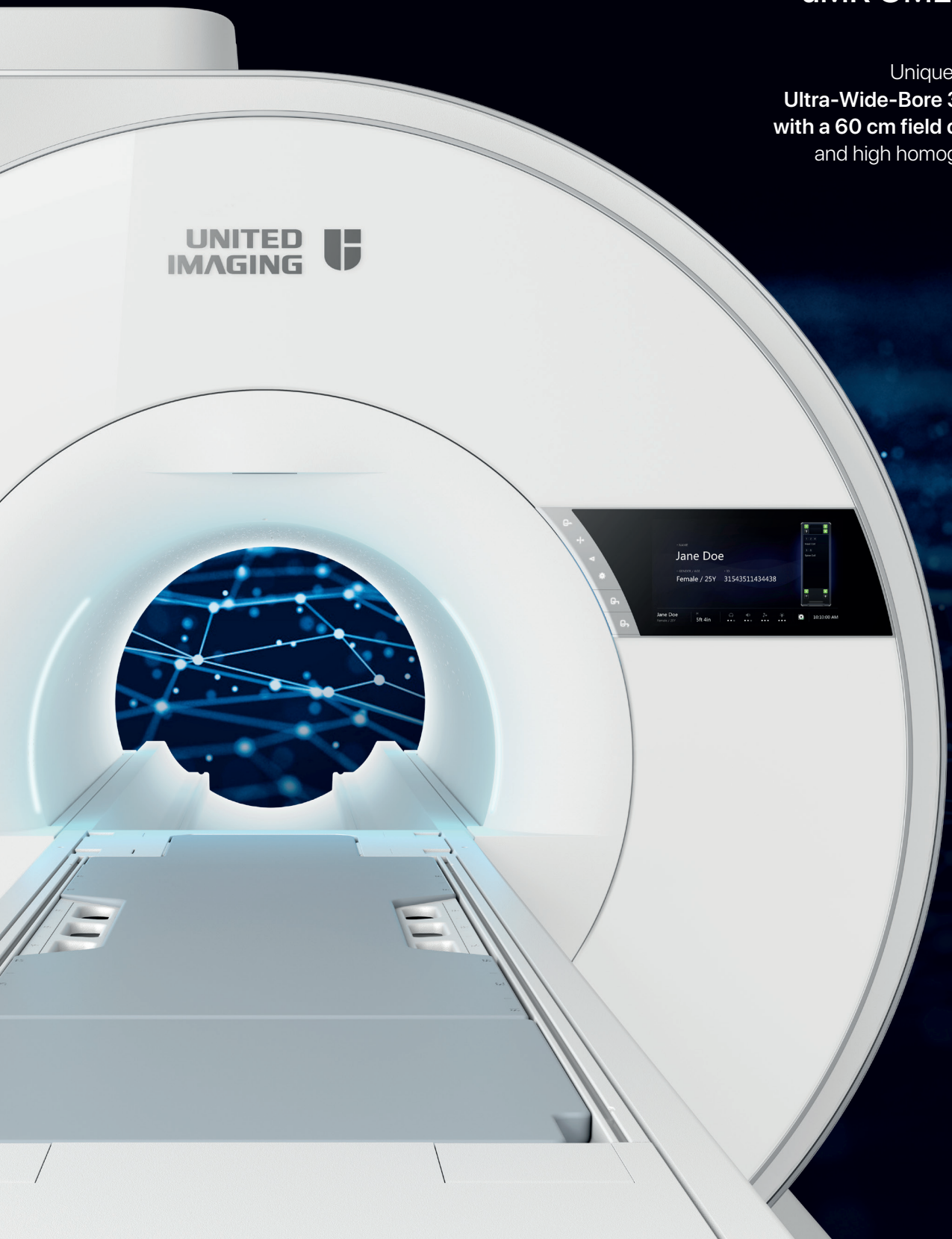

MORE INFO:

The Rise of the "Phygital" Command Centre: Connecting Technology and Human Touch in Healthcare

Hospital command centres are transforming into AI-powered "phygital" hubs that blend digital innovation with human care. Moving beyond logistics, they now predict needs, streamline operations and support clinicians. By personalising journeys and extending care beyond hospital walls, they enhance access, reduce delays and improve outcomes—while ensuring inclusive experiences for both tech-savvy and traditional patients.

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key points

- AI shifts command centres from reactive to predictive, improving patient flow and resource use.
- "Phygital" care blends digital tools with human support for a seamless patient experience.
- Automation reduces clinician admin tasks, enhancing care quality and work-life balance.
- Personalised outreach helps close care gaps and boosts patient engagement.
- Hybrid systems ensure accessibility for both digital-first and traditional patients.

Healthcare is Changing—So Should the Command Centre

When people think of command centres, the first thing that might come to mind is air traffic control—highly skilled professionals guiding planes to and from runways, managing flight paths and ensuring everything flows smoothly in the skies. Traditionally, hospital command centres have worked in a similar way, guiding patients through the system, from the emergency room (ER) to inpatient units, from surgery to recovery, and from hospital discharge to secondary care centres or homes. The goal? Maximise efficiency, minimise delays and make sure patients get where they need to go.

But here's the thing—healthcare is so much more than just moving patients from point A to point B. As we shift toward whole-person care, the command centre model has to evolve, too. It's no longer just about bed management and inpatient logistics. The future is about combining physical and digital experiences—what we call "phygital" healthcare—to create a seamless, coordinated care journey that follows the patient, no matter where they are.

The Evolution of the Hospital Command Centre

Hospital command centres have been around for a while, making sure hospitals run as smoothly as possible—managing bed availability, coordinating transfers and keeping surgeries on schedule. Traditionally, these centres have been all about reacting to what's happening in real time, handling everything from patient flow to crisis situations like COVID-19 surges. But now, leading health systems are taking things to the next level. Instead of just responding to

challenges as they come up, modern command centres are becoming proactive, AI-driven hubs that optimise the entire patient journey—from the moment someone walks through the doors (or even before) to when they're discharged and beyond.

From Crisis Management to Predictive Precision

With real-time data, artificial intelligence (AI) and digital twin technology, today's command centres aren't just tracking beds and patients—they're predicting what's going to happen next. This shift from reactive to predictive is huge because it allows hospitals to plan ahead, making smarter decisions that improve both efficiency and the patient experience.

We're seeing this play out in several key ways. AI-driven capacity forecasting helps predict surges in patient volume so hospitals can allocate resources before they hit a bottleneck. OR scheduling is getting a major upgrade, reducing surgical delays and increasing revenue by making better use of available OR time. Automated bed assignments are cutting down wait times for inpatient admissions, helping move patients through the system more smoothly. AI-powered care navigation is making it easier to coordinate patient transfers between facilities, reducing delays and ensuring people get the right care in the right place at the right time.

Hospitals that have fully embraced these AI-driven command centres are seeing real results. ER wait times are down, OR efficiency is up, and care denials due to capacity issues are decreasing. But as these centres become more advanced, there's an even bigger opportunity on the horizon—using this intelligence beyond hospital walls to improve how patients navigate care in the first place.

The Traditional Hospital Command Centre: Moving from Manual to Smart

For years, hospital command centres were all about keeping things moving. The job was to track beds, manage surgical schedules and make sure discharges happened on time. But the way it was done? Mostly manual. Think whiteboards, spreadsheets and a lot of phone calls. Even with some basic digital tools, there were still gaps—miscommunications, inefficiencies and unnecessary delays that slowed everything down.

Now, with AI and automation in the mix, hospitals are moving from static tracking to intelligent, real-time decision-making. Instead of reacting to problems as they happen, they're anticipating them before they even occur. This isn't just a shift in technology—it's a complete transformation in how hospitals operate. And it's not just about making things more efficient inside the hospital. The next step is taking this approach beyond hospital walls, using predictive analytics to help patients find and access the right care before they even set foot in a facility.

> "The future is about combining physical and digital experiences—what we call 'phygital' healthcare."

That's where hospital command centres are headed—turning from internal operations hubs into powerful engines for patient-centric care navigation. It's no longer just about keeping things running inside the hospital; it's about shaping the entire care journey and making healthcare more seamless, proactive and connected than ever before.

The Digital Shift: From Clipboards to Command Centres

It wasn't long ago that hospitals ran on clipboards, whiteboards and phone calls. A patient's medical records were stacks of paper stored in manila folders, and if they needed to see a specialist at another facility—or, worse, in another state—the process of transferring records was frustratingly slow. The shift to Electronic Medical Records (EMRs) was a game-changer. Suddenly, care teams could access real-time patient information, making it easier to coordinate care.

Now, we're seeing another major evolution. Today's health systems aren't just using EMRs for internal record-keeping—they're giving patients more control over their own health data. Patients can now transfer their medical history between providers, even across state lines, with just a few clicks. This transition puts the patient in the driver's seat, empowering them with access to their own records and making continuity of care smoother than ever before.

But technology is only part of the equation. What's really driving change in healthcare today is consumer demand.

The Rise of the Healthcare Consumer: Expectations Are Changing

If healthcare wants to keep up, it needs to take a hard look at how other industries—like retail and travel—are shaping consumer expectations. Think about Amazon, where people can browse, purchase and track deliveries in real time, all from an app. Or consider the airline industry, where travellers can book flights, choose seats, check in and receive updates—all without ever talking to an agent.

Consumers now expect the same level of convenience in their healthcare experience. But here's the problem: most health systems aren't keeping up.

- 94% of consumers want virtual healthcare options, yet nearly half of surveyed health systems are offering fewer virtual visits than two years ago.
- 24% of patients say they would switch providers to ensure access to virtual healthcare. (Deloitte 2024)

Healthcare isn't just about treating illnesses anymore—it's about delivering a seamless, digital-first experience that fits into people's lives.

The Challenge for Health Systems: Integrating AI and Automation

This level of transformation is not an easy task for hospitals. Unlike other industries that can switch platforms or update their customer experience tools with relative ease, there is no single software solution that can do everything in healthcare.

While most health systems have adopted standard EMRs, they now must evaluate additional AI-driven solutions for capacity planning, scheduling assistance, clinical decision support and workflow automation.

Adding to the complexity is the balance of transformational change teams with traditional IT departments. Many health system IT teams are structured around large, multi-year implementations, such as EMRs, and are not set up for an agile environment where small pilot programmes are tested, scaled and iterated upon.

Unlike static enterprise software, AI-driven solutions consistently improve over time—models evolve, new features are released, and updates require ongoing integration, governance and support.

Health systems are now grappling with how to manage innovation alongside operational stability. The need to bridge the gap between transformational teams and IT is one of the biggest challenges facing digital health adoption today.

Helping the Providers: AI-Powered Assistance for Clinicians

One of the biggest areas where AI is making a difference is reducing the administrative burden on providers. Take ambient listening technology, for example. Instead of physicians manually typing notes or dictating after hours, AI-powered ambient documentation tools listen in real time during patient visits.

At our institution, we've seen:

- A 27% reduction in outside-of-work charting time ("pyjama time"), allowing providers to have a better work-life balance.
- 37% faster closure of patient charts, leading to more accurate and timely billing.

Beyond documentation, AI also supports clinical decision-making. AI-powered clinical support tools can review a patient's medical history, lab results and symptoms alongside the latest medical literature, helping providers make more informed diagnosis and treatment decisions.

The Health System Command Centre of the Future: Beyond Hospital Walls

While AI-powered hospital command centres are game-changers, they're just the beginning. Healthcare is no longer just about what happens inside the hospital—we have to think about the entire patient journey. That means creating a health system command centre that connects physical and digital care in a way that actually makes life easier for patients and their caregivers.

Frances: Managing Chronic Conditions with Phygital Care

Frances lives in rural South Carolina, miles away from a major medical centre. He has type 2 diabetes and, twice a year, makes the long drive into the city to see his endocrinologist for an in-person check-up. But between those visits, a lot can happen—his blood sugar levels fluctuate, his medication needs adjusting, and sometimes he has questions but doesn't know whether they warrant a trip to the doctor.

Thanks to phygital healthcare solutions, Frances' continuous glucose monitor (CGM) sends real-time data

to a virtual care team monitored by the health system command centre. If his blood sugar levels fall out of range, an alert is triggered, and someone from the team proactively reaches out to check-in. Instead of waiting months for his next appointment, Frances can have a virtual consultation with a diabetes educator, who gives him guidance on food choices and medication adjustments.

When Frances does need an in-person visit, scheduling is seamless—his command centre team ensures that he gets an appointment that works with his travel schedule. And if something urgent comes up, he can have an on-demand virtual visit, preventing a trip to the ER.

Why This Matters: For patients like Frances, managing a chronic condition is more than just attending scheduled doctor visits—it's an ongoing, daily challenge. The ability to connect real-time health data with a proactive care team ensures that Frances isn't left guessing between appointments. He gets the right support when he needs it, without unnecessary delays or disruptions to his life.

> "Healthcare isn't just about treating illnesses anymore—it's about delivering a seamless, digital-first experience."

From a health system perspective, this approach reduces preventable ER visits, improves medication adherence and enhances patient engagement. Instead of reactive care that waits for problems to escalate, phygital solutions create a continuous care loop, keeping patients healthier while optimising healthcare resources. By blending digital tools with human support, this model ensures that patients like Frances receive the right care, at the right time, in the right place—whether that's at home, through a virtual visit or in a doctor's office.

Charlotte and Mike: Finding a Provider and Navigating Maternity Care

Charlotte and Mike had just moved to a new state when they found out they were expecting their first child. Excited but overwhelmed, they needed to find a doctor they could trust—one who took their insurance, spoke Mike's native language and had experience working with first-time parents.

Instead of endless phone calls and internet searches, they went to an interactive website powered by their health system's command centre. There, they were able to filter providers by location, availability, language and insurance, making it easy to find the right fit. They even got to watch short video introductions from different obstetricians, allowing them to feel a personal connection before making a decision.

Once they picked their doctor, scheduling online for their first appointment was simple. They received reminders about their appointment time, which included location information and even where to park. Because they were prompted by the reminder to complete all their paperwork in the app ahead of time, check-in was easy and they were taken into the exam room to meet with their provider and have an excellent in-person visit.

As they prepared to leave, their entire prenatal care plan was mapped out for them, with a mix of in-person visits for ultrasounds and virtual appointments for routine check-ins. They received reminders before each appointment and had access to a nurse navigator for any questions. Each month, Charlotte received an automated monthly care plan—sharing education and information relevant to that stage of her pregnancy. This provided additional resources and helped Charlotte stay connected with the care team. Instead of stress and uncertainty, Charlotte and Mike felt confident and supported from the start.

Why This Matters: Finding the right provider is one of the most important decisions an expecting family makes, yet the process is often overwhelming, full of guesswork and riddled with administrative hurdles. By integrating digital tools into the healthcare journey, health systems can empower patients like Charlotte and Mike to make informed choices, ensuring they feel confident from the start.

For health systems, a well-designed, AI-driven provider matching and maternity care navigation system leads to better patient engagement, improved prenatal care adherence and a stronger connection between patients and their providers. It also reduces appointment no-shows, optimises scheduling and ensures that expectant parents receive the guidance they need—when they need it—without unnecessary friction.

At its core, this approach makes maternity care more personalised, accessible and stress-free. By blending

digital convenience with human-centred care, health systems can ensure that every expecting parent—regardless of location, language, or experience level—feels informed, connected and prepared for the journey ahead.

Maria and Camila: A Seamless Transition from Emergency to Follow-Up Care

Maria rushed her mother, Camila, to the ER after she suddenly became dizzy and disoriented. The doctors quickly determined that it was a combination of dehydration and medication side effects, and after a few hours of IV fluids and monitoring, Camila was ready to go home.

Before they left, a nurse sat down with them to go over Camila's discharge plan, printed in both Spanish and English. Her follow-up appointments were already scheduled, eliminating the stress of having to call and book them later. Maria and Camila were also given clear explanations of their care options—some visits could be virtual, while others would require in-person check-ups.

Over the next few weeks, Maria received text message reminders in Spanish, allowing her to confirm, reschedule or cancel appointments with just a tap. When Camila needed physical therapy, the care team arranged for an in-home therapist to visit, reducing the burden on Maria. When Maria had questions about medication, a video call with a pharmacist was scheduled to ensure Camila was taking everything correctly.

Instead of feeling lost after leaving the hospital, Maria and Camila felt guided, supported and connected to a system that cared about them beyond the ER doors.

Why This Matters: A trip to the emergency room doesn't end when a patient is discharged. For many families, the real challenge begins once they get home—managing medications, scheduling follow-up care and figuring out the next steps. Without a clear and proactive plan, patients are at risk for complications, missed appointments and even preventable readmissions.

By integrating discharge planning with digital follow-up support, health systems can create a smoother, more coordinated transition from the hospital to home. Automated appointment scheduling removes barriers to follow-up care, while multilingual text reminders ensure that patients and caregivers stay informed in a way that works for them. Virtual visits and in-home services further reduce the strain on families, making it easier to access care without unnecessary travel or stress.

For health systems, this approach reduces ER return visits, improves patient adherence to care plans and enhances overall outcomes. More importantly, it fosters trust—showing patients and families that their care doesn't stop at the hospital doors. It continues in a way that is seamless, supportive and centred on their needs.

Sarah: Closing Care Gaps with AI-Driven Outreach

Sarah had always kept up with her annual mammograms—until the COVID-19 pandemic disrupted her routine. With everything else going on, scheduling a preventive screening had taken a back seat. Life got busy, months turned into years, and before she realised it, she was overdue for her next mammogram.

One evening, Sarah received a text message from her health system, reminding her that she was past due for her screening. The message wasn't just a generic alert—it was personalised to her, complete with a direct link to schedule her appointment online. No phone calls, no waiting on hold, just a simple click to book a time that worked for her.

At first, she hesitated. Nothing felt wrong, so was it really necessary? But the ease of scheduling made the decision simple. Within minutes, her appointment was confirmed.

Sarah wasn't alone. Across the health system, hundreds of women like her received similar notifications. Within the first 12 hours of launching the AI-driven outreach, 127 women had scheduled their mammograms—all without a single call from a staff member. Over time, this initiative led to more than 2,000 mammograms being scheduled, closing a critical care gap that had widened during the pandemic.

For Sarah, the AI-driven outreach turned out to be more than just a convenient reminder. Her mammogram detected an abnormality, something she never would have known without the screening. Because her appointment had been scheduled quickly, follow-up tests and treatment were initiated without delay. She was one of 181 women identified with abnormal results through this initiative—women whose conditions might have gone undetected for months or even years without proactive intervention.

Why this matters: This is where AI in healthcare isn't just about efficiency—it's about saving lives. By leveraging automation to engage patients at the right time, health systems can close gaps in preventive care, ensuring patients like Sarah receive the screenings they need before it's too late.

Emily's Journey: Transforming Specialty Care Referrals with AI Agents

For many patients, getting referred to a specialist feels less like a seamless healthcare journey and more like being handed an overwhelming homework assignment. Instead of a smooth handoff, they're left navigating a frustrating maze of research, scheduling challenges and insurance roadblocks—often with little guidance.

Take Emily, for example. She visits her primary care doctor for persistent stomach pain. After an evaluation, her doctor says, "You need to see a specialist." But beyond those words, Emily is on her own. She now has to figure out which specialist takes her insurance, is available and meets her needs. Then comes scheduling the appointment, only to learn she needs lab work before she can even be seen. That means finding a lab or imaging centre, dealing with insurance pre-approvals and waiting—sometimes for weeks—while a revenue cycle team manually enters her information into an insurer's portal. Even after all that, she has to follow up repeatedly just to make sure her prior authorisation is processed before it expires. And only then, after all the back and forth, can she finally see the specialist.

It's a tedious, frustrating process for patients like Emily. But it's just as painful for healthcare teams. Revenue cycle staff spend 15 to 30 minutes on each prior authorisation request, wading through long backlogs that delay patient care and add administrative burden. The entire system feels outdated—because it is.

The referral process has long been a pain point in healthcare, bogging down patients and providers alike. However, with AI-driven automation, patients like Emily no longer have to struggle alone through a fragmented system. Instead of a process filled with delays, roadblocks and uncertainty, referrals can now be streamlined, intuitive and proactive.

With AI-powered agents, everything changes. The moment Emily's primary care doctor submits a referral, AI steps in to take care of the details in real time. Instead of Emily scrambling to find a specialist, AI instantly identifies in-network providers that fit her insurance, availability and medical needs. It also checks if she needs labs, imaging or diagnostics before scheduling, ensuring nothing gets missed upfront.

From there, AI submits all necessary test orders and prior authorisation requests electronically to her insurance. Instead of waiting days—or weeks—the entire process is completed in under 30 seconds. Before Emily even leaves her doctor's office, she gets a text message letting her know that her referral has been processed, her insurance authorisation is approved, and she can book her lab tests directly through a link.

Once she completes her lab work, AI automatically notifies her specialist that her results are ready. Emily then receives a follow-up text with a direct link to schedule her appointment at a time that works for her. By the time she walks into the specialist's office, her test results are already in the system. There are no back-and-forth calls, delays or frustrating unknowns—just a smooth, coordinated healthcare experience.

Why This Matters: This isn't just about making things more efficient. It's about fundamentally changing the patient experience. By shifting from a reactive, fragmented model to a proactive, AI-powered approach, health systems can remove barriers to speciality care, make scheduling and approvals seamless, eliminate unnecessary delays and create a more intuitive, patient-centred experience.

> "Digital transformation in healthcare isn't about replacing traditional interactions—it's about enhancing them."

For patients like Emily, AI removes the stress and confusion that comes with navigating speciality care. It eliminates long wait times by processing everything in real time, ensures transparency at every step and creates a smooth, coordinated journey from primary care to a specialist.

For health systems, the benefits are just as significant. AI takes on the administrative workload, allowing staff to focus on complex cases instead of chasing down paperwork. It eliminates the backlog of prior authorisations, turning a process that used to take weeks into one that happens in seconds. Scheduling workflows improve, ensuring specialists see fully prepared patients, which makes visits more productive. And on the financial side, faster approvals mean fewer denials and quicker reimbursements.

The future of referrals isn't just more efficient—it's more human. By using AI to take on the administrative burdens that slow everything down, healthcare can finally focus on what matters most: getting patients the care they need, when they need it, without the hassle. The days of frustrating, disjointed referrals are ending, and AI is leading the way.

The goal is to create a seamless, cohesive experience where both digital and in-person workflows are equally supported, ensuring that every patient, regardless of their comfort with technology, receives great care.

For patients like Ken, we need to make sure our systems are built with flexibility in mind. That means maintaining well-trained staff to handle live calls,

> "The best healthcare system is one that meets patients where they are—whether that's through AI, a phone call or a friendly face at the front desk."

Meeting Patients Where They Are—The Story of Ken

In an era where digital tools are transforming healthcare access, it's easy to assume that every patient will embrace online scheduling, automated reminders and AI-powered voice assistants. But the reality is that digital isn't for everyone, and as healthcare leaders, we have to design systems that work for all patients—not just the ones who prefer technology.

Take Ken, for example. Ken is a long-time patient who still does things the way he always has. When he needs an appointment, he doesn't book online or use an AI-powered voice bot. Instead, he calls the access centre, listens impatiently as the automated system offers self-service options and immediately asks to speak to a live person. The morning of his appointment, he calls again—not to cancel, but just to confirm that it's still scheduled for that day and to ask where he should park.

When Ken arrives at the office, he bypasses the pre-registration texts he received and heads straight to the front desk. He asks for a clipboard because he prefers to fill out forms by hand. When it's time to pay, he pulls out his chequebook and writes a physical check at the counter. And before he leaves, he schedules his next appointment in person, carefully writing it down in his calendar.

Why This Matters: Ken's experience is a reminder that no matter how advanced our digital solutions become, there will always be patients who prefer the human touch and a familiar, physical experience. Digital transformation in healthcare isn't about replacing traditional interactions—it's about enhancing them.

ensuring front desk teams are ready to assist patients in person and keeping manual processes available for those who prefer them. At the same time, digital interactions need to integrate smoothly with in-person touchpoints so that whether a patient engages online, over the phone, or in the office, their experience is consistent and coordinated.

Healthcare is about meeting patients where they are, not forcing them into a single way of doing things. While digital advancements will continue to drive efficiency and convenience, the key to true transformation is recognising that some patients will always prefer the human connection. By designing an experience that respects both digital-first patients and those like Ken, we ensure that every patient gets the care they need in the way that works best for them.

Final Thoughts: The Future of Healthcare is Hybrid—Embracing Both Digital and Human Touch

The evolution of hospital command centres represents more than just an operational upgrade—it's a shift in how we think about delivering care. Healthcare is no longer confined to physical walls or defined by rigid workflows. Instead, it is moving toward a fluid, patient-centred model that blends the best of technology with the irreplaceable human touch.

AI and automation are already making healthcare more efficient, reducing wait times, eliminating administrative burdens and ensuring patients receive timely interventions. We use real-life patient journeys to plan the combination of technology and the human touch: Frances managing his diabetes with real-time digital monitoring, Charlotte and Mike seamlessly

navigating maternity care, Maria ensuring her mother's smooth transition from the ER to home, and Sarah receiving a life-saving mammogram thanks to AI-driven outreach. As we gradually integrate technology, these stories provide proof that digital transformation is making an impact. We should continue striving toward a fully integrated model—one that enhances the work of the care team and delivers an excellent experience for patients.

But as we innovate, we cannot forget patients like Ken—those who prefer traditional, human-driven experiences. The goal is not to force digital adoption but to create a seamless healthcare journey that accommodates all preferences. Whether a patient books an appointment through AI-powered scheduling or calls the front desk to speak with a person, their experience should feel connected, coordinated and easy.

The future of healthcare isn't just about going digital—it's about making healthcare work for everyone. That means expanding command centres beyond hospital walls, integrating AI and automation where it makes sense and ensuring providers have the tools they need to focus on patient care rather than administrative tasks. It's about designing a system that is intuitive, adaptable and, above all, human.

Healthcare isn't just about efficiency—it's about delivering better outcomes and experiences for patients, families and providers. The next generation of hospital command centres will not only optimise logistics but will shape the future of whole-person care. For health leaders, the challenge is clear: embrace the power of technology while ensuring no patient is left behind. The best healthcare system is one that meets patients where they are—whether that's through AI, a phone call or a friendly face at the front desk.

Conflict of Interest

None

references

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How Interoperability and Automation Are Reshaping Medication Management in European Hospital Pharmacies

European hospital pharmacies are undergoing digital transformation to enhance efficiency, patient safety and clinical outcomes. However, fragmented systems and a lack of interoperability hinder progress. The EAHP's Special Interest Group unites pharmacists and vendors to standardise data exchange, inspired by the DICOM model. This collaborative, phased effort aims to achieve vendor-neutral, plug-and-play automation and improve medication management across Europe.

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key points

- Hospital pharmacies face major challenges due to fragmented digital and automation systems.
- Interoperability is vital to improve efficiency, safety and staff productivity in pharmacies.
- The EAHP formed a Special Interest Group to drive standardisation and system integration.
- Experts propose a vendor-neutral model inspired by the DICOM standard in medical imaging.
- Collaboration among pharmacists, vendors and regulators is key to achieving seamless workflows.

When I was asked to write an article about Interoperability in hospital settings, I immediately thought about hospital pharmacies. Indeed, I could see firsthand the pain of lack of standardised interoperability in that domain during my collaboration with French e-health company Eurekam on chemotherapy monitoring solutions.

Digital transformation in hospital settings comes with its own unique organisational, change management and technological hurdles, so adding the resource- and time-consuming interoperability of digital solutions on top of these can be overwhelming.

There is no denying that the digital transformation of hospital pharmacies is accelerating, driven by the imperative to improve efficiency, enhance patient safety and optimise resource allocation. As in most hospital departments, pharmacies lack personnel. Digitisation and automation may be critical to alleviating this issue. However, this transformation is often hindered by fragmented software and automation systems that fail to communicate effectively, leading to inefficiencies, operational bottlenecks and increased risks.

During an EAHP (European Association of Hospital Pharmacists) conference in Florence last year, I was introduced to a newly formed Special Interest Group that aims to tackle the very issue of interoperability of digital systems in their working environment.

This Special Interest Group, organised by the EAHP and led by experts in hospital pharmacy, including Patrick Koch and Francine de Stoppelaar, has been actively working to address these challenges

by advocating for greater interoperability and standardisation in hospital pharmacy automation.

Francine and Patrick's insights on the one hand, combined with the perspective of solution vendors they put me in touch with, have provided a roadmap for a more connected, efficient and patient-centric hospital pharmacy system in Europe and beyond.

The Three Pillars of a Modern Hospital Pharmacy

Louis Bertin is a hospital pharmacist and Board Member of the European Association of Hospital Pharmacists (EAHP) and helped set up the EAHP's Special Interest Group (SIG) on digital solutions interoperability. Louis walked me through the overall context of hospital pharmacies' digital transformation to put the interoperability effort in perspective.

Louis identifies three fundamental pillars of hospital pharmacy: logistics, treatment preparation and clinical pharmacy. Each of these pillars plays a crucial role in ensuring patient safety and the effective delivery of pharmaceutical care. As Louis described it, the pyramid works somewhat like Maslow's pyramid of needs: it is easier to tackle the next level of the pyramid if you have covered the foundational levels below.

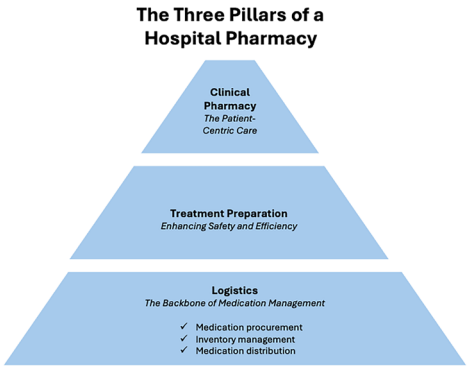

Figure 1. The Three Pillars of a Hospital Pharmacy. Source: Author's own work, based on the interview with Louis Bertin

1. Logistics: The Backbone of Medication Management

The logistical aspect of hospital pharmacies encompasses procurement, inventory management and medication distribution. Hospitals must maintain precise control over their medication stocks to prevent shortages or overstocking, both of which can have severe consequences. Digital inventory management systems have already revolutionised logistics by improving tracking accuracy and minimising waste. However, a lack of interoperability between hospital inventory systems and automated dispensing units, for example, often results in inefficiencies that could be avoided through better integration. Hospital pharmacists and technicians spend a sizeable amount of time and energy compensating for this, time that comes at the expense of their dedication to the next levels of the pyramid.

2. Treatment Preparation: Enhancing Safety and Efficiency

The preparation of treatments, particularly chemotherapy drugs and customised pediatric medications, requires extreme precision. Implementation of automation solutions has proved to improve safety by reducing human errors in compounding and dose calculation. For example, robotic systems and other monitoring systems for chemotherapy preparation are now being widely adopted to ensure the correct formulation and to protect pharmacists from hazardous exposure.

Nevertheless, without a standardised data exchange framework, communication between robotic systems and electronic health records (EHR) remains inconsistent, limiting their full potential.

3. Clinical Pharmacy: The Patient-Centric Care

The role of the hospital pharmacist is continuously evolving. Beyond dispensing medications, pharmacists are increasingly involved in direct patient care, collaborating with physicians to optimise prescriptions, identify drug interactions and adjust treatments based on laboratory results.

> "What DICOM achieved in imaging, we must now achieve in pharmacy automation. We need the same level of vendor-neutral, plug-and-play interoperability."

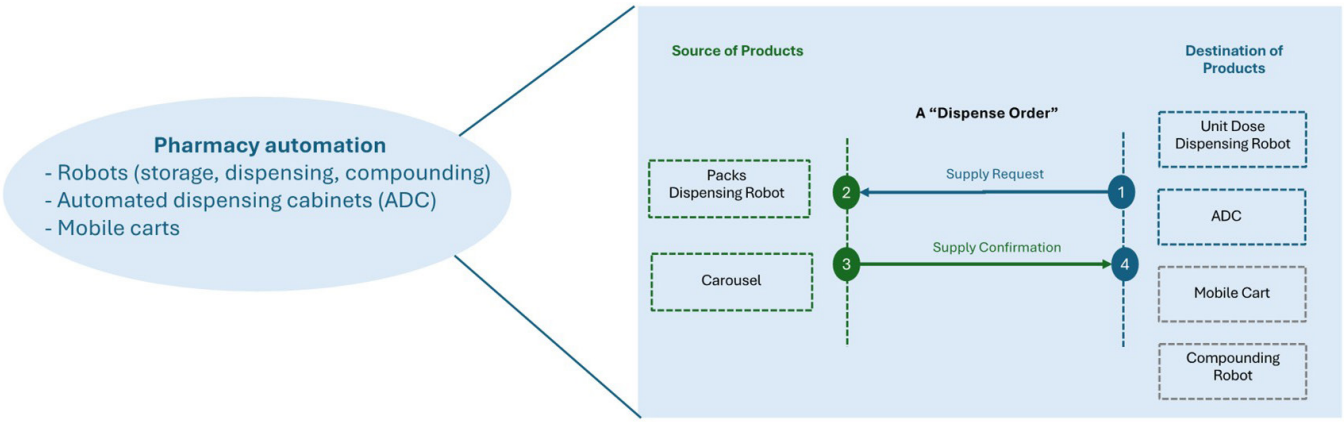

Figure 2. Hospital Pharmacy Interoperability Need: Interoperability amongst Pharmacy Systems. Source: European Association of Hospital Pharmacists (EAHP) – Special Interest Group on Interoperability. Reproduced with permission.

This is what some hospital pharmacists aspire to spend most of their time doing and the reason why they pursued this career. So, the more interoperability there is, the smoother and expedited the first two levels of the pyramid will be; the more hospital pharmacists will have time to dedicate to the high-added-value activities of clinical pharmacy.

And at this level again, the integration of AI-driven clinical decision support tools has the potential to significantly enhance these activities. However, for these tools to be truly effective, they also must be seamlessly integrated into hospital IT systems, enabling real-time data sharing and decision-making.

The Interoperability Challenge in Pharmacy Automation

Francine de Stoppelaar, Associate at Deloitte UK and Associate Professor at the University of Leicester, brings a wealth of experience in implementing fully digitalised hospital pharmacy models. Francine explained to me how her work at the Cleveland Clinic London revealed that whilst automation can bring significant benefits, the lack of interoperability between systems often diminishes their effectiveness. Francine is an expert in hospital digital transformation and its practical challenges. This made her particularly well suited to attack the next frontier of interoperability when joining the SIG project for hospital pharmacies as Co-Chair.

Breaking Down Silos in Hospital Automation

As Francine describes, in many hospitals, automated systems operate in isolation. Robotic dispensing units, unit-dose packaging machines and automated medication storage systems often function independently, requiring manual interventions to transfer medications between them. This fragmentation leads to delays, increased labour costs and a higher likelihood of errors. A unified digital framework that links these systems could eliminate redundant tasks and significantly improve operational efficiency.

Vendor Collaboration: A New Paradigm

When prompted to explain the absence of a unified framework, Francine points out that one of the key obstacles to achieving interoperability is the historical reluctance of automation vendors to collaborate.

This was not for bad intentions, but traditionally, each vendor has developed proprietary systems optimised for their own ecosystem, making cross-platform integration difficult as a consequence.

This is the reason why the EAHP formed this Special Interest Group (SIG) on interoperability. An overseeing group was needed to change this dynamic. By bringing together hospital pharmacists and automation vendors, the SIG is fostering dialogue aimed at developing universal standards for pharmacy automation.

Francine also notes that a significant breakthrough in this initiative has been twofold. Firstly, this is the first vendor-neutral collaborative platform of its kind, and secondly, each participating vendor has contributed financially, which has incentivised them to actively contribute to interoperability solutions. Nine leading vendors have currently joined the effort, marking a shift towards a more collaborative industry approach.

Adopting a pragmatic, phased approach, the EAHP Special Interest Group on Interoperability has chosen to focus first on resolving interoperability challenges within the hospital pharmacy's automation systems (as

illustrated in Figure 2). This initial step aims to ensure seamless communication between automated devices operating within the pharmacy perimeter. Once this internal interoperability is achieved, the group will turn to the next phase: integrating these systems with the broader hospital IT ecosystem (as shown in Figure 4).

To move from strategy to implementation, the SIG is working on clearly defined, real-world use cases—such as the interoperability between automated dispensing cabinets (ADCs) and pharmacy robots. These concrete scenarios form the basis for practical frameworks supporting seamless automation, as we will discover in the contribution from Patrick Koch.

> "Our goal is to deliver a vendor-neutral communication mechanism that any hospital in Europe can adopt."

Lessons from Other Sectors: Can DICOM Inspire Pharmacy Automation?

Patrick Koch, founder and CEO of Peka Consulting, is an independent consultant specialising in the digital transformation of medication management and the automation of hospital pharmacies. He brings his expertise in healthcare interoperability and co-leads the Special Interest Group (SIG) on Interoperability launched by EAHP in 2024.

With a background in medical imaging IT, including a tenure at Carestream, Patrick believes that hospital pharmacy automation can learn valuable lessons from the success of the DICOM (Digital Imaging and Communications in Medicine) standard. DICOM has enabled seamless communication between imaging devices and software from different vendors, reducing integration complexity and costs.

"What DICOM achieved in imaging, we must now achieve in pharmacy automation," Patrick explains. "We need the same level of vendor-neutral, plug-and-play interoperability."

Applying the DICOM Model to Pharmacy Automation

Patrick envisions a similar approach to drive integration across automated pharmacy equipment and pharmacy IT systems. This would require a close collaboration between vendors and hospital pharmacists, just as it happened in radiology during the development of DICOM:

- Standardised communication protocols between automation devices (robots, dispensing cabinets) and pharmacy IT systems, which not only enable system integration but also promote more standardised workflows within hospital pharmacy operations.
- A common data structure for medication records and prescriptions, based on existing healthcare standards like HL7, FHIR and IHE.

The Future of Pharmacy: Plug-and-Play Automation

To fully harness the benefits of automation, hospital pharmacies need a plug-and-play ecosystem – one where various systems and devices from different vendors can interoperate without custom development efforts for each project.

Patrick outlines a few key priorities to get there:

- **Standardising communication protocols across the board.** Just as DICOM structured data exchange in imaging, hospital pharmacies need a unified technical framework that dictates how data should be formatted, shared and interpreted.
- **Greater regulatory and policy support for interoperability.** Public authorities can act as catalysts by incentivising or mandating vendor-neutral approaches in procurement and regulation.
- **Shifting from siloed product offerings to vendor-neutral workflow integration.** Instead of promoting seamless integration only within their own product portfolios, vendors must align with a common, vendor-neutral communication protocol. This approach ensures that automation solutions can be integrated into broader hospital workflows, regardless of brand, enabling hospitals to build best-of-breed systems without being locked into a single vendor.

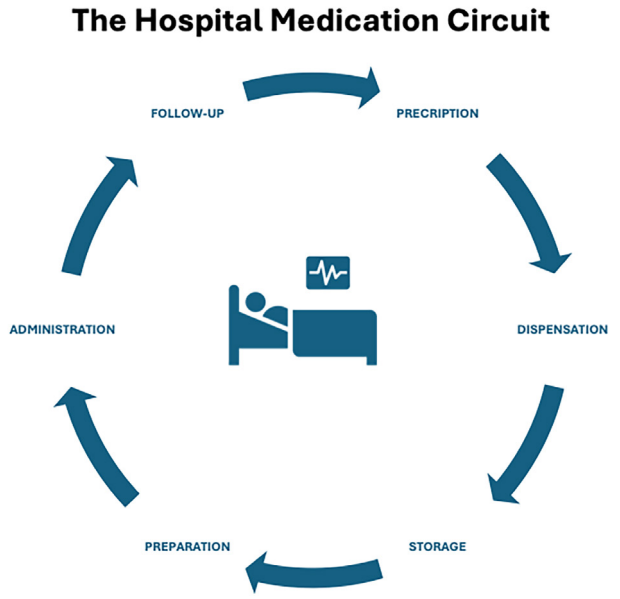

Figure 3. The Hospital Medication Circuit. Source: Author's own work

A European Initiative to Make It Happen

Through the EAHP Interoperability SIG, Patrick and a group of 12 hospital pharmacists and nine major automation vendors across Europe are taking action. Their mission is to define and test a standard communication protocol for the most common use cases, such as replenishing automated dispensing cabinets and producing unit doses.

"Our goal is to deliver a vendor-neutral communication mechanism that any hospital in Europe can adopt," Patrick concludes. "It's time to make medication management as seamless and safe as modern imaging has become."

The Vendor's Perspective: Opportunities, Hurdles and Strategic Directions

As hospital pharmacists navigate the real-world challenges of digital transformation, solution vendors are simultaneously grappling with the complexities of integration, regulation and fragmented market dynamics. As the task of creating new interoperability conditions is going to eventually fall on their shoulders, hearing about their perspective sheds additional light on the problem the group is trying to solve.

From large players like Becton Dickinson to niche specialists like Triatech specialising in Automated Dispensing Cabinets and Alphatron focused on the digitisation of the dispensing leg of the hospital medication circuit, vendors look at the problem from different angles but with a common motivation to turn interoperability from a constraint to an opportunity.

Interoperability—the seamless integration of different technologies and systems within a healthcare environment—emerges for these vendors as both a business imperative and a collaborative challenge, requiring not only technical solutions but also alignment across the entire ecosystem.

Three leading voices in the pharmacy automation space—Hakan Aya, CTO of Triatech; Stefan Soloman, Interoperability Lead at Becton Dickinson (BD); and Harald Verloop, CEO of Alphatron Medical—offered me their respective and valuable insights into how vendors are addressing the hurdles of interoperability and shaping strategic responses to unlock the full potential of automation in hospital pharmacies settings and beyond.

1. Hakan Aya: The Challenge of Interoperability in Pharmacy Automation

Hakan Aya's company, Triatech, specialises in automated dispensing cabinets (ADCs) for hospital pharmacies. Originally an electronics engineer with experience in medical devices, Hakan joined Simeks in 2004 as a partner, initially distributing ADCs in Turkey before developing their own line of systems in 2015 with the co-founded company Triatech under Stockart brand. Triatech now operates in 33 countries and is preparing to expand into North America. Aya's company focuses primarily on ADCs, with plans to explore other areas of pharmacy automation in the future.

Interoperability Challenges. Hakan explained to me the critical role of interoperability in the success of hospital pharmacy automation from his perspective as an ADC vendor. The integration of ADCs with hospital information systems (HIS), material management systems and billing systems is particularly challenging, as these systems often come from different vendors. In Turkey, where these systems are typically integrated into a single software, interoperability is less of an issue. However, in Europe and the US, the fragmented nature of hospital systems makes integration both complex and costly.

Hakan underlines that the integration of ADCs with other hospital systems is typically expensive and time-consuming, taking around 2 to 3 weeks per site. This process can account for 5 to 10% of the total project cost for small-sized projects, with hospitals bearing the brunt of the financial burden in many cases. The lack of standardised interoperability is therefore costing time and money on most projects, when these resources

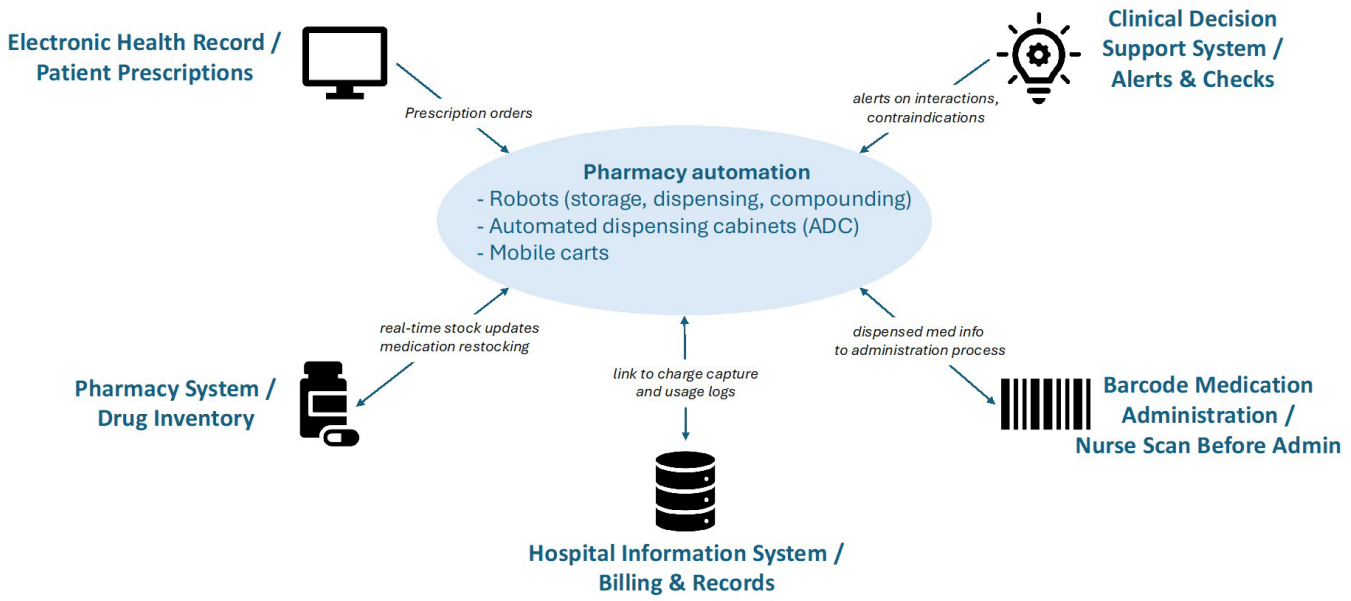

Figure 4. Hospital Pharmacy Interoperability Need: Pharmacy Systems Interoperability with Hospital IT Systems. Source: Author's own work

could have been utilised for innovation by vendors and for more equipment by hospitals instead.

The Future of Interoperability. Despite these challenges, Hakan shared with me his optimism about the future of interoperability, placing his hopes on the SIG where he is particularly active and invested.

Hakan believes that the industry's focus on improving interoperability will lead to smoother integration of different systems. With pre-designed interfaces for different devices, his company Triatech aims to reduce the complexity and cost of integration, making it easier for hospitals to adopt ADCs and other automated solutions.

Despite the slow progress in standardisation, Hakan is confident that the SIG initiative will provide a boost. He believes this industry-wide European initiative will ultimately foster a more interoperable healthcare ecosystem, enabling vendors and hospitals to achieve greater efficiency and lower costs. This effort is particularly important as Triatech looks to expand into the North American market, where interoperability is a critical consideration.

2. Stefan Soloman: Navigating the Fragmented Landscape of Medication Management

Regulatory and Technological Challenges. Stefan Soloman is the interoperability lead for medication management devices at Becton Dickinson (BD). Stefan provides another perspective on the challenges of interoperability in hospital pharmacies. Indeed, BD offers a wide range of devices, such as dispensing robots and infusion pumps, that play a central role in medication management. However, these devices cannot function effectively in isolation. They require integration with other hospital IT systems, such as Pharmacy Information Systems (PIS), Electronic Health Records (EHRs) and Electronic Medication Administration Records (EMARs).

Stefan emphasises that one of the primary challenges is the regulatory fragmentation across different countries. Unlike the telecom industry, where Stefan used to work and where global standards ensure seamless communication, healthcare systems have developed in a way that varies significantly by country. This has led to a situation where hospital systems and their accompanying technologies are highly fragmented, making interoperability a complex and expensive endeavour.

The lack of EU-wide regulations for interoperability means, in particular, that vendors must create solutions tailored to specific countries or hospitals. This has led to the development of "islands of innovation," where different systems work in isolation but do not communicate effectively with others. As a result, Stefan argues, the broader adoption of hospital automation technologies has been slower than expected.

BD's Role in Overcoming Fragmentation. BD recognises the importance of interoperability in enabling fully automated hospital workflows. However, achieving this goal requires collaboration between multiple stakeholders, including other medical device

vendors and healthcare IT companies. The challenge is compounded by competing vendor interests, as each company aims to maintain its competitive edge in the marketplace.

In this context, Stefan sees potential in early-stage collaboration among vendors to demonstrate that interoperability is a shared goal. Phase 1 of this effort, as he describes it, focuses on bringing together medical device vendors to agree on the importance of interoperability. This is what the SIG is currently realising through the building of a common understanding and goals.

> "Interoperability is not a luxury; it is a prerequisite for realising the full promise of automation."

However, the collaboration among medical device vendors is not enough to solve the problem entirely. As the next step, Stefan advocates for the inclusion of healthcare IT vendors (systems like Electronic Health Records, prescription software etc.), whose systems need to integrate with medical devices for effective medication management.

Long-Term Vision for Regulatory Standardisation. In the long term, Stefan believes that regulatory standardisation will be essential to achieving widespread interoperability. Keeping drawing on the analogy with the telecom and payments industries, Stefan envisions a future where EU-wide standards for interoperability are mandated, making it easier for new vendors to enter the market and ensure that their products are compatible with existing systems. This regulatory framework would reduce fragmentation and accelerate the adoption of new technologies across healthcare systems.

We should not reinvent the wheel: interoperability standards like HL7 and IHE already exist; they just need to be adopted and enforced by European regulatory authorities.

3. Harald Verloop: The Role of Pharmacy in Digital Transformation

Alphatron Medical and the Shift Toward Automation. Harald Verloop's company, Alphatron Medical, has been involved in medical technology for over 25 years, with a focus on imaging systems and medical IT. Alphatron's platform, which initially targeted nursing workflows, now includes pharmacy systems as part of the broader effort to automate hospital workflows.

During our discussion, Harald shared that while radiology and other hospital departments have made significant strides in digital transformation, pharmacy departments have been slower in adopting automation and interoperability solutions.

Barriers to Pharmacy's Digital Transformation. As I asked him the reasons for this delay, Harald shared the interesting insight that the pharmacy's slower involvement in interoperability efforts is due in part to the lack of a clear feedback loop. In fields like radiology, where immediate feedback on image quality is provided to the radiology department, integration into hospital workflows happens more quickly. However, pharmacy departments are focused on the clinical aspects of medication (personalising prescriptions, avoiding iatrogenesis etc.) with less emphasis on medication verification and administration, which are critical to ensuring patient safety. Indeed, pharmacists are responsible for the delivery of medications but not for their administration to patients, which is the responsibility of nurses. Therefore, multiple actors along the medication chain are in charge of the process steps under their watch without clear ownership of the final patient outcome.

Medication Errors and the Need for Closing the Loop. Harald highlights that a significant percentage of medication errors (around 38%) occur during the administration phase – the one where his company, Alphatron, is focused – often due to fragmented responsibilities between doctors, nurses and pharmacists. He argues that closing this loop by ensuring that pharmacists are integrated into the entire end-to-end medication process—from prescription to administration—can significantly reduce medication errors and improve patient care.

Vendor Perspectives and Standardised Frameworks. Alphatron, like other vendors, faces challenges in ensuring interoperability due to the fragmented nature of hospital systems and the need for collaboration with other stakeholders. Harald supports initiatives like the Integrating Healthcare Enterprise (IHE) framework, which provides a standardised approach to testing and certifying the interoperability of medical devices. By adhering to such frameworks, vendors can ensure

that their products communicate effectively with other systems, which is crucial for enabling integrated workflows.

Conclusion: Toward an Interoperable Future in Hospital Pharmacy

The convergence of insights from hospital stakeholders and solution vendors paints a detailed picture of the current state of hospital pharmacy automation. While hospitals highlight integration gaps and the resulting operational inefficiencies, vendors acknowledge these pain points and reveal the underlying structural and market-level constraints.

Interoperability is not a luxury; it is a prerequisite for realising the full promise of automation in healthcare. Addressing this challenge will require coordinated action across the ecosystem. Hospitals must insist on integration-ready technologies and invest in internal governance for digital transformation. Vendors must prioritise open standards and actively contribute to initiatives like this SIG and IHE. Policymakers and regulators should support the development of EU-wide interoperability mandates and certification frameworks.

Only through this shared commitment can automation efforts evolve from isolated successes into system-wide improvements in patient safety, operational efficiency and staff satisfaction, giving birth to much wider innovation and patient outcome improvement in the process.

Conflict of Interest

None

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Reinventing Health Systems from the Core: Integrating Data, Technology and Talent for the Future of Care

Health systems need transformation through integrated data, technology and talent. Key priorities include developing a future-ready workforce, strengthening public-private partnerships, ensuring data interoperability and fostering adaptive learning systems. Bold policy innovation is essential to support digital health, equity and sustainability, aiming to create resilient, patient-centred systems that evolve with emerging challenges.

ANCA DEL RÍO

Consultant Data and Digital Health | WHO Europe | Zurich, Switzerland

key points

- Health systems must integrate data, technology and talent for future resilience and efficiency.
- Workforce training should focus on AI literacy, digital health and adaptive leadership skills.
- Public-private partnerships need to shift towards co-creation for long-term, ethical innovation.
- Data interoperability is essential for seamless care delivery and advanced AI deployment.
- Policy innovation must enable flexible, anticipatory frameworks to support digital health solutions.

A New Mandate for Health Systems Innovation

The future of health systems will not be written by those who hold on to legacy models, but by those bold enough to reimagine their foundations. Amidst global shifts, geopolitical uncertainty, ageing populations, climate crises and pandemics, there is a universal imperative: make health systems resilient, efficient and patient-centred. But this transformation must go beyond digitisation for its own sake. It demands integration of systems, of technologies and above all, of people.

The mandate for innovation is no longer optional. While the last decade has seen exponential progress in health technologies, from wearable diagnostics to AI-powered decision support, the systemic fragmentation in how these innovations are deployed remains a critical bottleneck. Many digital tools are developed in silos, piloted in isolated care settings and rarely scale beyond initial implementation. Even more concerning is the widening gap between technology's potential and the readiness of health systems to integrate, govern and sustain its use.

Meanwhile, health systems across the globe are contending with a seismic shift in public expectations. Today's patients demand not only access to care but coordination, transparency and engagement. They expect data to follow them, decisions to be personalised

and services to be both digitally enabled and human-centred. Meeting these expectations requires more than procurement; it requires systems-level redesign.

This article explores five interdependent dimensions of health system innovation that are too often treated in isolation. First, we ask whether we are preparing our health and care workforce for the wrong future; one where AI, behavioural transformation and new roles redefine not just how care is delivered, but by whom. Next, we interrogate the role of public-private partnerships (PPPs): can we evolve from transactional vendor relationships to true co-creation hubs that foster sustainable, ethical innovation? From there, we address the foundational challenge of interoperability, arguably the most underappreciated and yet indispensable pillar of digital transformation. Without interoperable systems, health data remains locked in silos, impeding efficiency, safety and coordinated care. We then shift our focus to how systems can become learning entities, designed not just to operate but to evolve. Leveraging artificial intelligence and real-time analytics for dynamic decision-making may well be the hallmark of 21st-century health resilience. Finally, we turn to policy, not as a backdrop, but as a critical lever of innovation. Bold, anticipatory policies will be required to shape how digital health is governed, how care is financed and how equity is safeguarded in an increasingly tech-driven health landscape.

Health systems cannot afford to approach these challenges in isolation. The integration of advanced technologies, interoperability frameworks and talent development strategies must converge into a cohesive agenda. This article is both a provocation and a roadmap, a call for bolder leadership and smarter collaboration. It is a call to action for policymakers, healthcare leaders, private sector innovators and frontline workers to align on a new social contract for health.

Are We Training for the Wrong Future?

Across Europe and globally, healthcare workforces are under strain. Burnout, attrition and skill gaps are rising, particularly in digital readiness. While technologies like AI, robotics and predictive analytics offer potential to reduce burden, they also introduce new competencies that current training systems are ill-equipped to support.

We are witnessing a **Digital Health Workforce Revolution**, yet most capacity-building initiatives remain locked in outdated curricula and reactive upskilling. What we need instead is a proactive, system-wide approach to talent management, one that embraces **AI literacy, data fluency and adaptive leadership** as core competencies. Healthcare professionals must become confident users and co-creators of digital tools, not passive recipients. To get there, we must rethink how digital competencies are embedded across the professional journey, from education to leadership. This involves a fundamental shift in how we approach training, such as:

- Integrating digital health and data ethics into medical and nursing education.
- Promoting interdisciplinary learning across IT, policy and clinical care.
- Embedding resilience and digital adaptation in clinical training.
- Investing in leadership development focused on change management at all levels.

But even this is only the beginning. The very architecture of health and care workforce development must evolve to reflect hybrid career pathways that intersect public health, clinical care, technology and systems thinking. This means investing in new roles such as digital health navigators, clinical stewards, telehealth coordinators and AI interpreters, positions that bridge the gap between patient care and data systems. Certification frameworks should evolve to include modular, lifelong learning options that reward adaptability.

We must also confront structural inertia. Managers and mid-career professionals, who often serve as gatekeepers to innovation but receive the least targeted digital upskilling, play a pivotal role in digital adoption. The above mentioned, along the public sector leaders

> "A digitally empowered health and care workforce is central not only to implementing health innovation but to shaping it."

Pillar	Strategic Focus	Objective	Example Practice Area
1. Future-Ready Workforce	Embed digital literacy, AI ethics and adaptive leadership	Empower professionals to lead and sustain innovation	Modular training, hybrid roles
2. Co-Creation Ecosystems	Transition from vendor-based PPPs to co-designed innovation platforms	Generate scalable, context-aware digital solutions	Innovation hubs, cross-sectoral accelerators
3. Data Interoperability	Build open, transparent and shared health data infrastructure	Enable predictive care, integration and AI deployment	Public APIs, national health registries
4. Learning Health Systems	Institutionalise real-time analytics, evaluation and dynamic reconfiguration	Promote continuous system adaptation and operational efficiency	Dashboards, digital twins, agile planning
5. Policy Innovation	Design anticipatory, participatory and cross-sector regulatory frameworks	Align public value with innovation incentives	Regulatory sandboxes, open procurement

Table 1. Five Pillars of Health System Reinvention: A Strategic Framework for Digital Transformation.

require targeted support to become facilitators, not blockers of innovation by enabling new forms of credentialing and recognition (ie micro-certifications, on-the-job learning credits) and modular training formats that allow them to continuously adapt in fast-evolving environments.

Ultimately, preparing healthcare professionals for the future is about more than skills. It is about enabling agency, nurturing innovation culture and **making the health sector an attractive place to grow**, not just work. **A digitally empowered health and care workforce is central not only to implementing health innovation but to shaping it**. This behavioural transformation must be supported by structural change and investment in lifelong learning, certification pathways for hybrid roles (eg clinical data scientists) and modernisation of public sector recruitment and retention strategies. A future-ready health and care workforce is not only technically competent but behaviourally agile and ethically grounded. Empowering health professionals to lead innovation, not just survive it, is central to making digital transformation humane, inclusive and effective.

Interoperability is Not a Feature, It Is the Infrastructure

We cannot optimise what we do not connect. Despite years of investment, **true data interoperability** remains elusive across much of the health sector. Fragmented systems, legacy software and competing vendor standards continue to limit real-time data sharing. This lack of integration impacts everything from clinical decision support to population health management. It creates blind spots in care, inefficiencies in service delivery and systemic barriers to innovation.

Data interoperability must no longer be viewed as a technical aspiration but as a foundational pillar of health system architecture. Without a common framework for accessing, sharing and acting on health data, we cannot meaningfully deploy artificial intelligence, scale integrated care or build resilient systems. To unlock true interoperability and systemic transformation, health systems must adopt a strategic mindset that aligns governance, infrastructure and public trust. Achieving this requires three pivotal shifts:

1. **Governance before technology.** Interoperability is fundamentally a governance issue. It calls for enforceable, transparent policies at the national and regional levels. These frameworks must ensure ethical use, equitable access and long-term accountability, going beyond fragmented technical guidance toward a whole-of-government approach.
2. **Shared health data infrastructure.** Countries must invest in secure, scalable data platforms built on open standards, public APIs and vendor-neutral protocols. This includes national registries, clinical repositories and digital twins that can be accessed across settings. Interoperability should be a procurement condition and a compliance requirement, not a technical afterthought.
3. **Trust through transparency.** No data system can thrive without the trust of its users. Citizens must know how their data is collected, used, protected and governed. Clear communication, opt-in mechanisms and data stewardship models must be built into every digital health architecture.

When done right, interoperable systems are more than data highways, they are engines of transformation. They enable predictive analytics for population health, support AI-driven triage and decision support and facilitate cross-border coordination during public health emergencies. They also reduce waste, eliminate redundancy and create the foundation for continuous learning health systems.

Critically, interoperability is what makes innovation equitable. Without it, only the digitally mature systems benefit from AI and data analytics. With it, all systems, regardless of size or sophistication. gain access to smarter, safer, more coordinated care. For that to happen, we must prioritise simplicity and usability in regulation, ensuring standards are not just robust but also easy to navigate for developers and implementers alike. **Interoperability is not just infrastructure, it is the backbone of digital health transformation.**

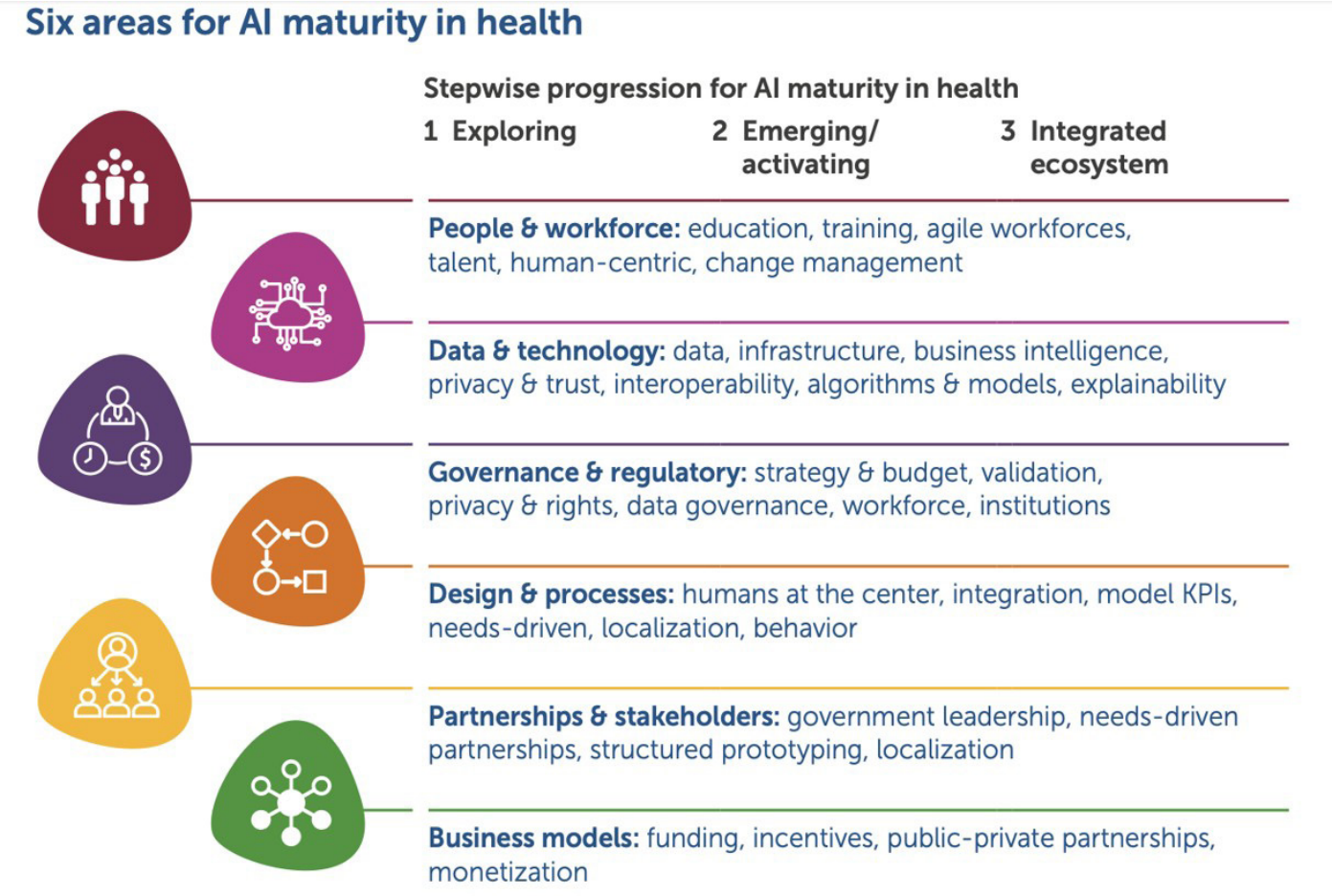

Figure 1. AI & Interoperability: A Roadmap to Systemic Impact. Source: Reimagining Global Health through Artificial Intelligence: A Roadmap to AI Maturity - Infographic. The Novartis Foundation.

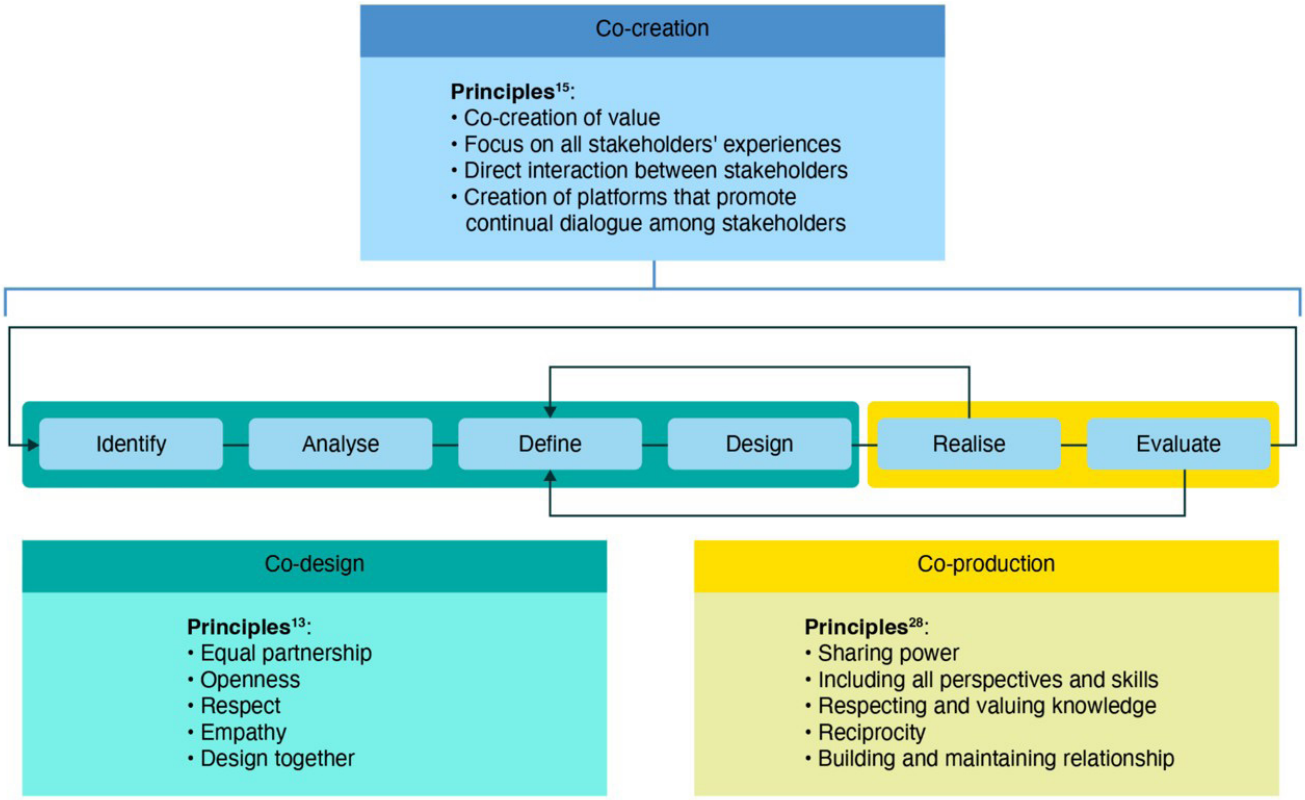

Figure 2. Model for co-creation of public health initiatives. Source: Palmer VJ (2022). Co-creation, co-design and co-production for public health: A perspective on definition and distinctions.

From Vendor Contracts to Innovation Hubs: Reimagining Public-Private Collaboration

For decades, public-private partnerships (PPPs) in healthcare have been defined by procurement and service outsourcing. Although these transactional models may address short-term operational needs, they often fail to harness the full creative potential of the private sector, fall short of ensuring long-term value for health systems or driving true innovation. Today's challenges ranging from system inefficiencies to digital inequities demand a new generation of partnerships grounded in trust, shared purpose and co-designed solutions. We need to move toward **Co-Creation Ecosystems:** flexible, ethically governed models where public institutions, tech innovators, healthcare providers and patients co-design solutions that respond to real-world system needs. These ecosystems are not merely contractual, they are relational. They build on mutual accountability, continuous learning and an alignment of public interest with entrepreneurial agility.

To truly redefine how we build meaningful partnerships across sectors, the next generation of PPPs must be anchored in a new set of values and operating models. These should reflect shared ownership, ethical co-creation and measurable impact. Some guiding principles include:

- **Transparency and shared risk** in design and implementation phases.
- **Open innovation platforms** where ideas can be tested before procurement.
- **Value-based metrics** that move beyond KPIs to measure systemic impact.
- **Inclusive governance**, with patient representatives and frontline workers at the table.

Reimagining PPPs also means embedding flexibility into partnership frameworks. Static contracts are misaligned to the fast-paced evolution of health technology. Instead, agreements should include iterative milestones, built-in review cycles and cross-sector working groups that foster adaptability.

Moreover, partnerships must address power asymmetries. Too often, smaller health systems and public entities are at a disadvantage in negotiations with large private sector actors. Creating pre-competitive collaboration spaces and neutral convening bodies ie WHO, European Commission platforms or national digital health agencies ie Innosuisse can ensure fairness and accountability in innovation agendas.

Innosuisse Health Innovation Booster: A Swiss Co-Creation Model in Action

Use Case Co-Creation in Health Innovation

Switzerland's Innosuisse-funded Health Innovation Booster exemplifies a next-generation PPP designed to foster system-responsive solutions. Through this initiative, universities, startups, hospitals and patient groups engage in a structured innovation process to address complex healthcare needs, ranging from chronic care redesign to digital health validation. Unlike traditional procurement, Innosuisse acts as a convener and enabler, offering funding and process facilitation but allowing stakeholders to define challenges and solutions collaboratively. This creates a sandbox for experimentation where early-stage concepts can mature before scaling. Crucially, the initiative focuses not just on commercialisation, but on long-term impact, equity and system readiness, offering a replicable model for co-creation ecosystems throughout Europe.

Equally critical is aligning funding streams with co-creation objectives. Blended financing combining public investment, donor funding and private sector resources, can de-risk early-stage development while maintaining public ownership of mission-driven solutions.

Policymakers play a pivotal role in creating enabling environments for these ecosystems balancing speed with accountability and economic opportunity with social value. WHO and other public institutions can play a catalytic role by defining ethical guidelines, offering convening power and strategic alignment with health equity, national agendas and sustainability goals.

The shift from vendors to value partners is not just a financial or operational reform, it is a cultural transformation. It is about recognising that the future of health innovation lies not in siloed procurement, but in purposeful collaboration rooted in public good.

Designing Systems That Learn and Adapt

Resilient health systems are not static, they evolve. The ability to adapt to new challenges, technologies and population needs is what distinguishes systems that merely survive from those that thrive. Future-proofing healthcare requires moving beyond linear improvement models to embrace **systems thinking and continuous learning loops**, structures that allow data, insights and innovations to feed back into policy and practice in real time. Central to this adaptive capacity is the integration of **real-time analytics and intelligence** into routine operations. Dashboards and data streams must inform decision-making at all levels, from clinical encounters to national planning. This supports rapid response during emergencies, enables predictive modelling for disease trends and enhances the efficiency of service delivery.

Artificial intelligence further expands the potential of learning systems. When responsibly deployed, AI can improve resource allocation, identify early-warning signals and assist in clinical decision support. However, to be effective, AI must be embedded into systems that are transparent, auditable and continuously monitored, not layered on top of fragmented or outdated infrastructures.

Another essential ingredient is **modularity**. Health services must be designed like ecosystems: flexible, interoperable and capable of rapid reconfiguration in response to demographic shifts, changing disease burdens or climate-related disruptions. This means modular care pathways, adjustable workforce models and facilities that support multi-purpose use.

> "Interoperability is not just infrastructure, it is the backbone of digital health transformation."

But technology and design alone are not enough. **Innovative financing mechanisms** are needed to support experimentation and scalability. Blended capital strategies, drawing from public, philanthropic and private sources, can fund pilot projects, de-risk innovations and build national capacity without reinforcing inequities. Equally important is embedding evaluation criteria that reflect long-term value, not just immediate outputs.

Learning health systems also require a **culture of collaboration and reflection.** Continuous improvement must be incentivised across the system. Providers, policymakers, data scientists and patients must be empowered to learn from one another, share insights and act on evidence.

Ultimately, designing systems that learn and adapt is not about chasing novelty, it is about institutionalising resilience. It is about creating the conditions for responsible innovation and systemic responsiveness. Health systems that embed learning as a core function will not only manage disruption, they will shape the future of care.

Policy Innovation as a Health System Imperative

Behind every breakthrough in care lies a bold policy. While policy has long been a powerful driver of health system reform, when thoughtfully designed and implemented, it can serve as both a catalyst for innovation and a safeguard for equity. Rather than seeing policy as a barrier or an afterthought, it may be more productive to frame it as the architecture that enables new care models to take root and scale sustainably.

In today's context of digital transformation, demographic shifts and mounting expectations for more responsive and inclusive care, there is value in reconsidering how policy is shaped. A **shift from reactive regulation** to forward-looking, enabling frameworks could create more **fertile ground for innovation** to emerge. This means exploring how policy can anticipate change, encourage experimentation and provide clarity in an increasingly complex ecosystem.

Some health systems are already exploring this approach by aligning digital health and sustainability strategies, linking procurement to open standards and embedding flexibility in policy cycles. Lessons from these experiences suggest that anticipatory policymaking doesn't require overhauling entire systems, it can start with targeted adjustments that reduce fragmentation and improve clarity.

For innovators and implementers alike, the consistency and navigability of regulation are just as important as its content. Simplifying complex or overlapping frameworks and offering practical guidance can make a significant difference in the ability of digital health solutions to scale, especially for smaller institutions or early-stage initiatives. Moreover, coordinated policy across sectors ie health, education, digital, energy and finance, can unlock new synergies and open opportunities for green healthcare facilities, cross-border health data exchange and hybrid workforce models supported by digital tools. Such a cross-sectoral perspective holds the promise to foster system-wide transformation rather than isolated innovation.

While governments should act as **architects of transformation**, not just regulators, policymakers should consider adopting more participatory models of policy design. Engaging those closest to service delivery (clinicians, patients, regional leaders) improves compliance and ensures that frameworks are grounded in operational realities and adaptable to local contexts. However, this requires forward-thinking policy frameworks that anticipate future needs and create the conditions for sustainable innovation (such as regulatory sandboxes). Examples of such transformative action include:

> "True transformation does not lie in fragmented reforms but in whole-system design."

- Mandating open standards in health IT procurement.
- Incentivising data sharing and use of decision support tools.
- Funding digital twins and predictive modelling for future hospitals.
- Promoting energy-efficient health and life sciences infrastructure as part of green transition plans.

Innovative policy is about creating conditions where responsible experimentation is not only allowed but encouraged. By promoting flexibility, coherence and inclusion, policy can evolve from a gatekeeper into a partner in system transformation. For those committed to building resilient, people-centred and digitally mature health systems, policy innovation is not a final step but a strategic starting point.

Time for Integrated Ambition

Health systems innovation is not about choosing between efficiency and equity, digital or human, it is about integration. The future belongs to systems that can connect technology with empathy, data with action

and public purpose with entrepreneurial energy. To do this, we must invest in people, rebuild trust in data and unlock collaboration across silos.

True transformation does not lie in fragmented reforms but in whole-system design. To fully realise the promise of AI, interoperable platforms and patient-centred innovation, health systems must build digital maturity from the inside out starting with shared governance, integrated workflows and long-term policy commitments. The next chapter of healthcare won't be led by software alone. It will be shaped by **leaders who see the system, listen to the front lines and are unafraid to redesign the architecture of care.** This demands courage from public officials, creativity from private innovators and unwavering advocacy from civil society.

In the face of growing uncertainty, we cannot afford to keep patching outdated models. We must pioneer frameworks that are dynamic, ethical and adaptable, designed to evolve as the world does. The future of health will be shaped by our capacity to innovate with integrity, to collaborate with clarity and to govern with foresight.

Conflict of Interest

None.

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Healthcare 4.0: Why Digital Transformation and Interoperability Are Key to Future-Proofing Hospital Management

Digital transformation and interoperability are reshaping hospital management by enhancing efficiency, improving patient care and breaking down data silos. Interoperable systems enable AI-driven insights, seamless data exchange and cybersecurity compliance. Despite challenges like high costs and resistance to change, strategic adoption of standardised solutions, staff training and cloud-based platforms can drive success. A digital-first approach is essential for future-ready healthcare institutions.

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key points

- Digital transformation improves efficiency, reduces costs and enhances patient care in hospitals.
- Interoperability ensures seamless data exchange, breaking down silos in healthcare systems.
- AI-powered analytics optimise decision-making, staffing and early disease detection.
- Cybersecurity and compliance are crucial as digital healthcare adoption accelerates.
- Standardised solutions and cloud platforms enable scalable, future-proof healthcare systems.

Introduction

The healthcare sector is undergoing a radical shift driven by digital transformation and interoperability. As hospitals and clinics strive to enhance patient-centred care, reduce inefficiencies and improve clinical decision-making, the integration of advanced digital solutions has become imperative. Interoperability is at the core of this shift, ensuring that various healthcare IT systems—such as Electronic Health Records (EHRs), telemedicine platforms, AI-driven diagnostics and remote monitoring devices—can communicate seamlessly. Without interoperability, data silos persist, creating inefficiencies, increasing costs and ultimately compromising patient outcomes.

This article explores how digital transformation and interoperability are reshaping hospital management, the challenges healthcare organisations face and the strategic steps leaders should take to future-proof their healthcare institutions.

The Need for Digital Transformation in Hospital Management

Hospital executives are under mounting pressure to enhance operational efficiency, reduce costs and improve patient care quality. Traditional, paper-based or disconnected digital systems are no longer sustainable in an era where data-driven decisions define organisational success. Several key areas benefit from digital transformation in hospital management, enabling both operational improvements and enhanced patient care:

1. Operational Efficiency and Cost Reduction

A well-implemented digital strategy streamlines administrative workflows, reduces duplication of efforts and minimises costly inefficiencies. For example, AI-powered predictive analytics can optimise staff scheduling, reducing labor costs while maintaining high-quality care.

Example: A study by McKinsey & Company found that hospitals leveraging AI-driven workforce optimisation achieved a 15% reduction in staffing costs without compromising patient satisfaction (McKinsey & Company 2022).

1. Breaking Down Data Silos

Many healthcare systems continue to operate in isolation, which leads to fragmented patient records and incomplete medical histories. Interoperability bridges these gaps, allowing real-time data exchange between laboratories, pharmacies, specialists and primary care providers. By breaking down these data silos, healthcare organisations can ensure that every provider involved in a patient's care has access to the most up-to-date and accurate information.

Example: A U. S. hospital network adopted FHIR (Fast Healthcare Interoperability Resources) standards, achieving a 40% improvement in information accessibility across departments, reducing unnecessary tests and accelerating treatment.

"Interoperability is pivotal in connecting digital healthcare systems and improving overall hospital performance."

2. Enhancing Clinical Decision-Making

With interoperable EHRs, physicians gain immediate access to comprehensive patient histories, diagnostic results and treatment plans. This facilitates more accurate and timely decision-making, helping clinicians provide better patient care.

Example: A hospital in Germany integrated AI-based decision support tools within its EHR system, which resulted in a 20% reduction in diagnostic errors and a 30% improvement in time-to-treatment for critical patients (Moazemi et al. 2023).

3. Improved Patient Experience and Engagement

Patients today expect seamless, technology-driven healthcare experiences, including digital appointment scheduling, telehealth consultations and real-time access to their medical records. Implementing patient portals that integrate directly with hospital systems enhances engagement and, in turn, improves health outcomes. By offering these digital solutions, hospitals demonstrate a commitment to innovation and patient satisfaction.

Interoperability: The Key to Seamless Healthcare Operations

Interoperability is pivotal in connecting digital healthcare systems and improving overall hospital performance. Without it, the full potential of digital transformation cannot be realised, and healthcare systems will remain fragmented.

2. Facilitating AI and Machine Learning Integration

Interoperability is essential for the effective deployment of AI-driven diagnostics and predictive analytics. These tools rely on vast amounts of structured data from multiple sources to deliver early disease detection, risk stratification and personalised treatment plans. Without interoperability, these AI systems cannot function effectively and healthcare organisations fail to unlock their full potential.

Example: A cancer research institute implemented interoperable AI analytics across its oncology departments, leading to a 25% increase in early-stage cancer detection rates (NITI Aayog 2018).

3. Strengthening Cybersecurity and Compliance

As digital transformation accelerates, cybersecurity threats become more prevalent. Ensuring data security while maintaining interoperability is crucial, especially in light of regulations such as GDPR (Europe) and HIPAA (U. S.). Implementing blockchain-based solutions for medical data exchange adds an extra layer of protection of sensitive patient information.

Challenges in Implementing Digital Transformation and Interoperability

Despite the significant benefits, the path to digital transformation in healthcare is not without its challenges.

Several barriers need to be addressed for organisations to fully leverage the potential of digital tools and systems, such as Electronic Health Records, AI and interoperable platforms:

- **High Implementation Costs.** Upgrading legacy systems and training personnel require significant investment.
- **Resistance to Change.** Hospital staff and administrators may be hesitant to adopt new digital workflows, especially when accustomed to traditional methods.

Ongoing education and support are critical to ensuring that hospital staff are equipped to leverage new tools effectively.

- **Leverage Cloud-Based Interoperability Platforms.** Cloud solutions offer scalability, security and seamless integration across healthcare networks, making it easier for organisations to adopt and scale new technologies..
- **Prioritise Cybersecurity Measures.** Hospitals must adopt zero-trust security frameworks to protect sensitive patient data.

> "Without interoperability, data silos persist, creating inefficiencies, increasing costs and ultimately compromising patient outcomes."

- **Data Standardisation Issues.** Many systems still use proprietary formats, making seamless integration difficult. Standardisation of data formats is essential to ensure that disparate systems can communicate effectively.
- **Cybersecurity Risks.** As more data is shared between healthcare providers, the risk of cyber threats increases. Robust cybersecurity frameworks are needed to safeguard patient data and ensure compliance with regulations.

Strategic Solutions for Overcoming Barriers

To overcome these challenges, healthcare leaders must take proactive steps:

- **Adopt Open-Source and Standardised Solutions.** Implementing FHIR, HL7 and DICOM standards ensures compatibility across systems, enabling seamless communication and data sharing.
- **Invest in Staff Training.** Digital transformation is as much about people as it is about technology.

Conclusion: A Digital-First Future for Healthcare

As hospitals navigate the complexities of modern healthcare, digital transformation and interoperability are no longer optional; they are business imperatives. By breaking down data silos, leveraging AI and ensuring seamless communication across healthcare systems, hospitals can improve operational efficiency, reduce costs and enhance patient care.

Healthcare leaders must take proactive steps today to invest in future-proof technologies that enable scalable, secure and interoperable systems. Those who fail to adapt risk falling behind in an increasingly data-driven, patient-centred industry. The future of healthcare lies in digital transformation, and those who embrace it will lead the way in improving both patient outcomes and organisational performance.

Conflict of Interest

None

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Mental Health in the Digital Era

Mental health is increasingly strained by digital pressures like social media, burnout and isolation, yet technology also offers new paths to care. From AI-driven apps to virtual therapy and support platforms, digital tools are transforming how emotional well-being is managed across all ages. Addressing the global mental health crisis requires not only innovation but also systemic change, funding and a collective commitment to treating mental health as a universal human right.

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key points

- Constant connectivity increases stress, anxiety and burnout across all age groups.
- Mental health apps offer scalable, accessible support for diverse needs.
- Children and older adults need tailored digital tools and guidance.
- Clinician burnout is rising, requiring tech-enabled peer support and reform.
- Mental health must be treated as a right, not a privilege, in policy and practice.

"Mental health… is not a destination, but a process. It's about how you drive, not where you're going." —Noam Shpancer, Clinical Psychologist

In the era of electric cars, artificial intelligence and an overwhelming digital presence, Mental Health Awareness Month invites us to reflect on a challenge that affects us all—mental health. It is more than a buzzword: it is a human right, a foundation of well-being. But before we discuss digital tools, modern pressures and mental health crises, we must ask: What is the mind? Is it simply neural activity? A field of experience? Or something more—spiritual, intangible deeply personal?

While neuroscience maps brain activity and psychology categorises behaviour, our subjective experience—the "I" that hopes, dreams, suffers—remains elusive. Descartes said, "I think, therefore I am," while modern neuroscientists describe consciousness as emerging from complex neural networks. Yet no theory fully explains what it means to be conscious. This mystery is even more relevant today, as artificial intelligence evolves and society seeks safeguards against unethical uses of digital tools, aiming for safe environments that protect mental well-being.

So, how do we care for something we don't fully understand? And how do we integrate that care into a digital age that empowers and overwhelms us? Technology has transformed how we live, but it has also intensified pressures on our mental health. Social media, AI and constant connectivity offer both solutions and new challenges. To navigate this paradox, we must approach mental health with humility, curiosity and a commitment to holistic care.

According to the World Health Organisation, mental health is *"a state of mental well-being that enables people to cope with the stresses of life, realise their abilities, learn well and work well, and contribute to their community."* It is both a personal and collective asset—essential to relationships, productivity and social contribution. Mental health is a basic human right and a foundation of socio-economic development (WHO 2022b).

It also exists on a continuum—not as a simple division between "healthy" and "ill." We all move along this spectrum throughout life, experiencing varying degrees of happiness, distress, function and resilience. Yet mental health remains undervalued, underfunded and stigmatised. Although WHO's Mental Health Action Plan

2013–2030 calls for stronger global infrastructure, the gap between need and access remains wide (WHO 2022a).

Mental Health in the 21st Century: A Global Crisis

The scope of the crisis is immense. Depression, anxiety, ADHD, eating disorders, burnout and loneliness have become widespread, and digital exposure often worsens or exposes these issues.

- One in eight people globally lives with a mental health condition—nearly 1 billion people (WHO 2022b).
- Depression is the top cause of disability worldwide, affecting 264 million people (WHO 2022b).
- Anxiety impacts 301 million globally, especially among youth (WHO 2022b).
- In the U.S., one in five adults faces mental illness yearly, but fewer than half receive treatment.
- Burnout affects 76% of workers in high-stress jobs, including healthcare and tech (National Alliance on Mental Illness 2023).
- Loneliness, often dubbed a "silent epidemic," affects 33% of adults worldwide, with rates even higher among older adults and adolescents (MasterMind 2025)

This paints a grim picture, but also an opportunity. According to McKinsey, mental health accounts for 290 million disability-adjusted life years but receives only 2% of global healthcare spending. Addressing the €186–€326 billion ($200–$350 billion) investment gap could reduce the burden by over 40% by 2050 (McKinsey Health Institute 2025). This is not just a health issue—it's also an economic and social imperative.

The digital era has deepened these challenges in unprecedented ways. While we're more connected than ever, we face new stressors: notifications, social comparison, information overload and eroded work-life boundaries. At the same time, digital innovation—from wellness apps to teletherapy—offers tools for care. The question remains: how do we harness tech's benefits while managing its risks?

The Digital Dilemma: Are We More Connected or More Distracted?

The Social Media Paradox reveals the scope of our digital immersion:

- Worldwide, an average person spends a total of 6 hours and 38 minutes looking at a screen each day (for internet-connected activities). This includes 2 hours and 21 minutes of scrolling through social media channels, 1 hour and 25 minutes of streaming music and 52 minutes of listening to podcasts. The majority of this time, 3 hours and 46 minutes, is spent on mobile devices (Moody 2025).
- The average American check their phone 159 times a day (Howarth 2025)
- Globally, 4 trillion hours are spent on social media annually (Howarth 2025)
- 46% of Americans watch more user-generated content than TV (Howarth 2025)
- There are approximately 5.31 billion social media user identities worldwide, accounting for 64.7% of the global population (even if this figure may include duplicate or non-human accounts) (Kepios 2025)

Social media is growing fast, with 241 million new users joining in a single year. How do these numbers affect our time, focus and mental state?

Nir Eyal, in *Indistractable*, explains how digital environments hijack attention. Distraction is not just caused by tech; it's driven by emotional discomfort. We don't simply get distracted—we seek it. Social media, designed to maximise engagement through dopamine loops, feeds this cycle, fostering compulsive behaviour (Eyal 2020).

> "Mental health is a basic human right and a foundation of socio-economic development."

This constant digital stimulation is not harmless. Excessive screen time and comparison culture have been linked to:

- 41% of Gen Z feeling anxious, sad or depressed due to social media (Pew Research Center 2023)
- 70% of adults experiencing sleep issues from screens before bed (Sleep Foundation 2023)
- A 50% rise in depression among teenage girls tied to social media (Journal of Adolescent Health 2022).

- Loneliness and decreased real-world interaction, with 1 in 4 young adults reporting feelings of isolation despite being "connected" online (Fleck 2025).
- 69% of remote workers report increased burnout from digital communication tools (Haan 2024)

Social media promises connection but often delivers isolation. It offers inspiration but breeds comparison. It gives information but drowns us in noise. The challenge is not to reject technology, but to use it wisely—to support mental health rather than harm it.

Mental Health Across Life Stages: A Digital Lifeline?

Our mental health needs evolve with life's stages, and digital tools are increasingly stepping in to offer support that is personalised, accessible and effective. From early childhood through to later life, technology can help bridge gaps in access and improve emotional well-being.

As mental well-being is increasingly being prioritised, mental health apps are likely to have been chosen by many as their ultimate tool when looking for support. According to the National Library of Medicine, approximately 20,000 wellness apps are currently being made available, designed to address a wide range of needs (Wilhelm 2025). But with so many options, we need to know how to identify the most suitable app based on our specific need, age, gender, on their reputation and clinical validation, efficacy and how they protect our health privacy.

> "The challenge is not to reject technology, but to use it wisely—to support mental health rather than harm it."

The overwhelming number of mental health apps available online makes it difficult to distinguish between the good and the not-so-effective ones. In this article, I will highlight only a few of the most reliable, interesting and promising examples.

General Population

Mental health issues such as stress, anxiety, insomnia and burnout are now widespread, driven by work demands, digital overload and lifestyle stressors. The global mental health apps market, valued at €7.93 billion ($8.53 billion) in 2025, is expected to grow to €33.89 billion ($36.44 billion) by 2034 (Precedence Research 2025; Mental Health Market 2025). Apps like **Headspace** and **Calm** have become household names, offering mindfulness and sleep support. **Woebot** uses conversational AI grounded in CBT to deliver personalised emotional care. Platforms like **BetterHelp** and **Talkspace** connect users to therapists via text or video, lowering the barrier to access. Meanwhile, **BeLight** and **Zenbox** integrate neuroscience and biofeedback to manage stress through breathing, light and sound. **MindMics**, with its wearable tech, offers heart health tracking to support emotional regulation.

Children & Adolescents

The youth mental health crisis is deepening. One in six U.S. children aged 6–17 has a mental health disorder and suicide is the second leading cause of death for those aged 10–14 (NAMI 2023; Swedo 2021). Screen time, cyberbullying and social media pressure are major contributing factors, with 59% of teens reporting online harassment (Pew 2023; Khalaf 2023). **Poppins**, an AI-assisted, gamified app for neurodivergent children, supports task management and emotional regulation. **Smilamind** offers evidence-based, scalable solutions to treat the right child at the right time. **BeLight**, with child-specific features like storytelling and guided breathing, promotes emotional literacy. These tools must be used in tandem with parental oversight, educator support and digital media education.

Women

Women experience unique mental health challenges tied to biology and social roles. PMDD affects 5–8% of women, and 1 in 7 mothers experience postpartum depression (Mishra et al. 2023; PSI 2023). Hormonal transitions during menopause can trigger anxiety, mood swings and cognitive changes. Apps like **Clue** help track cycles and mood patterns, aiding diagnosis and advocacy. **The PSI App** provides access to peer support and teletherapy for postpartum struggles. **Stella** supports women through menopause with symptom tracking and lifestyle guidance. While **Woebot** is not gender-specific, it is particularly effective for women during hormonal transitions. Inclusivity, cultural sensitivity and affordability remain vital for widespread adoption.

Older Adults

Mental health among seniors is often overlooked, yet loneliness and cognitive decline are growing concerns. Globally, 43% of adults over 60 reports feeling isolated, a known risk factor for depression and dementia (Cigna 2023). Cognitive conditions like Alzheimer's affect 55 million people and are expected to triple by 2050 (WHO 2022b). **GrandPad** offers a senior-friendly interface for video calls and telehealth. **CogniFit** and **Cogniclear VR** provide cognitive assessment and training in immersive formats.

Virtuleap uses VR to enhance memory and focus. Designing for digital literacy and physical accessibility is essential to ensure these tools serve this population effectively.

Digital Tools for Mental Health Professionals

There are far more people in need of mental health treatment than current services can accommodate—many of whom face complex challenges that cannot be addressed by self-help tools alone. While public discourse often centres on patients, the mental health professionals who support them are under immense strain. High caseloads, emotional fatigue and systemic barriers are pushing many clinicians toward burnout.

Mental health professionals frequently see 30 to 40 patients each week, often with limited time for self-care or supervision. According to the American Psychological Association, 60% of therapists report symptoms of burnout, including exhaustion, cynicism and diminished empathy. These issues are compounded by systemic problems such as inadequate funding, excessive administrative burdens and a lack of peer support networks. As Jodie Green of the Clinician Burnout Foundation notes, "Burnout is no longer the exception—it's the norm in high-demand mental health environments." Mental health struggles don't pause while people wait for care and professionals themselves need support to continue providing effective treatment (Clinician Burnout Foundation 2025).

In response, a number of digital tools have emerged to support clinicians. Iluria, though initially designed for caregivers, offers valuable features for professionals, including anonymous journaling, peer support networks and access to emergency resources. These tools help reduce isolation and provide a space for processing stress. Another platform, Thera-Link, streamlines telehealth delivery with secure video sessions and built-in tools for self-care, including mindfulness exercises and burnout assessments.

Virtual coaching and supervision networks are also gaining traction across Europe, especially in countries like Germany and Switzerland. Platforms such as CoachHub, Kajabi, Noomii and Mighty Networks allow mental health professionals to connect, share experiences, access training and receive mentorship. These resources foster a sense of community and help clinicians feel better equipped to manage the demands of their roles.

> "The mind, with all its complexity and mystery, remains at the heart of this conversation."

Addressing burnout among mental health professionals requires more than just technology—it calls for systemic reform. But digital tools, when thoughtfully designed and responsibly used, can play a vital role in supporting the well-being of those who care for others.

Conclusion: Co-Creating the Future of Mental Health

As we reflect on Mental Health Awareness Month, it's clear that the digital era offers both challenges and opportunities for mental health. The mind, with all its complexity and mystery, remains at the heart of this conversation. While we may not fully understand consciousness, we can—and must—care for it, using every tool at our disposal to support well-being across the lifespan.

The mental health crisis is a global challenge, but it's also a global opportunity. By investing in digital solutions, we can bridge gaps in access, reduce stigma and empower individuals to take charge of their mental health. From apps for children to platforms for older adults, from coaching networks to virtual therapy, technology is transforming how we approach mental well-being. Yet, technology alone is not enough. We need systemic change—more funding, better policies and stronger communities—to ensure that mental health is truly a human right, not a privilege. The meaningful

change happens when we work together—clinicians, technologists, policymakers and individuals with lived experience—listening, learning and building solutions as a community. But this transformation requires action, not just awareness.

Let's commit to a future where mental health is prioritised, where digital tools are used responsibly and where no one is left behind. Let's ask ourselves: *How can we co-create a world where the mind—our most precious and enigmatic resource—is nurtured, protected and celebrated?* The answer lies in our collective efforts, our willingness to innovate and our unwavering belief in the power of connection, compassion and care.

Conflict of Interest

None.

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Prime Plus provides the most clinical value of any blood gas/critical care analyzer profile by adding essential tests for kidney function (Urea, Creatinine, eGFR), plasma volume (ePV), ionized magnesium (iMg) and MCHC.

Creatinine, eGFR, and Urea

Over 50% of patients admitted to the ICU develop some degree of acute kidney injury.[1] Creatinine, eGFR, and Urea monitoring provides indication of changes in kidney function and helps guide therapy to prevent AKI.

Estimated Plasma Volume (ePV)

The plasma volume status of a patient is one of the top priorities in evaluating and treating critical illness including CHF, ARDS, AKI, and Sepsis.[2-4]

Ionized Magnesium (iMg)

Hypomagnesemia is a frequent finding in critically ill patients.[5] Magnesium therapy guided by real time ionized magnesium monitoring has been shown to improve outcome in these patients.[6]

Mean Corpuscular Hemoglobin Concentration (MCHC)

Helps differentiate types of anemia.

Test Menu:

pH PCO_2 PO_2 SO_2% Hct Hb MCHC Na K Cl TCO_2
iCa iMg Glu Lac Urea Creat CO-Ox tBil HbF

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Decision Support

Advancing Early Alzheimer's Detection with LucentAD® Complete

LucentAD® Complete is a blood-based test that helps detect Alzheimer's disease early using multiple biomarkers and a proprietary algorithm. Powered by Simoa® technology, it offers a non-invasive, accessible alternative to traditional methods. Available as an LDT, it supports clinical decision-making and streamlines trial recruitment by identifying individuals in early stages.

CHRISTIAN MAROLT

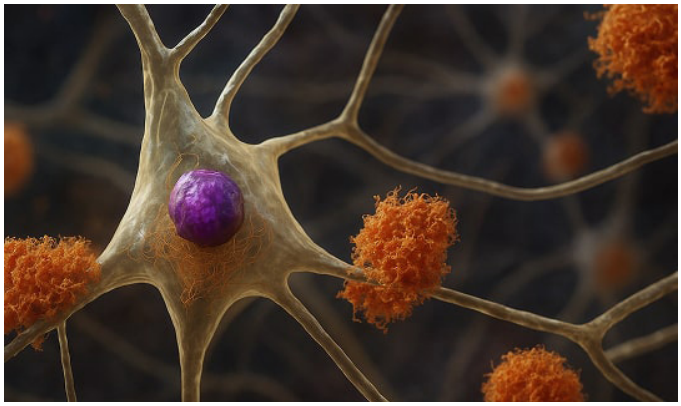
Executive & Editorial Director | HealthManagement.org | Limassol, Cyprus

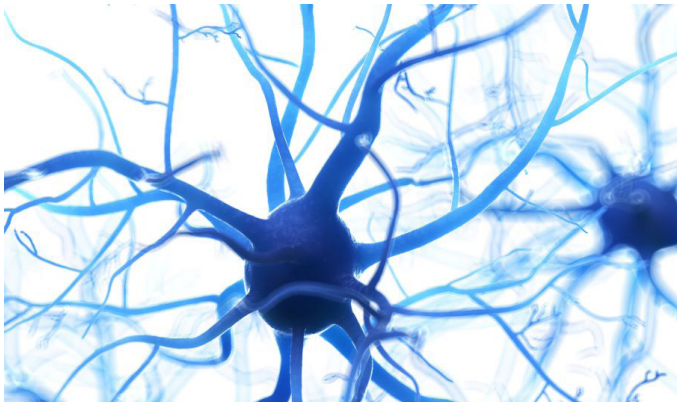
key points

- LucentAD® Complete enables early Alzheimer's detection using blood-based biomarkers.
- The test uses Simoa® technology and a proprietary algorithm for accurate results.
- It offers a non-invasive, accessible alternative to PET scans and CSF analysis.
- It aids clinical trials by identifying early-stage participants for new therapies.
- Available as an LDT, it supports immediate clinical decision-making and referrals.

Alzheimer's disease remains a growing global health crisis, with nearly 7 million Americans currently living with the disease—a figure expected to double by 2050. As the population ages and new therapies like Leqembi and Kisunla gain approval for early-stage intervention, the demand for practical, accessible diagnostic tools has never been more urgent. Traditional diagnostic methods, such as positron emission tomography (PET) imaging and cerebrospinal fluid (CSF) analysis, remain effective but are often costly, invasive and logistically challenging.

LucentAD® Complete is a multi-analyte, algorithmic blood test designed to provide clinicians with a practical, non-invasive tool for assessing Alzheimer's risk with high diagnostic accuracy. Powered by Quanterix's Simoa® HD-X technology, LucentAD® Complete combines





biomarkers including p-Tau 217, Aß40, Aß42, GFAP and NfL through a proprietary algorithm to deliver precise and actionable insights.

Although Quanterix is actively pursuing FDA approval for the underlying technology, LucentAD® Complete is already delivering value to clinicians and researchers today. Its immediate availability provides a much-needed resource for those working to address Alzheimer's disease at its earliest stages.

> "LucentAD® Complete brings Alzheimer's detection out of the lab and into everyday clinical practice — early, accessible and scalable."

Available today as a laboratory-developed test (LDT), LucentAD® Complete offers clinicians immediate access to its capabilities. This accessibility is particularly valuable in clinical environments where early intervention can significantly impact patient outcomes. From primary care settings to specialised neurology practices, the test provides actionable insights that can guide clinical decision-making and streamline patient referrals for advanced diagnostic evaluation.

Beyond routine clinical use, LucentAD® Complete is also proving invaluable in clinical research settings, particularly for the recruitment and stratification of participants in Alzheimer's clinical trials. Therapies targeting the earliest stages of Alzheimer's disease require diagnostic tools capable of identifying potential trial candidates early enough to achieve meaningful therapeutic benefit. Traditional diagnostics, while effective, are often impractical for large-scale screening due to their invasiveness, expense and logistical challenges.

LucentAD® Complete addresses these limitations by offering a scalable, blood-based alternative that can be readily integrated into clinical trials. Its ability to accurately identify amyloid-positive individuals early in the disease process supports more efficient patient selection and enhances data quality. For researchers evaluating new therapies aimed at slowing or halting Alzheimer's progression, the availability of a reliable diagnostic tool that can be deployed widely is essential.

To gain a deeper understanding of LucentAD® Complete's clinical utility, applications and analytical validation, download the full white paper at LucentDiagnostics.com.

Conflict of Interest

Spotlight articles are the sole opinion of the author(s), and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

Sustainability

Healthcare Systems Facing Climate Change: From Preparedness to Emergency Preparedness

In light of the increased frequency and intensity of extreme weather events, a resilient health system shouldn't just bounce back to its previous state after a crisis; it should learn and transform to be better prepared for future challenges. A proactive and comprehensive approach are key steps for realising climate-ready healthcare systems as accountable factors of strength for communities.

PROF. ARCH. SIMONA GANASSI AGGER

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key points

- The European Green Deal is an ambitious plan to address climate change and environmental challenges while fostering economic growth and social progress. The primary objective is to achieve net-zero greenhouse gas emissions by 2050.
- One Health Approach is a holistic and interdisciplinary framework that recognises the interconnectedness of the health of humans, animals, plants, and their shared environment.
- Sustainability is well-being and meeting today's needs without compromising tomorrow.
- Adaptation is the proactive adjustments and changes made to existing systems to minimise the negative impacts of climate change.
- Mitigation refers to actions taken to reduce the causes and severity of potential negative impacts in the immediate operational sense and in the long-term context of broader challenges like climate change.
- Resilience is the ability of systems to proactively foresee, absorb, adapt to, and recover from shocks and stresses while continuing to provide essential healthcare services.
- Redundancy in healthcare facilities refers to the practice of having backup options or alternatives in place to ensure the continuity of care.

Framework

The global landscape of human health is increasingly shaped by the pervasive and intensifying impacts of climate change. Scientists and researchers are deeply realistic about the devastating social effects of war-related environmental destruction and pollution, but they are especially pessimistic with regard to the parallel environmental situation, with rising average temperatures and related consequences, coupled with a greater frequency and severity of extreme weather events - no longer abstract projections but tangible realities. Taking all this into consideration, it is evident that there is now an even stronger need to increase attention on environmental problems and their impact on human and environmental health, stressing the danger of abandoning if not in words, in actions, the crucial 'One Health' approach and attacking the 'Green Deal' vision.

The environmental shifts are not only causing direct harm through events like heatwaves and floods but are also exacerbating existing health vulnerabilities and creating new public health challenges. The potential for a significant surge in mortality and economic losses by mid-century underscores the critical need for immediate and comprehensive action across all sectors, with healthcare systems occupying a central and indispensable role. The human tragedies developing in

this dark period of history can't diminish the effort to fight climate change and protect human and environmental health.

A paradigm shift towards proactive, ready for emergencies, preparedness is not merely advisable but absolutely essential for safeguarding public health in the 21st century. The considerations that will be exposed, will address some points, with regard to healthcare systems and, in particular, the healthcare facilities.

The Path Towards Understanding the Threats of Climate Change

Climate change has a wide array of impacts on human health, both directly through immediate consequences of altered environmental conditions and indirectly through complex ecological and social pathways. It can be seen as a stress test that hits all the pillars of the healthcare system. It is certainly of some relevance to see the difficult path to reach a comprehensive nexus between climate, human health and its critical pillar: the healthcare system.

The first alert about changes in the composition of the atmosphere and their negative effects was in the late 19th century when the Swedish scientist Svante Arrhenius, in 1896, wrote about the greenhouse effect and predicted that changes in atmospheric carbon dioxide levels could significantly impact Earth's surface temperature, a concept central to modern climate science. In 1958, American scientist Charles David Keeling proposed the Keeling Curve, which provided clear evidence of rising atmospheric CO2 levels. Early climate models began to predict the consequences of these increases. In 1988, NASA scientist James Hansen's testimony to the U.S. senate brought the term "global warming" into widespread public consciousness, highlighting the potential of climate change to impact weather patterns.

The negative aspects of global warming started to draw significant attention and reaction outside of the scientific world and brought as the first important action with the production of the Kyoto Protocol signed at the United Nations Convention on Climate Change of 1992, in parallel with initiatives such as the Conference of the Parties (COP) in the framework of the United Nations Framework Convention on Climate Change (UNFCCC) focusing on global climate policies and actions. The COP, held in Paris in 2015, was and is a legally binding international treaty on climate change, the point of reference for the environment and health global policies. Relevant was the creation of the Intergovernmental Panel on Climate Change (IPCC), the United Nations body for assessing the science related to climate change. IPCC, since 2001, provided "policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options."

One of the most important actions was the launch by WHO with the World Bank and UNFCCC of the "2008-2009 Disaster Reduction Campaign". This action was, in fact, of great relevance for the healthcare system, specifically for its facilities. It was focused on the theme "Hospitals Safe from Disasters: Reduce Risk, Protect Health Facilities, Save Lives."

Among the main goals of the campaign were:

- Raising awareness globally about the critical goal of protecting health facilities from natural hazards.
- Advocating for policy changes and increased investments to make hospitals and health services more resilient, encouraging the development of national strategies and plans for hospital safety in disaster-prone areas.
- Providing tools and resources to support governments, health professionals, and communities in reducing risks to health infrastructure.
- Facilitating knowledge sharing and the dissemination of good practices in making hospitals safe.
- Producing and disseminate information materials, including campaign kits, flyers.
- Promoting the implementation of the Hyogo Framework for Action (2005-2015) in the health sector.

The Global Vulnerability of Health Facilities

In parallel with the awareness of the climate change impact, in the first decade of the new millennium, the physical disasters produced by such impacts started to become known universally, outside the scientific and policy-managerial world of health, and with them, the aspect of the recognitions of the vulnerability of the health facilities. The media also conveyed to the general public the effect of Hurricane Katrina (2005) that resulted, in addition to 1500 deaths, the destruction of a number of hospitals. Other disasters involved hospitals due to excessive winds and storms, as well as big fires resulting from the cascade effects of hospital disruptions produced by hurricanes. Another event that was highly publicised was in 2017, in Texas, when Hurricane Harris damaged healthcare infrastructure, causing the evacuation of several hospitals.

In Europe, the event that gave evidence of another critical aspect impacting the healthcare facilities' functionality was the 2003 heat wave that swept a large part of Northern Europe and resulted in more than 70,000 deaths, mostly among elderly, fragile people of the lower social strata of the society. In these specific cases, the health facilities failed to assist the increased number of persons needing help and people with specific problems affecting the respiratory system.

The most relevant aspects of vulnerability in the European area were and still are related to floods and excess precipitations. In 2002, the media started to give relevance to the extent and scope of severe damages produced by the main European rivers. In a major report published in 2013, the International Commission for the Protection of the Danube River listed eight countries in Central Europe hit by floods. The catastrophic Storm Boris in September 2024 caused widespread flooding across Central and Eastern Europe. A new word entered in the ordinary vocabulary - Medcanes, a new type of storm hitting the Mediterranean area. Heat waves, droughts, flooding and wildfires highlighted the weakness in healthcare facilities mostly in terms of functionality and support for the increase in the number of services.

The major considerations about the physical conditions of the hospitals in Europe were related to the patient's protection. For example, it was noticed that exceptionally strong winds could destroy windows and generate problems with the safety or comfort of hospitalised patients. Could these facts allow the conclusion that European hospitals have a high level of resilience with regard to climate risks?
The scarcity of data in this regard should prudently leave the question open. Many publications of the European Environment Agency (EEA) and a recent study give a different picture. The 2023 XDI Global Hospital Infrastructure Physical Climate Risk Report "takes into account damages from six different climate change hazards. The results are based on an analysis combining climate hazard projections with typical hospital-specific information and spatial context data to calculate risk probabilities". It shows that the impact of extreme weather on hospitals infrastructures and healthcare delivery. Globally, the number of hospitals at risk has increased, especially in low and middle-income countries. Also the European countries present an unexpected relevant percentage of hospitals at risk of destruction.

The Pressure for Change in the Health System

The pressure for change worldwide regarding the healthcare domain was brought by the increased awareness that the health sector was not an irrelevant contributor in the production of greenhouse gases (GHGs) with a heavy carbon footprint and a relevant ecological footprint due to the consumption of energy, basic natural resources such as water, plastic pollution and the complexity of its waste.

> "The impact of climate change on healthcare facilities and their vulnerability doesn't appear to be sufficiently explored."

It cannot be underestimated the real shock produced by the COVID-19 pandemic. In many areas, such as the U.S., Canada and Australia, there were signs of major improvements Also Europe, in spite of the variety of health systems of its 27 component countries, also accelerated changes brought by the complex events.

The first and more general was the Green Deal for EU sustainability and climate neutral *"In November 2019, the EU Parliament declared a climate emergency asking the European Commission to adapt all its proposals in line with a 1.5 °C target for limiting global warming and ensure that greenhouse gas emissions are significantly reduced. In response, the Commission unveiled the European Green Deal, a roadmap for Europe becoming a climate-neutral continent by 2050."* For the EU to reach the 2030 target, it approved a package of new and revised provisions in the 2023 legislation known as Fit for 55, comprising 13 interlinked revised laws and six laws on climate and energy.

More related to COVID-19 were a set of basic changes in EU policies concerning health, some directly stimulating more attention and stressing the need for more funding for the healthcare sector, such as additional funding for the EU4HEALTH Programme

to address the crisis preparedness in the EU. Another initiative called the Health Emergency Preparedness and Response (HERA) was launched as a new road in the policies of the European Union with the aim to coordinate European responses to major threats to health.

Where is the Vision of Hospital Preparedness?

A deep analysis of the documents produced by the many agencies and organisations shows evidence of the difficulties involved in constructing a common European front for the mitigation of climate-change related natural disasters. Further evaluation has brought to the following conclusions. The first remarque is that the goals indicated in the studies refer to the ones exposed by Garry Cohen, President and Co-Founder of HCWH (Health Care Without Harm), in his presentation of 2015 in the COP 21 (Conference of Parties) of Paris by pointing out three fundamental sectors of activity to three major challenges posed by climate change: reduce impact, improve resilience and advocate.

The questions that arise are: what have these activities concretely produced? In an important survey conducted of the Joint Research Centre of the EU, the Covenant of Mayor, respondents, mostly public members of local governments, left out hospital facilities from the list of the critical infrastructure to be protected in case of natural disasters. In another survey, made in the framework of the EU project about measures for GHG reductions by hospitals, the vast majority of hospital managers indicated that they didn't consider such actions part of their core business. COVID-19 provided other examples of the crucial, yet unrecognised role of a hospital's physical infrastructure and the required flexibility and functionality, as well as the role of technicians, necessary arms of the medical/sanitary sector.

In the preceding analysis, certain attention is paid to hospitals and their resilience, but it is less clear how to operatively address the risks related to climate change. The impact of climate change on healthcare facilities and their vulnerability doesn't appear to be sufficiently explored.

Jérémy Guihenneuc et al. (2023) identify climate change as the biggest global health threat of the 21st century and assert that while healthcare facilities play a central role in the care of populations, there has been no comprehensive assessment of the impact of climate change on them. The UNDRR also identifies climate change as *"the defining issue of our time"* and highlights the need to increase awareness and training of all health actors (decision-makers, purchasers, health professionals, health, students, technicians, logisticians, etc.) on climate change and its challenges.

The conclusions are clear: there is a growing understanding of the critical role of health facilities facing possible increasing disastrous events of climate change, coupled with the need that health professionals in all capacities, medical as well as technical or administrative, acquire better awareness and ensure more participation in developing measures to ensure functionalities and efficiency during disasters.

Equally essential is a reflection on terms currently used, more as concepts than as operative goals.

> "Emergency action has to become a normal necessity and needs a different level of preparedness."

These include adaptation, mitigation, resilience and sustainability. Adaptation is conceived as taking action to adjust to present and future impacts while Mitigation is defined as reducing climate change acting on the reduction of greenhouse gases heat-trapping in the atmosphere. Resilience refers to the capacity of the healthcare systems to withstand shock.

The book "Strengthening Health Systems –A Practical Handbook for Resilience Testing" published in 2024 in the framework of the Organisation for Economic Cooperation and Development (OECD), addresses its attention to problems related to the most aggressive and problematic health problems of our historic period epidemics, air pollution etc. It is not taken into consideration the assumption that healthcare facilities are a crucial part of strengthening resilience of healthcare systems.

The situation regarding Sustainability is almost the same. The American Hospitals Association (AHA) defines the parameters for each hospital's sustainability

as the reduction of carbon footprint. There were, especially in the U.S., events that produced the complete destruction of hospitals. In Boston in February 2023, historically low temperatures caused emergency rooms to close due to flooding from burst pipes. Disastrous events from different types of climate change factors are now more frequent and aggressive and require actions focused on:

- increased attention to the physical structure of healthcare facilities
- revises the notion of preparedness, which needs a different vision, concepts, and supporting actions.

There is a need for a different approach to the vulnerability of healthcare infrastructure. Emergency action has to become a normal necessity and needs a different level of preparedness.

Preparedness Using the Vulnerability of Healthcare Facilities Approach

Preparedness was interpreted, till recently, the result of actions developed in the framework of adaptation and mitigation, and it was ensured by the resilience of the healthcare facility. It needs to be said that a number of institutions have not fulfilled the request for adaptation plans. Even in cases in which normal procedures were followed, however, when an exceptional event hit, the situation after the impact has frequently shown that they were, in reality, insufficient safety measures and preparation. The conclusion that can be drawn is clear and unavoidable. The escalation and unpredictable strength of climate change related disasters unequivocally impose reconsidering the level and the quality of preparedness of healthcare facilities, taking into consideration also the territorial infrastructures (road, bridges etc.) connecting them to the areas that each facility should serve.

Emergency preparedness should now be accepted as the new normal. The focus of hospital-based preparedness covers certainly the necessity of protecting the persons already hospitalised, the hospitalisation of people getting worse in their chronic illnesses, and the absolute need for the preservation of the infrastructure's functionality for the increased demand of care of the people directly hit by the disastrous events.

The path to preparedness of hospitals should have two fronts: one, forecasting the type and intensity of the estimated risks and two, unparallel the capacity of the single healthcare facility to stand all types of risks. But this is not what studies show. The attention to preparedness by healthcare facilities doesn't reach the level of analytical evaluation required for preparing health systems for climate change, confirming the findings highlighted above.

The first report on the European situation by EEA published in January 2024 with EUCRA (EUropean Climate Risk Assessment) offers a guide for risk analysis and assessment and presents thematic factsheets highlighting the risks of the different systems (e.g. terrestrial and freshwater, marine and coastal Ecosystem, food production and food security etc.….) and within the all-encompassing domain of human health.

What emerges in total evidence by now is the need to consider that the risk analysis working within the framework of historical patterns is no longer sufficient. Baugh et al. (2021) propose a new approach based on the specific work done by their team to achieve a different type of prevention for this setting. The core concept of this approach is a comprehensive, system-wide climate resilience assessment for a large, geographically diverse health network in New England. The initiative involved evaluating the vulnerability of over 30 facilities—including hospitals, rehab centres, and research buildings—to key climate threats such as extreme heat, flooding, and high winds, using future climate projections for 2030 and 2070. By integrating expert consultation, regional climate data, and probabilistic and consequence-based risk mapping, the team developed tailored threat scenarios for each site. These scenarios were categorised by likelihood and impact to inform both infrastructure upgrades and emergency preparedness planning.

Climate projections is the first step of the work and represents the first innovation of this approach. The climate patterns should not be based on historical data but on climate change projections over the short and long term. Europe could take advantage of the data of Copernicus, a component of the European Union's space programme. It is also important to take into account and examine possible data and studies produced in the same area by other authorities, city governments or private entities that have worked on projected changes in weather patterns over time.

Climate-Health Innovative Analysis

The above description, covering the most difficult and innovative part of the suggested innovation, has to be seen as the first phase of a two-phase process that is now being labelled in other reports as Climate-Health Innovative Analysis (CHVA), which can be synthesised as follows:

Phase 1 focuses on vulnerability analysis, identifying potential threats (heat, flooding, high winds, seismic tremors) and their impact on hospital functions. The unique and evolving challenges posed by climate change necessitate a shift towards more advanced and climate-specific vulnerability assessment and resilience-building strategies. As stressed before and reported by now in important studies, relying solely on historical data, which is the basis of traditional HVA, can't adequately address the non-linear and intensifying nature of climate change impacts. An interdisciplinary team of engineers, architects, technicians, facility managers, and clinical leaders, as reported in the New England work mentioned before, collaborated to project various event levels and categorise potential consequences according to three levels (major, severe, catastrophic).

Phase 2 centres on developing a comprehensive plan to address the identification of vulnerabilities and related need of interventions. This involves:

- Technical experts defining necessary actions to reduce or eliminate each vulnerability.
- Discussions with management, hospital staff, the supply chain, and the local leaders.
- Involving the community and increasing awareness.
- Proposing solutions based on the hospital's structure and the severity of threats, potentially including equipment relocation or structural changes.
- Acknowledging potentially high total costs for addressing all vulnerabilities.
- Strategically prioritising interventions based on scientific and technical knowledge, infrastructure familiarity, and input from various specialists.
- Consideration of the situation and safety of essential territorial infrastructures (roads, bridges etc..) and services (water, electricity, sewage, waste etc.)

The resulting plan aims to improve short-term emergency preparedness by focusing on the most likely and impactful weaknesses. It also establishes the phases of a long-term programme for increasing resilience against evolving climate threats.

The methodology offers three key takeaways for hospital managers:

a. **Awareness of ongoing vulnerabilities** aimed to create a wide-ranging vulnerability list and the degree of urgency recognising that delayed interventions leave specific areas not prioritised at risk, necessitating therefore to be matter of control measures.

b. **Understanding total costs and obsolescence** and evaluating the cost for each activity that possibly can eliminate the vulnerability and assess the possibilities of economic interventions. It also provides a basis to evaluate when the facility might become unviable despite investments, potentially requiring replacement with a totally new one.

c. **Long-term, adaptable programme** and creating a framework for continuous improvement and updates, facilitating seamless transitions between administrations and enabling post-implementation evaluation.

This model for an innovative **CHVA** assures a big step forward with regard to:

a) its larger view of predictable risks related to climate change

b) its vision starting with the single vulnerabilities in their totality and strategically operating on the most probably urgent, having in the meantime all under control

c) interdisciplinary contribution and community awareness

Conclusion

It is extremely important to be aware of the necessary actions, the tools available, the results, especially in the present planetary situation characterised by the many kinds of unrest producing further impact on human health and environment, and drawbacks in terms of the One Health vision. The specific risks and vulnerabilities of each hospital will differ according to location, social characteristics and features. The approach that was synthetically presented above can be broadly applicable. To adopt, to develop a proactive and comprehensive approach are key steps for realising climate-ready healthcare systems as accountable factors of strength for communities. The three goals pointed out are certainly among the most relevant of the many recommendations that can be proposed.

Conflict of Interest

None.

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Advances in Imaging

A Royal Welcome: United Imaging Lands in the UK with Its First Installation

United Imaging marks its UK debut with the installation of the uMR® 680 MRI system at New Victoria Hospital in Glasgow. Partnering with MIS Healthcare, this milestone introduces next-generation diagnostic imaging powered by AI, high-performance gradients and advanced patient comfort features. The system boosts clinical precision, workflow efficiency and accessibility, aligning with United Imaging's global mission to transform healthcare through innovation.

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key points

- United Imaging installed its first UK MRI system at New Victoria Hospital in Glasgow.
- The uMR® 680 delivers fast, high-precision imaging for a wide range of clinical uses.
- Its AI-powered features enhance image clarity and diagnostic confidence.
- EasySense allows contactless respiratory monitoring, improving patient comfort.
- QScan reduces scan noise by up to 97%, supporting a more relaxed patient experience.

United Imaging has reached a significant milestone in its global journey with the first-ever installation of its technology in the United Kingdom.

In close partnership with MIS Healthcare, a UK-based exclusive distributor of world-leading medical technologies, New Victoria Hospital has enhanced its advanced diagnostic capabilities with the addition of the uMR® 680 – a state-of-the-art magnetic resonance imaging system designed for precision, speed and diagnostic confidence.

Located in the southeast of Glasgow, New Victoria Hospital is a flagship institution in Scotland's modern healthcare landscape, purpose-built to serve a population of nearly 400,000 patients annually. The hospital offers a wide range of specialised services—including cardiology, renal dialysis and gynaecology—and houses eight state-of-the-art operating theatres. Its sustainable design has earned the hospital an 'Excellent' BREEAM rating, reflecting a commitment to high environmental standards and responsible healthcare infrastructure.

The installation of the uMR® 680 significantly enhances the hospital's diagnostic capabilities—delivering faster, more precise imaging and enabling a broader spectrum of clinical applications. This advanced system brings next-generation MRI technology into routine clinical practice, setting a new benchmark in diagnostic imaging.

Integrating High-Performance System with Next-Generation AI-Enabled Architecture

The uMR® 680 combines a high-performance gradient system (45 mT/m and 200 T/m/s simultaneously on each axis) with high-density surface coil arrays and United Imaging's industry-leading AI-enabled imaging platform, uAIFI. Together, they provide sharper, more detailed images—enabling quicker, more confident diagnoses across a wide range of clinical applications.

High-Performance Gradient Design and High-Density RF Channels

With exceptional gradient performance of 45 mT/m and 200 T/m/s (simultaneously on each axis), and high-density surface coil arrays that optimise signal capture, the system delivers outstanding image quality through an improved signal-to-noise ratio.

uAIFI DeepRecon

DeepRecon leverages advanced algorithms to eliminate unwanted noise while preserving exceptional image quality. This enhances resolution, enabling precise visualisation of even the smallest anatomical structures and supporting radiologists in managing complex cases.

uAIFI Qscan: Whole-body Quiet Scanning

QScan is United Imaging's innovative quiet scanning feature for whole-body examinations, reducing scan noise by up to 97% and contributing to a more relaxed patient experience.

Transforming Global Diagnostics: One Installation at a Time

The installation of the uMR® 680 reflects a shared vision among United Imaging, MIS Healthcare and New Victoria Hospital: to increase access to advanced imaging and raise standards of care across the United Kingdom.

> "The installation of the uMR® 680 significantly enhances the hospital's diagnostic capabilities—delivering faster, more precise imaging and enabling a broader spectrum of clinical applications."

Additionally, a double safety lock design in both the image and K-space domains preserves data fidelity, ensuring the reliability of diagnostic outcomes.

Wide Bore with Starlight Design

The 70 cm wide bore ensures comfort for patients of all sizes, providing ample space and a calming diagnostic environment. Thanks to industry-leading magnet and gradient homogeneity, the broad field-of-view significantly improves efficiency by covering larger anatomical areas in a single scan while maintaining image quality at the edges. This supports seamless whole-body imaging, optimises workflow and enhances patient comfort. The unique Starlight design further relaxes patients by creating an in-bore atmosphere reminiscent of a clear night sky.

uAIFI EasySense: Contactless Sensing of Patients' Respiratory Motion

EasySense is the industry's first dual-source phased-array millimetre-wave radar solution for contactless patient monitoring. It allows patients to breathe freely during scans, enhancing comfort—particularly for individuals with respiratory conditions. The technology detects respiratory motion with exceptional accuracy down to 0.1 millimetres, with high temporal resolution, capturing data every 20 milliseconds. Fully integrated within the MRI bore and unaffected by clothing or coils, it delivers interference-free imaging and consistent diagnostic accuracy.

This achievement marks the beginning of United Imaging's presence in the region—a significant step forward in delivering intelligent, accessible and innovative healthcare solutions to communities worldwide.

Learn more about how United Imaging is redefining the future of medical imaging: https://eu.united-imaging.com/en/product-service/products/mr/umr-680

Conflict of Interest

Spotlight articles are the sole opinion of the author(s), and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

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GEM Center, Ho Chi Minh City, Vietnam

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In recent years, healthcare technologies have taken centre stage at HMA, mirroring the swift digital transformation of hospitals across Asia. HMA 2025, though, will shift focus back to the core principles of hospital management: quality and safety of care, patient experience, and effective leadership. Digital technology won't be left out completely but will be discussed in relation to how it can enhance these core areas.

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Smarter Imaging, Safer Patients: Affidea's New Era in Contrast Media Optimisation for Sustainable Healthcare

Affidea's Contrast Media Management Programme enhances patient safety, imaging quality and sustainability by optimising contrast media use across its network. Piloted in Vilnius with up to 18% less contrast used and 28% radiation dose reduction, the initiative combines clinical precision, environmental responsibility and operational efficiency. It builds on Affidea's Dose Excellence legacy to promote smarter, safer radiology.

CHRYSAA PARASKEVOPOULOU

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key points

- Affidea launched a contrast media programme to improve safety and sustainability in imaging.
- The initiative reduces unnecessary contrast use through personalisation and standardised protocols.
- A pilot in Vilnius showed 18% less contrast use and 28% lower radiation without harming quality.
- The programme aligns with ESG goals by cutting waste and minimising environmental impact.
- Affidea plans to scale the programme across its network, advancing responsible radiology practices.

As the demand for medical imaging grows, so does the responsibility to deliver it safely, efficiently and sustainably. In response, Affidea has launched its Contrast Media Management Programme—an innovative initiative that transforms how contrast media is used across diagnostic services, combining clinical precision with a strong commitment to patient safety and environmental responsibility.

Clinical Excellence in Action

Affidea's **Contrast Media Management Programme** reflects a deep commitment to advancing care. By promoting smarter, safer and more consistent use of contrast media, the programme supports better patient outcomes while championing responsible, high-quality imaging.

Contrast media is essential in imaging, but their inappropriate use through excessive volume, inconsistent protocols or lack of personalisation could compromise image quality, increase radiation dose and result in unnecessary consumption. As imaging demand continues to grow across Europe, effective contrast media management is not just a clinical concern, it's an operational and environmental necessity.

Optimising contrast use goes beyond improving diagnostic quality, it's about acting responsibly. Ensuring each patient receives the right amount of contrast enhances accuracy and minimises exposure. Just as importantly, efficient usage reduces waste, limits environmental impact and supports more sustainable healthcare practices. At its core, it's a balance between clinical excellence and resource stewardship, precisely why Affidea launched this programme: to enable safer,

smarter and more sustainable imaging across its network.

Affidea's approach is strategic and multidisciplinary, built around four core pillars:

- **Patient Safety:** Personalised contrast dosing based on weight, renal function and clinical indication improves safety and minimises risk.
- **Imaging Quality:** Standardised protocols ensure high diagnostic confidence and reduce variability.
- **Operational Efficiency:** Harmonised workflows enhance consistency and reduce delays.
- **Environmental Sustainability:** Optimised use of contrast media supports waste reduction and aligns with healthcare's broader ESG goals.

This is not a one-size-fits-all solution, but a dynamic, data-driven framework adaptable to each clinical setting, supported by automation, staff training and real-time monitoring tools.

With a focus on patient safety, diagnostic consistency and responsible resource use, Affidea is leading a smarter, more sustainable future for radiology.

From Pilot to Proof: The Vilnius Success Story

Affidea piloted the programme at Vilnius Oncology Hospital in Lithuania, in collaboration with GE Healthcare with impressive results. **Contrast media usage was reduced by up to 18%**, all while maintaining, or even enhancing, diagnostic image quality. In addition, the program led to **a 28% reduction in radiation dose** for CT coronary angiography procedures, while maintaining image quality for an accurate diagnosis.

These results underscore the effectiveness of personalised contrast protocols, demonstrating that it's possible to improve patient safety and imaging performance while minimising environmental impact. The initiative not only streamlined clinical practice but also raised awareness among staff about sustainable healthcare delivery, marking a meaningful step forward in responsible radiology.

Building on the Dose Excellence legacy

Affidea's Dose Excellence Programme has long been a benchmark for radiation safety. The Contrast Media Management Programme extends that legacy expanding the focus beyond radiation to the full scope of patient exposure and resource use.

Together, these programs form a comprehensive framework for safety and quality. While the Dose Excellence Programme minimises radiation, the Contrast Media initiative ensures contrast agents are used efficiently and appropriately. The result: consistently high-quality imaging with minimal necessary exposure for both patients and the planet.

With the pilot's success, Affidea is now scaling the programme across its network. Future plans include:

- Extending optimised protocols to more centres and procedures
- Scaling real-time monitoring tools for greater consistency
- Advancing contrast administration through data-driven, patient-focused innovation

This initiative isn't just improving current practice, it's defining the new standard in contrast media management. It plays a vital role in shaping the future of patient care, operational excellence and sustainable healthcare.

> "Optimising contrast use goes beyond improving diagnostic quality, it's about acting responsibly."

Affidea's Contrast Media Management Programme is more than an innovation, it's a clear statement of purpose. It proves that healthcare can be safer, smarter and more sustainable. With the right tools, a shared vision and a culture of continuous improvement, medical imaging can deliver exceptional care, while protecting both patients and the planet.

Conflict of Interest

Spotlight articles are the sole opinion of the author(s), and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

Future Hospital

The Evolution of Institutional Logics in Medicine: Current Trends and Prospects for Resolution

Healthcare is shaped by competing institutional logics—professional, managerial and market—each influencing medical practices and business models. These logics often clash, especially between quality care and cost-efficiency. AI holds the potential to ease these tensions by streamlining workflows and freeing up resources, particularly through non-interpretative applications in administration and operations.

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key points

- Multiple institutional logics shape modern medical practice and healthcare strategies.
- Conflicts often arise between professional, managerial and market-driven healthcare models.
- These tensions impact value propositions and the structure of healthcare business models.
- AI offers tools to optimise workflows and reduce resource strain in clinical and administrative tasks.
- Non-interpretative AI solutions may have the most measurable impact on healthcare delivery.

Institutional Logics

Institutional logics can be defined as a set of practices and beliefs that predominate in an organisational or professional field (Scott 2000). Generally speaking, an organisational field is governed by a dominant logic that guides practices and strategies within a given profession (Thornton et al. 1999). In complex organisational fields, several logics may coexist with a codominance effect (Dunn et al. 2010).

When several logics coexist, conflicts may arise, with several possible responses. The first response is a relationship of domination, where one logic dominates the others and guides practices within the profession. The second response is one of a power struggle over a long period of time, with no single logic standing out. This response may lead to a relationship of dominance by one of the logics or to a status quo. The third response is characterised by multiple competing logics with a codominance effect that results in heterogeneity of practices within the profession or an organisational field (Goodrick et al. 2011).

Institutional Logics in Healthcare

Like other sectors and professions, healthcare has evolved significantly in recent years. The paradigm shift in the doctor-patient relationship, the digital transformation of healthcare, access to information and the arrival of AI have profoundly altered the medical sector and the relationship with patients. In the past, the doctor-patient relationship was based on paternalism, where the doctor was seen as all-powerful. Respectful of medical power, patients followed medical instructions without reservation. Nowadays, with access to information via the Internet, the free choice of doctors and the diversity of services available, the relationship between patients and doctors is changing. This

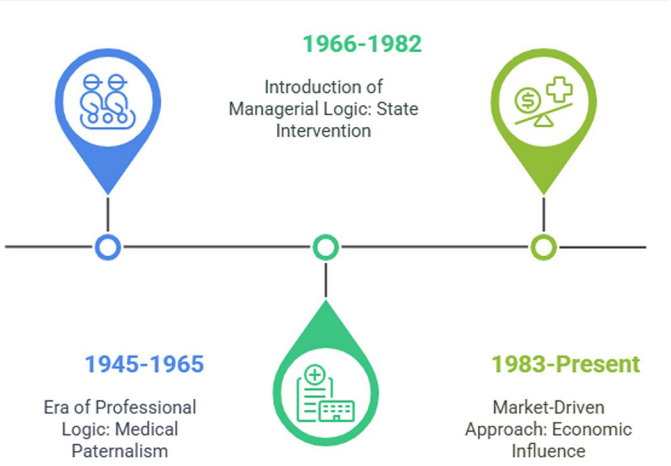

Figure 1. Evolution of healthcare governance: Key periods and shifts. Source: Adapted from Scott (2000)

paradigm shift is linked to changes in institutional logic within the medical sector.

The first period, from 1945 to 1965, was governed by a professional logic. Medical practices were centred on competence and medical expertise, of which doctors were the guarantors. This period was based on medical paternalism. The terms of payment between patient and doctor minimised the intervention of third-party payers, giving doctors a high degree of autonomy.
The second period, from 1966 to 1982, saw the arrival of the state as a new player in the healthcare sector. Access to healthcare was seen as a right for all, with the introduction of numerous health programmes. From the 1970s onwards, the costs of these services rose rapidly, necessitating more drastic control and better management of healthcare costs. This period was governed by a managerial logic in which cost control and better resource management were major objectives.

The third period runs from 1983 to the present day. This period saw the emergence of economists as new players in the healthcare sector. During this era, state regulation of the healthcare system was challenged by economists, who turned to a system governed by competitive mechanisms. This change in institutional logic towards the market had a significant impact on doctors, who went from being self-employed to salaried employees. It was also during this period that the concept of patient-centred medicine emerged. This

> "Modern medicine is governed by a market logic based on competition and patient-centred care."

Since the last century, medicine has seen the emergence of multiple institutional logics that have changed medical practices and strategies within the profession. According to Scott (2000), whose work is based on the American healthcare system, medicine has been marked by three distinct periods (Figure 1). Each period was governed by a dominant institutional logic.

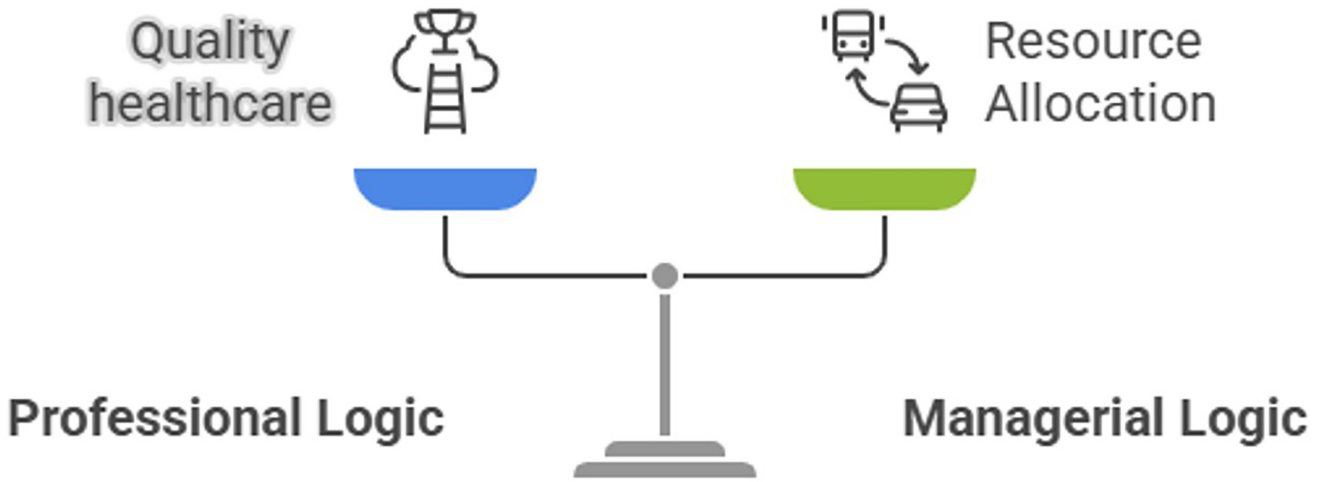

Figure 2: First conflict – balancing quality and efficiency in healthcare. Source: Inspired from Vo (2024)

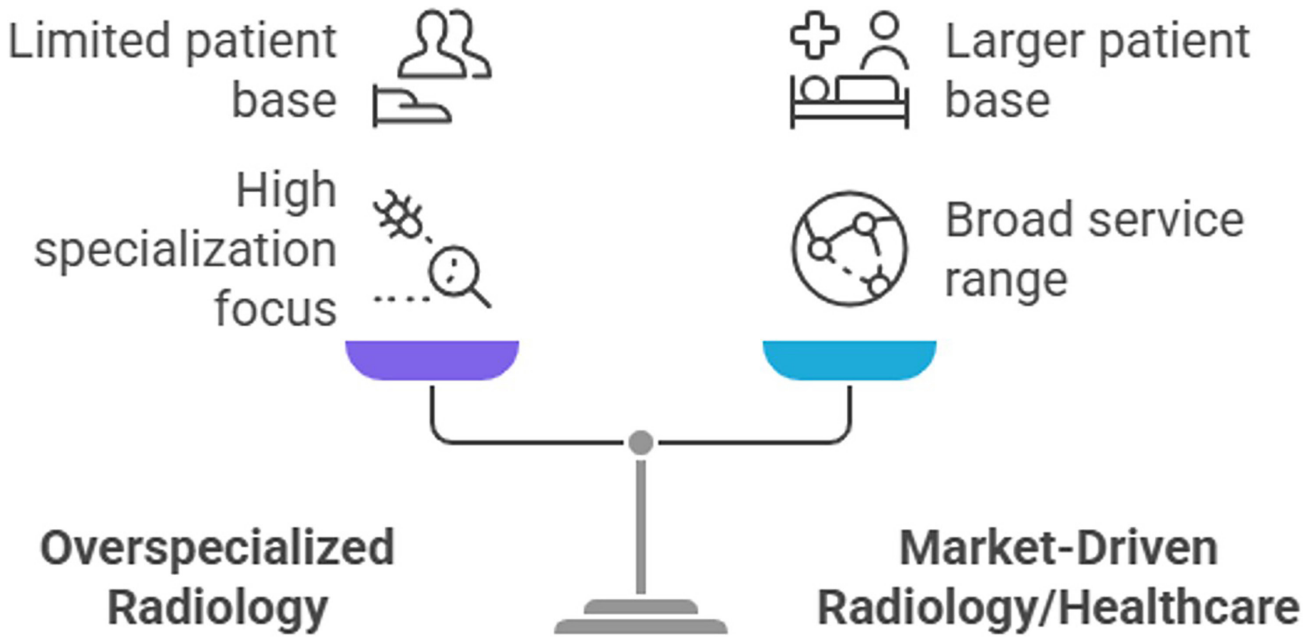

Figure 3: Second conflict – A professional logic centred on sub-specialisations contrasts with a market-oriented logic focused on patient recruitment and the delivery of patient-centred medicine. Source: Inspired from Vo (2024)

approach focuses on the communication of care to patients, health promotion and the partnership between care providers and the patient (Constand et al. 2014)

Conflicting Logics in Healthcare

As discussed in the previous chapter, modern medicine is governed by a market logic based on competition and patient-centred care. Collaboration with the patient is privileged over the paternalistic relationship. Despite a dominant market logic, conflicts exist with other institutional logics within the healthcare sector. The conflict most frequently encountered in the healthcare sector concerns the professional logic of healthcare professionals, who are confronted with the managerial logic of administrators. In this conflict, professional logic is gradually abandoned in favour of managerial logic (Power 1999). Another response may also arise from this struggle. Co-optation is an adaptation by professionals that consists of adopting an element of another logic while retaining the main elements of the dominant logic.

And finally, decoupling is a possible response to this conflict. In decoupling, care professionals only partially adopt practices derived from a managerial logic. The practices are only applied in a partial, ritualistic way, with no impact on actual work. The impacts are only minor (Andersson et al. 2018).

> "The value proposition in healthcare differs according to the point of view adopted."

The Impact of Conflict on the Medical Business Model

As with any business that needs to generate profits, medical centres or hospitals rely on a business model to operate and generate earnings. Although there is no consensus on the definition of a business model, it can be defined as a set of functions that includes value proposition, target market, revenue generation and strategy (Chesbrough 2007).

The concept of the "business model canvas" is proposed by Osterwalder et al. (2010). The business model canvas is a visual tool containing nine blocks

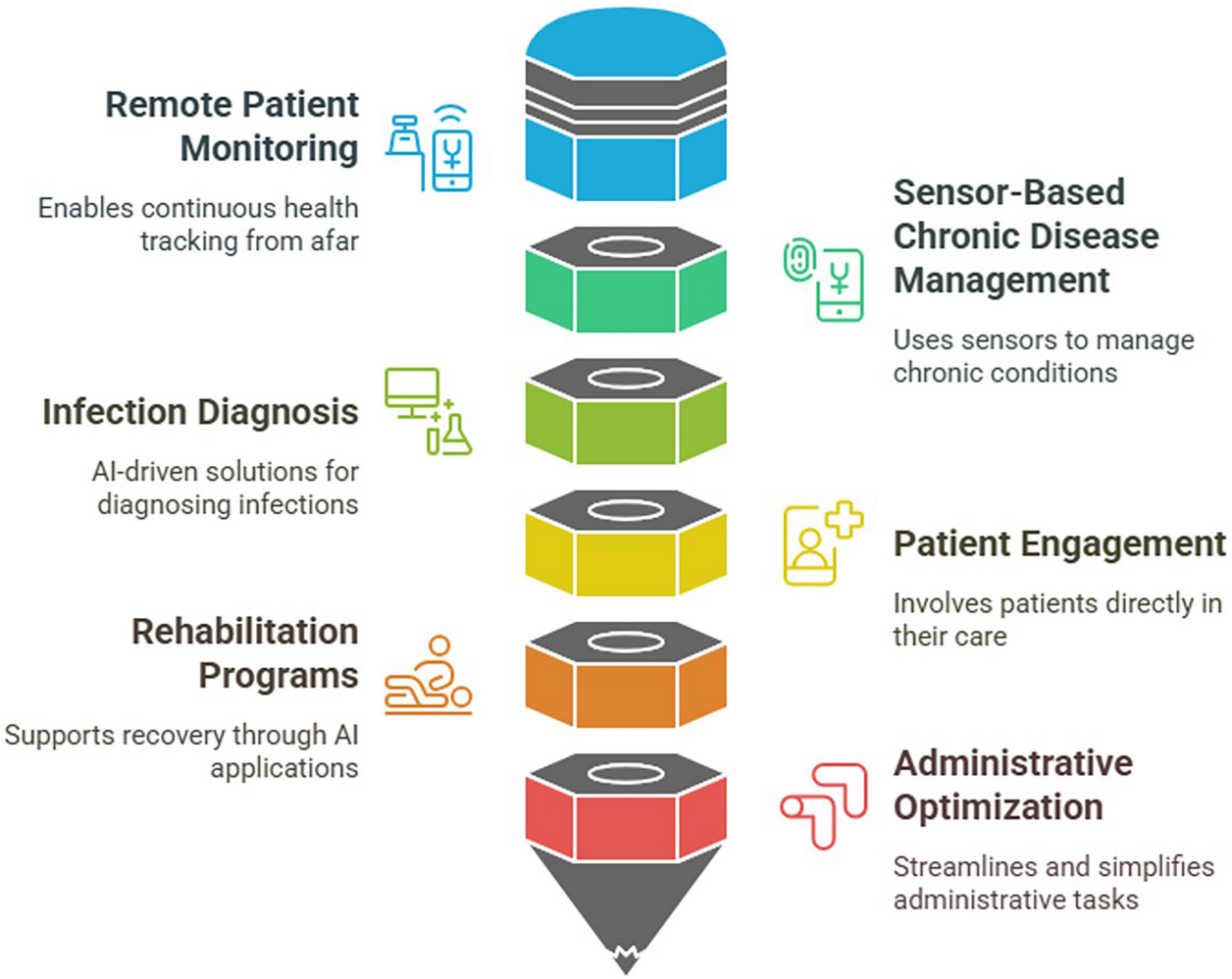

Figure 4. AI's multifaceted role in healthcare. Source: author's own work

representing a key business function. The value proposition is one of these nine elements. The value proposition is seen as a benefit provided to customers in return for a cost (Barnes et al. 2009).

The value proposition in healthcare differs according to the point of view adopted. For doctors, the value proposition is based on evidence or "evidence-based medicine". For managers, the value proposition is defined by the health benefit obtained in return for a cost (Marzorati et al. 2017). In his study of institutional logics and the value propositions of a radiology business model, Vo (2024) demonstrated a complex relationship between the value propositions arising from different institutional logics. According to Vo (2024), the different value propositions used in the radiology sector stem from different institutional logics, which include professional, market and managerial logics. This principle can be extended to the broader healthcare sector. Thus, the value propositions derived from a radiology business model are a heterogeneous set of values.

In the medical imaging sector, Vo has identified several types of conflict, all of which have elements of managerial logic as their common denominator. The first type of conflict (Figure 2) concerns value propositions derived from a professional logic that are at odds with elements derived from a managerial logic. This situation is a caricature of today's world. In this case, managers are allocating fewer and fewer resources to healthcare professionals, who must always do more with less. The result is a decline in the quality of care, to the detriment of productivity.

The second conflict (Figure 3) is more prevalent in the medical imaging sector, where sub-specialties are given greater prominence and represent quality medicine according to professional logic. Value propositions linked to overspecialisation in medicine or radiology clash with market value propositions whose values are based on comprehensive patient care and broad services in order to recruit a greater number of patients.

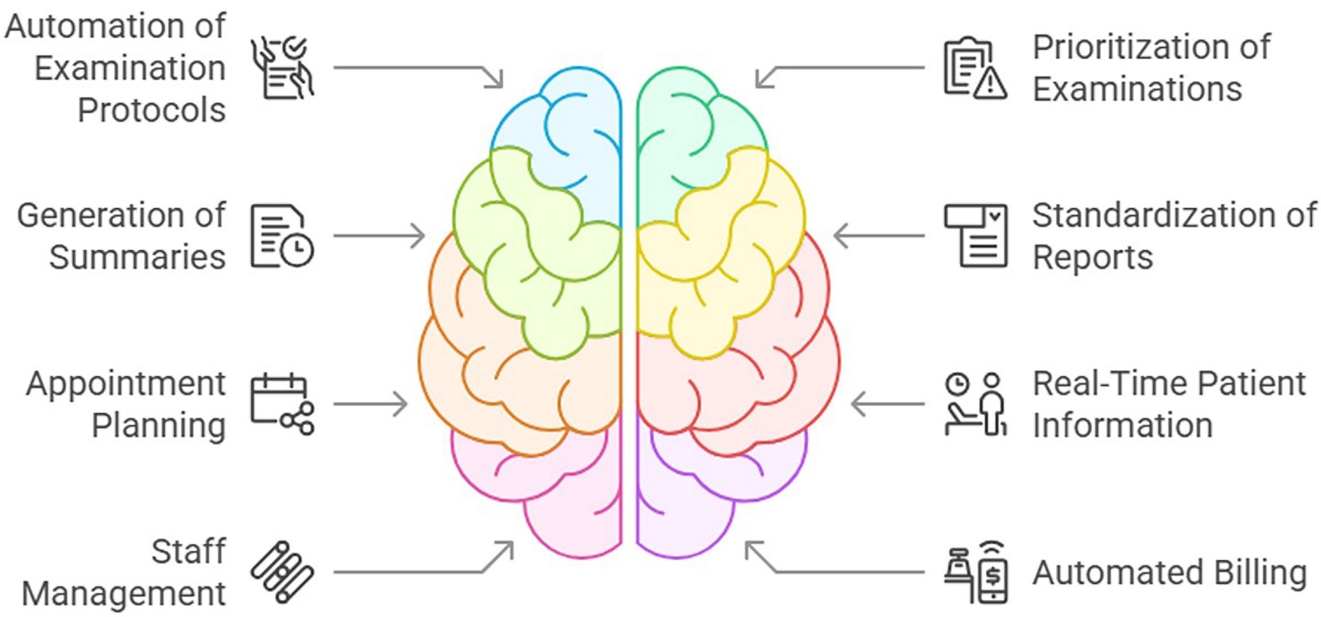

Figure 5. Non-interpretative AI solutions in radiology. Source: author's own work

As demonstrated by Vo (2024), centres that focus on highly specialised services are unable to offer a wide range of services for organisational and economic reasons. The costs of offering overspecialised services are very high. On the other hand, health institutes offering more "generalist" care have more opportunities to recruit a larger number of patients. When a patient requires more specialised expertise, he or she is referred to these specialised centres. Moreover, an organ- or subspecialty-based approach does not allow for holistic patient care.

solutions which are common in radiology. Today, there are many applications in medicine (Figure 4). The market offers applications for remote patient monitoring, sensor-based monitoring of chronic pathologies and infection diagnosis. AI solutions involve patients directly in their care, offering applications that facilitate their treatment. Solutions are used in rehabilitation programmes, notably in perioperative medicine or in the execution of fitness exercises.

Aside from all these medical-based AI solutions, other applications (Figure 5) optimise workflow and

"Non-interpretative solutions—such as workflow optimisation and management applications—would likely have a more significant impact on the work of healthcare professionals."

The Role of AI in Managing Conflicting Institutional Logics

Over the past decade, advances in computer science have been meteoric, with the development of Deep learning, Machine learning and Big Data. The advent of artificial intelligence (AI) has opened up new perspectives in medicine, particularly in the interpretative

simplify administrative tasks (Al Kuwaiti et al. 2023). In the radiology sector, such AI solutions can automate examination protocols (Brown & Marotta 2017), prioritise radiological examinations according to degree of urgency (Richardson 2021), generate summaries from information provided by corresponding physicians (Rush et al. 2015), standardise radiology reports, plan radiology appointments according to cancellations and examination duration (Lakhani et al. 2018), inform

patients in real time of waiting times (Thompson et al. 2024), manage staff and work schedules (Saini 2023) and automatically bill examinations or services performed (Denck et al. 2019).

As discussed above, most of the conflicts generated have as their common denominators value propositions derived from a managerial logic that aims to rationalise resources. Thus, from a hypothetical point of view, AI solutions would make it possible to free ourselves from certain resources by automating processes. The time saved would then allow more time to be devoted to tasks with real added value for the patient. The example of voice recognition in radiology is an example of the added value of AI. AI, particularly through machine learning, has enabled radiologists to directly dictate their reports, without having to go through the manual data entry phase previously carried out by secretaries. Freed from this non-value-added task, secretaries now have more time to admit and manage patients.

Conclusion

Almost imperceptibly, our practices and strategies in medicine are shaped by various value propositions stemming from different institutional logics. These logics govern the medical sector and are in constant competition. As a result, value propositions can come into conflict within a single business model.

The main tensions often arise from elements of a managerial logic aimed at rationalising costs. The implementation of AI could theoretically help overcome these conflicts. AI solutions could make it possible to bypass the limitations related to resources. Currently, most AI research focuses on interpretative solutions. However, from an operational and managerial standpoint, non-interpretative solutions—such as workflow optimisation and management applications—would likely have a more significant impact on the work of healthcare professionals. These impacts would also be easier to quantify. Therefore, future research should prioritise this direction.

Conflict of Interest

None

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Affidea Acquires Uroviva, Expanding Integrated Oncology Care in Switzerland

Affidea has acquired Uroviva, Switzerland's top urology network, nearly doubling its size and expanding integrated oncology services. The move strengthens Affidea's breast and prostate cancer pathways, combining diagnostics, treatment and monitoring. Uroviva's expertise and advanced technologies will support a seamless, patient-centred care model across 33 centres and 700 staff, enhancing cancer care delivery nationwide.

CHRISTIAN MAROLT

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key points

- Affidea acquired Uroviva, expanding its Swiss network from 17 to 33 centres.
- The deal strengthens Affidea's breast and prostate cancer care pathways.
- Uroviva adds expertise in urology, gynaecology and oncology to Affidea's services.
- Advanced tech like Da Vinci® and HIFU enhances treatment capabilities.
- The merger creates faster, more integrated care for Swiss cancer patients.

Affidea Group, a leading pan-European provider of specialist healthcare services including cancer care, advanced diagnostic imaging and community-based polyclinics, today announced the acquisition of Uroviva Group, Switzerland's foremost urology network, from German Equity Partners IV ("GEP IV"), a fund managed by independent German investment company ECM, and Uroviva Group's founding physicians. Through this acquisition, Affidea Switzerland almost doubles in size – from 17 to 33 centres and from 450 to 700 employees, positioning the company among the top outpatient healthcare providers in the country.

This acquisition complements Affidea's out-of-hospital diagnostic services and strong breast cancer care

pathway, enabling the development of an adjacent prostate cancer pathway. It also opens significant synergies in pathology, diagnostic imaging and oncology. These complementary services allow Affidea to offer an integrated pathway in both breast and prostate cancer care, delivering seamless and connected care experiences for patients.

The Uroviva Group is a leading network of medical specialists, combining top-level expertise in urology, gynaecology and oncology. With 16 locations across the cantons of Zurich, Lucerne, Zug, Solothurn and Aargau, and approximately 250 employees – including 55 physicians – Uroviva provides excellent, comprehensive outpatient care as well as inpatient treatment where required. Its service offering includes state-of-the-art treatment methods such as the Da Vinci® Surgical System, High-Intensity Focused Ultrasound (HIFU) and Rezum™ therapy.

Affidea is pleased to welcome new colleagues from the Uroviva Group. They bring with them not only outstanding medical expertise but also a strong alignment with our core values – especially a deep commitment to patient-centred, compassionate and high-quality care. By combining their services, the

Uroviva centres and Affidea's existing network will create a unique model of integrated care, offering patients faster access to diagnostics, personalised treatment plans and continuous monitoring.

Marc-Andre Christinat, CEO of Affidea Switzerland, commented: *"This acquisition is a transformational moment for Affidea in Switzerland. With Uroviva joining our network, we are not only doubling our footprint but also creating a leading national platform for integrated oncology care. We already had an integrated breast care pathway, which is now completed with Uroviva's gynaecology services (Gynéviva). We are now proud to offer also an integrated prostate cancer pathway. Our patients will now benefit from a connected care pathway in both breast, gynaecology and prostate, that brings together the best in diagnostics, medical expertise and oncology services, closer to our community."*

Dr. Charles Niehaus, Executive Director for Affidea Group, added: *"The acquisition of Uroviva is a defining moment in Affidea Group journey to building a comprehensive, high-quality cancer care network in Europe. By bringing together Switzerland's foremost urology provider with our existing expertise, we are creating an integrated platform that spans the entire patient journey - from early detection to advanced treatment and long-term surveillance. This is not just a strategic expansion, it is a commitment to our patients, doctors and the communities we serve. It means faster diagnoses, more precise treatments and a truly coordinated care experience that puts their needs at the centre, now with one more cancer care pathway fully integrated, focused on prostate. It is how we are shaping the future of personalised, specialist healthcare across Europe."*

Jan Sobhani, CEO of Uroviva Group: *"With this acquisition by Affidea, we are opening a groundbreaking new chapter in the development of Uroviva. We are joining forces with a pan-European experienced partner who shares our values and supports our vision of integrated, patient-centred care. Together, we are creating indeed new perspectives in Switzerland – for our patients, our employees, our partner institutions and all those who contribute every day to the success of our mission. I would also like to thank our partners at ECM for the successful cooperation over the past years. Their support enabled us to accelerate our growth and expand throughout German-speaking Switzerland."*

This is the second acquisition of Affidea in Switzerland this year, after the addition of the two pathology laboratories, after six new centres have been acquired in the past two years, all building Affidea Switzerland's integrated cancer care platform.

A Growing Need for Comprehensive Cancer Care in Switzerland

Cancer remains the second leading cause of death in Switzerland, accounting for 25% of total fatalities. Each year, more than 45,000 new cancer cases are diagnosed, resulting in approximately 17,000 deaths (OESD 2024). Moreover, the proportion of cancer cases among younger individuals (under 50 years old) is rising significantly, highlighting the urgent need for integrated and advanced oncology solutions.

Affidea's legal advisors for the transaction were Niederer Kraft Frey in Zurich, Switzerland and FRIEDRICH GRAF VON WESTPHALEN PARTNER in Freiburg, Germany, while Ernst & Young provided finance & tax services and Alantra for M&A advisory. The sellers of Uroviva Group were advised on the transaction by KPMG (M&A, commercial, finance & tax vendor services) as well as Milbank, Advestra and Bratschi (legal counsel).

Conflict of Interest

Spotlight articles are the sole opinion of the author(s), and they are part of the HealthManagement.org Corporate Engagement or Educational Community Programme.

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Patient Engagement

Inclusive Voices in Patient Organisations: Building Representation and Equity

The *Inclusive Voices in Patient Organisations* report by the Patient Inclusive Advocacy Foundation highlights leadership gaps in diversity and inclusion across eight countries. It identifies systemic barriers, shares successful practice and outlines a roadmap for embedding DEI in patient organisations. The report calls for urgent, sustained action to ensure that patient advocacy genuinely reflects and serves all communities.

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key points

- Patient organisations often lack leadership diversity and fail to reflect their communities.
- Systemic barriers like bias and limited networks block underrepresented groups from leadership.
- Inclusive leadership boosts innovation, trust and engagement in patient advocacy.
- Organisations must collect data, set targets and build diverse advisory groups to drive change.
- Sustained DEI efforts need long-term commitment, partnerships and leadership accountability.

The *Inclusive Voices in Patient Organisations* report, published by the Patient Inclusive Advocacy Foundation and developed by the Patient Advisory Committee on Equal Representation, offers a detailed and far-reaching analysis of diversity, inclusion and equity within patient organisations across Belgium, the Netherlands, the United Kingdom, Germany, Spain, Australia, the United States and Canada. Drawing extensively on data analysis, case studies and qualitative insights, the report highlights key representation gaps, showcases effective practices and presents practical recommendations to build sustainable and inclusive governance structures in patient advocacy.

A Historical Perspective on Civil Society Engagement

Efforts to promote inclusivity within patient organisations are deeply rooted in the broader historical evolution of

civil society engagement. Landmark events such as the 1945 establishment of consultative arrangements for non-governmental organisations within the United Nations, the 1975 Declaration on the Rights of Disabled Persons and the World Health Organisation's 2024 resolution on social participation in health systems have progressively strengthened the role of patient organisations in influencing global health policy. This historical context highlights the need to continue embedding principles of equity and inclusion into every aspect of patient advocacy.

Despite these advances, many patient organisations today do not fully reflect the diversity of the populations they serve. The report identifies persistent obstacles faced by women, racial and ethnic minorities, disabled individuals, LGBTQ+ people and immigrants in accessing leadership positions. Without a determined and sustained effort to incorporate diversity, equity and inclusion (DEI) principles, organisations risk reinforcing the very systemic inequalities they seek to address.

- In the Netherlands, only 7% of board members at top companies come from ethnically diverse backgrounds, compared to 25% of the overall population.
- In Germany, women hold just 26% of board positions in leading companies, despite representing half of the general population.
- In the United Kingdom, disabled individuals account for 14% of board chairs in charities focused on physical health, compared to 18% within the broader population.

These discrepancies reveal a significant disconnection between the composition of organisational leadership and the communities these organisations aim to represent. Challenges are even more pronounced for individuals who face overlapping forms of disadvantage, such as those affected simultaneously by socioeconomic barriers, limited education opportunities and geographic isolation.

"Without a determined and sustained effort to incorporate diversity, equity and inclusion principles, organisations risk reinforcing the very systemic inequalities they seek to address."

The Patient Inclusive Advocacy Foundation calls for a proactive and strategic commitment to dismantling exclusionary structures and fostering genuinely inclusive leadership at every level.

The Current State of Representation

One of the report's most significant findings is the widespread absence of comprehensive diversity data within patient organisations. While broader insights from non-profit and corporate sectors provide some benchmarking, specific sector-based information remains largely unavailable. Where data is accessible, it illustrates considerable underrepresentation across various leadership roles:

- In the United States, only 6% of non-profit board chairs identify as LGBTQ+, compared to 8% of the general population.
- In Canada, merely 13% of health non-profit board members are immigrants, although immigrants account for 23% of the national population.

Challenges Hindering Inclusion

The report identifies several entrenched barriers that prevent greater diversity and inclusion within patient organisations:

- **Data Deficiency:** Without the systematic collection of demographic data, organisations cannot meaningfully evaluate or improve their diversity performance.
- **Network Exclusion:** Marginalised individuals often lack access to influential networks that facilitate leadership opportunities.
- **Unconscious Bias:** Decision-making processes are often affected by ingrained biases unless explicitly countered through structured interventions.
- **Resource Constraints:** Many organisations struggle to secure stable, long-term funding necessary to embed DEI initiatives sustainably.
- **External Resistance:** Politicisation of diversity efforts has, in some instances, led to societal and institutional pushback, undermining momentum for change.

Furthermore, the phenomenon of "diversity fatigue" — where enthusiasm for DEI diminishes over time without structural integration — is a real threat to lasting progress. Patient organisations must anticipate and address this tendency if they are to maintain genuine commitment over the long term.

Opportunities Through Inclusive Leadership

While challenges are considerable, the benefits of inclusive leadership are equally substantial. Patient organisations that fully embrace diversity and equity not only strengthen trust within the communities they serve but also enhance the relevance, effectiveness and credibility of their advocacy work.

Key impacts identified in the report include:

- A 1.7 times higher likelihood of organisations leading innovation when they have diverse leadership.
- A 20% improvement in satisfaction levels among minority patients when organisations implement culturally competent practices.
- A 25% reduction in staff turnover rates when inclusive leadership programmes are introduced.
- A 10% stronger revenue growth for organisations with diverse leadership teams compared to their peers.
- A 30% increase in participation rates in health programmes when community advisory councils are established.

Through inclusive leadership, patient organisations can better challenge assumptions, create innovative solutions and build governance structures that are truly reflective of the people they aim to support.

Promising Practices in Action

The report documents numerous examples of patient organisations implementing practices that have successfully promoted greater inclusion and diversity. These include:

- **Demographic Surveys:** Systematically collecting anonymous demographic data to identify gaps and plan targeted strategies.
- **Setting Targets:** Defining concrete diversity goals at the board and leadership levels to drive measurable progress.
- **Establishing Advisory Groups:** Creating diverse patient advisory bodies to ensure marginalised voices influence organisational decision-making.
- **Career Development Initiatives:** Investing in mentorship schemes, leadership training and paid internship programmes to build diverse leadership pipelines.

> "Achieving true and lasting inclusion demands institutional bravery, unwavering accountability and a steadfast refusal to yield to external resistance."

- **Bias-Reducing Recruitment Practices:** Introducing measures such as name-blind shortlisting to remove potential biases during hiring processes.

Practical examples of success cited in the report include:

- **Canteen Australia,** which established a Diversity and Inclusion Advisory Group to ensure its services are attuned to the needs of diverse young people.
- **National Breast Cancer Foundation (Australia),** which created a board skills matrix to guide diverse and strategic board recruitment.
- **Cancer Research UK,** which introduced paid internships to open opportunities for underrepresented groups.
- **Luminus SA (Belgium),** which conducts regular diversity surveys to inform and refine its inclusion strategies.

These examples demonstrate that targeted, deliberate actions can lead to tangible improvements in representation and organisational responsiveness.

Recommendations for Sustainable Change

The report proposes a roadmap of short-, medium- and long-term actions for advancing diversity and inclusion in patient organisations, extending to funders, policymakers and healthcare institutions.

Short-Term Priorities (within 12 months)

- Broaden outreach efforts to include underrepresented communities more systematically.
- Create diverse patient advisory groups with real influence over decisions.
- Conduct and publish anonymous demographic surveys to establish a baseline for diversity metrics.

Medium-Term Actions (1-3 years)

- Launch tailored leadership development programmes aimed at nurturing talent from underrepresented backgrounds.
- Embed DEI principles into the fundamental governance structures of organisations.
- Set measurable diversity targets and implement transparent monitoring processes.

Long-Term Strategies (beyond 3 years)

- Institutionalise DEI principles in mission statements, charters and leadership selection frameworks.
- Forge long-term strategic partnerships with diverse community organisations.
- Hold leadership bodies accountable for embedding and sustaining inclusive practices over time.

Beyond the patient organisations themselves, the report urges policymakers to enact laws facilitating the collection of diversity data and encourages funders to offer multi-year financial support for DEI initiatives, thereby providing the stability needed for long-term cultural transformation.

Healthcare institutions, meanwhile, are called upon to build partnerships with inclusive patient organisations and to champion diversity within national and international healthcare policy forums.

Methodology and Limitations

The *Inclusive Voices in Patient Organisations* report is based on a robust mixed-methods research approach, combining analysis of crowd-sourced survey data with qualitative case study insights. Research efforts were concentrated on examining leadership diversity and governance structures across eight countries.

Nonetheless, the report acknowledges several limitations:

- Inconsistent data collection practices across different countries and sectors.
- Potential participation bias, as organisations already engaged in DEI efforts were more likely to contribute data.
- Challenges in cross-country comparisons due to differing legal frameworks, cultural norms and definitions of key demographic categories.
- The reliance on self-reported information, which can result in gaps or inconsistencies in data quality.

As such, the report presents valuable indicative trends rather than offering a fully comprehensive or standardised global analysis.

Conclusion: Sustained Commitment for Lasting Change

The *Inclusive Voices in Patient Organisations* report delivers a powerful and unequivocal message: diversity, equity and inclusion are not optional extras but essential foundations for building legitimate, effective and resilient patient advocacy organisations.

Embedding DEI principles at every level of governance and practice is crucial. Policymakers, funders and healthcare institutions must play a proactive role in enabling sustainable change through consistent support, clear legal frameworks and appropriate investment.

Achieving true and lasting inclusion demands institutional bravery, unwavering accountability and a steadfast refusal to yield to external resistance. By embracing the recommendations outlined in this important report, patient organisations can lead the charge towards a future where every patient's voice is genuinely heard, valued and acted upon.

Conflict of Interest

None

references

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Care Optimisation

Impact of the New Regulations on the Health Technologies Evaluation

Regulation (EU) 2021/2282 harmonises health technology assessment across EU Member States through Joint Clinical Assessments, improving consistency, transparency and stakeholder involvement. It supports faster access to innovative health technologies while allowing national control over non-clinical evaluations and reimbursement decisions, aiming to strengthen evidence-based decision-making and healthcare system sustainability.

SUSANA ÁLVAREZ GÓMEZ

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key points

- The regulation harmonises health technology assessments across EU Member States.
- Joint Clinical Assessments aim to speed up access to innovative health technologies.
- National authorities retain control over reimbursement and non-clinical evaluations.
- The process ensures greater transparency and stakeholder participation.
- Consistent methods support evidence-based and equitable healthcare decisions.

Introduction

We all agree that the incorporation of health technologies is a fundamental pillar in the protection of citizens' health. However, their importance does not end with this role, which is so beneficial to health; technologies are also a source of knowledge, research and innovation and a driving force for industrial and economic development.

But what do we mean by health technology? This term includes medicines, medical devices, *in vitro* diagnostic tests, medical and surgical procedures, therapies and digital medical products, organisational models and measures for the prevention, diagnosis or treatment of diseases. In short, health technology is any instrument, procedure, medicine, organisational system or innovation applied to healthcare.

According to the World Health Organisation (WHO), health technology is "the application of organised knowledge and skills in the form of devices, drugs, vaccines, procedures and systems developed to solve a health problem and improve the quality of life".

However, each of these technologies has its own regulatory standards and requirements to be applied in clinical practice to ensure quality, safety and efficacy. In order to determine whether a health technology fulfils the purposes for which it was created, a scientific evaluation process based on verified data is required to allow health authorities to assess its efficacy and decide whether to incorporate it into the health system. This process is called Health Technology Assessment (HTA).

Background

So far, assessment processes in the EU are fragmented. Each Member State conducts its own assessments, leading to duplication of efforts, inconsistent results and delays in patient access to innovative therapies.

Furthermore, although the conceptual framework of the HTA is very similar across EU member states, the demand for and pace of uptake of different types of technology is very different across EU countries. For this reason, Regulation (EU) 2021/2282 aims to address

these inequalities by harmonising HTA processes across Member States, allowing for faster, fairer and more collaborative assessments.

To achieve this, Regulation (EU) 2021/2282 has opted for a separate set-up for medicines and medical devices on the one hand and other technologies on the other. This is because traditionally the requirements for the marketing authorisation of medicinal products and/or medical devices have been different and the industries of the two types of technology are also different. To point out a difference, the use of medicinal products does not depend on the skill of the professional whereas the use of a medical device often requires the skill of the professional using it and sometimes also the characteristics and conditions of the healthcare facility in which it is to be used.

This dual configuration is what Spain has maintained with the Spanish Agency for Medicines and Health Products (AEMPS) on the one hand, and the Network of Agencies for the Evaluation of Health Technologies and Services of the National Health System (RedHTA) on the other. Although these two institutions are independent and use different methodologies, they have shared the same objective, which is to inform the decision-making process for incorporation into the portfolio of benefits and public funding.

> "Health technologies are a key driver of economic growth and innovation."

Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021

In Europe, the HTA is regulated by Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021 on health technology assessment and amending Directive 2011/24/EU on the application of patients' rights in cross-border healthcare.

Regulation (EU) 2021/2282 entered into force on 11 January 2022 and has been applied since 12 January 2025.

This Regulation aims to help member states make informed decisions, both on scientific clinical and non-clinical aspects, when deciding whether or not to incorporate a health technology. To this end, it proposes standards and a common methodology to avoid new evaluations in each country, with the ultimate aim of advancing patient access to these innovations.

To this end, the Regulation establishes a supporting framework and procedures for cooperation between Member States on health technologies at EU level, the so-called Joint clinical assessments (JCAs), and a mechanism whereby all information, analyses and evidence necessary for the Joint Clinical Assessment of health technologies are submitted by the health technology developer only once at EU level.

Joint Clinical Assessments

The introduction of Joint clinical assessments (JCAs) in the new HTA Regulation (EU) 2021/2282 aims to streamline the HTA process across the European Union, although some competences (such as the decision whether or not to reimburse a new technology) will remain a national prerogative. We can therefore say that CCPs are EU-wide assessments of the clinical value of new technologies.

The health technologies subject to joint clinical assessments are:

(a) Medicinal products for human use, for which an application for marketing authorisation has been submitted in accordance with Regulation (EC) No. 726/2004.

(b) Medicinal products authorised in the Union for which a joint clinical assessment report has been published, in order to vary a marketing authorisation for a new therapeutic indication.

(c) Medical devices classified in classes IIb or III in accordance with Article 51 of Regulation (EU) 2017/745.

(d) *In vitro* diagnostic medical devices classified in class D in accordance with Article 47 of Regulation (EU) 2017/746.

In relation to the joint assessment model, Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021 establishes four clinical and five non-clinical domains for medicinal products and medical devices, identified by the European HTA Network (EUnetHTA).

The clinical domains are:

- Identification of a health problem and current health technology
- Analysis of the technical characteristics of the new technology
- The relative safety of the new technology
- The relative clinical efficacy

In Spain, the Ministry of Health has published a draft Royal Decree regulating health technology assessment ("PRDHTA"). While Spanish regulations cannot deviate from or oppose the provisions of EU legislation, the PRDHTA seems likely to establish a number of additional requirements and local specifications that would be mandatory at the national level. The five non-clinical domains for medicines and medical devices identified are:

- Cost and economic evaluation
- Ethical aspects
- Organisational aspects
- Social aspects
- Legal aspects

The resulting joint clinical assessment report should be taken into account by the Member States, without prejudice to each State conducting further clinical analyses as necessary, nor does it restrict the ability of each State to conduct non-clinical evaluations. In addition to annexing the joint clinical assessment report to the national STD report, the Member State must report on how each joint clinical assessment report was duly taken into account in the assessment at national level.

Ultimately, Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021 aims to make the HTA an evidence-based scientific process that enables competent authorities to determine the relative effectiveness of existing or new health technologies, and focuses specifically on the added value of a health technology compared to other existing or new technologies.

Any development at national level in European Union (EU) member states has to be aligned with the above-mentioned Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021.

In this regard, work is underway in Spain on the draft Royal Decree regulating technology assessment in Spain, which is expected to be published in the coming weeks.

Coordination Group

Regulation (EU) 2021/2282 of the European Parliament and of the Council of 15 December 2021 establishes a Coordination Group that adheres to the following criteria:

- It is made up of members appointed by each Member State.
- Its role is to oversee, review and approve the joint technical work carried out by the sub-groups of national representatives for joint clinical assessments and joint scientific consultations.
- It aims to ensure that the joint work performed is of the highest quality, HTA international standards of evidence-based medicine and is timely.
- It must conduct its activities in an independent, impartial and transparent manner.

> "The HTA is not an end in itself but a means to make the best decisions."

With regard to independence, impartiality and transparency, the first thing to remember is that the HTA is not an end in itself but a means to make the best decisions. Its outcomes are used to inform decisions regarding the allocation of budgetary resources in healthcare, such as the setting of price levels or reimbursement for health technologies.

In order to ensure inclusiveness and transparency of joint work, the Coordination Group should collaborate and consult widely with stakeholder organisations that have a willingness and vocation for Union cooperation on STD. These include patient organisations, health professional organisations, clinical and academic societies, health technology developers' associations, consumer organisations and other non-governmental organisations in the field of healthcare. A network of stakeholders should be established to facilitate dialogue between these organisations and the Coordination

Group, and this dialogue should be transparent. In this regard, the regulation indicates that patients, clinical experts and other relevant experts involved in any joint work shall not have any financial or other interest in the health technology developers' industry that could affect their independence or impartiality. We cannot forget that these groups are affected by the HTA and are also covered by Regulation (EU) 2021/2282.

and training materials to improve the training and empowerment of patients, caregivers and users.

The second group of stakeholders consists of health technology developers. It is an advantage for this group that they can submit all the information, data, analyses and other evidence needed for the joint clinical assessment in one go at Union level. However, the Regulation does not restrict Member States' ability to

> "Patients have knowledge, perspectives and experiences that are unique and can make an essential contribution to HTA."

To ensure appropriate participation, the Coordination Group will set up sub-groups, in particular for joint clinical assessments, joint scientific consultations, identification of emerging health technologies and the development of methodological and procedural guidance.

Stakeholders

The first category of stakeholders is represented by patients and patient organisations as beneficiaries of new technologies that contribute to improving their level of health. In this respect, CCPs can effectively facilitate market access and contribute to the timely availability of innovative health technologies for patients.

In this respect, it should be noted that the Spanish Network of Health Technology Assessment and Benefit Agencies of the National Health System (RedHTA) issued a public statement on the progressive strategy of involving patients in the health technology assessment process. This statement, signed jointly with the Ministry of Health, Social Services and Equality (MSSSI), recognises *"the need and value of the active participation and collaboration of patients, caregivers and users to improve decisions related to health technologies in the National Health System. Patients have knowledge, perspectives and experiences that are unique and can make an essential contribution to HTA. Knowing, understanding and harnessing this knowledge allows patients' needs to be met more accurately, while improving the sustainability, transparency, accountability and democratisation of the decision-making process"*. This engagement strategy, initiated in 2017, takes the form of directly inviting technology-related patient organisations to evaluate and develop information

perform non-clinical assessments on the same health technology neither before nor after the publication of a joint clinical assessment report. That is why Member States can request additional information needed for complementary clinical analyses from the developers. Another important advantage is that developers can use real-life data which can improve their market positioning. What health technology developers must respect are the deadlines for submitting the requested information.

Healthcare professionals and their organisations such as scientific and academic societies also cooperate with the Coordination Group. Regulation (EU) 2021/2282 states that these experts should advise administrations on the potential value of a new medicine or medical device but should not have a relationship with the developers of that innovation. The point is that, normally, the most clinical research is conducted by doctors who have extensive knowledge of a pathology and understand the potential contributions of new medicine or medical devices, and this requires participating in trials and collaborating with the industry.

Joint Scientific Consultations

The Coordination Group will conduct joint scientific consultations to exchange information with health technology developers on their development plans for a particular health technology. These consultations will generate evidence to meet the likely evidence requirements of a subsequent joint clinical assessment on that health technology. The scientific consultation will result in a final document indicating the scientific recommendation being made and will address, in particular, all relevant design aspects of the clinical studies or clinical research design, including

comparators, interventions, health outcomes and patient populations.

Some Impacts

European health technology assessment agencies, including the Spanish Agency for Medicines and Health Products (AEMPS), together with the European Medicines Agency (EMA), have published a Report setting out a framework for collaboration between medicines regulators and health technology assessment agencies in Europe, aiming to create synergies between regulatory assessment and health technology assessment, as set out in Regulation (EU) 2021/2282.

Some of the key points on medicines assessment jointly identified are the following:

Scientific evidence in the form of randomised studies is preferred, both for benefit/risk assessment and for the evaluation of comparative effectiveness of medicines.

- Improved collection, analysis and reporting of outcomes other than clinical trial endpoints can substantially reduce uncertainty in decision-making.
- The availability of individual patient data from clinical trials could improve the quality of evidence, indirect comparisons and other analyses across studies.
- Better sharing of data, both from clinical trials and from registries and observational studies with real-world data, could help to interpret scientific evidence.
- They share a common interest in developing frameworks that support structured and informed decision-making, even under conditions of uncertainty.

Ultimately, this collaboration aims to create synergies between regulatory assessment and health technology assessment.

Next Steps

The scope of Regulation (EU) 2021/2282 will be extended to include orphan medicines from 2028, and all new medicines authorised by the European Medicines Agency (EMA) from 2030. These assessments will provide a single, harmonised assessment that Member States can use for national pricing and reimbursement decisions.

Conclusion

Health technologies are a key driver of economic growth and innovation and are part of an overall market for healthcare spending that represents 10% of the European Union's gross domestic product. The HTA aims to help Member States build and maintain sustainable health systems and encourage innovation that delivers better outcomes for patients.

The EU HTA Regulation (EU) 2021/2282 aims to raise the level of health protection for patients and users and to ensure the proper functioning of the European internal market for medicinal products, medical devices and *in vitro* diagnostic medical devices. To achieve this, it establishes a framework for the cooperation of Member States and the necessary measures for joint clinical assessment of health technologies.

The Regulation introduces significant updates, including the following:

1. Faster and more coordinated assessments

Member States will have to include the European findings in their own national report, although these European findings will not be binding in relation to national reimbursement procedures.

2. Greater transparency

The process is more open, with clear summaries that should include stakeholder input from the CCP reports for patients and stakeholders.

3. More input from patients and experts

Patients and healthcare professionals play a greater role in contributing to the CCP and Joint Scientific Consultations (JSC).

4. Consistent methods across Europe

Harmonised procedures make assessments consistent and comparable across Member States, promoting equity in decision-making.

5. Reducing duplication of effort

Centralising assessments at EU level reduces duplication of work and will allow Member States to tailor the results to their local health systems.

Conflict of Interest

None.

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Governance & Leadership

Creating Your Leadership Legacy: Aligning Purpose, Passion and Impact

Healthcare leaders can create a lasting legacy by aligning purpose with values, building authentic relationships and fostering trust. Emphasising emotional intelligence, daily intentional actions and psychological safety, values-driven leadership enables lasting impact. A true legacy is measured not by titles, but by lives influenced and communities strengthened through consistent, compassionate leadership.

DR. DAVID L. SCHREINER, PH.D.

Fellow of the American College of Healthcare Executives (FACHE) | Dixon, USA

key points

- Legacy is defined by how others experience your leadership, not just achievements.
- Values-driven leadership inspires action and fosters authentic relationships.
- Emotional intelligence is essential for creating trust and psychological safety.
- Daily intentional actions shape a meaningful and lasting leadership legacy.
- Great leaders align personal purpose with organisational impact and community care.

Imagine, for a moment, that you've announced your retirement from your leadership role. You're walking through the hospital or office for what might be the last time. People stop to shake your hand, share heartfelt stories and sincerely say, "Thank you." What do you hope they're expressing in that moment? How do you want to be remembered? Welcome to the profound yet accessible concept of your leadership legacy.

Your leadership legacy transcends a mere record of accomplishments; it is the lasting impression you leave on those you've impacted. Especially within healthcare, where stakes are high and human connections critical, leaders wield enormous influence not through hierarchical authority alone, but through meaningful relationships, consistent actions and steadfast values. Crafting your legacy, therefore, is an intentional journey—shaping tomorrow through deliberate engagement today.

Defining Your Legacy

While the idea of legacy can seem grand and perhaps intimidating, at its essence, it is deeply human and relational. In their insightful work "Your Leadership Legacy" (2006), Robert Galford and Regina Fazio Maruca assert that legacy is fundamentally how others experience your leadership. Are you remembered as a passionate advocate tirelessly championing your community's healthcare needs? Perhaps you're seen as an innovative builder who introduced entrepreneurial energy into healthcare delivery. Or maybe you're the empathetic guide whose thoughtful advice and genuine care nurtured countless professional journeys.

In my leadership journey, I've realised that a meaningful legacy is grounded in authenticity and sincere relational connections. When I recently spoke at the HIMSS conference alongside Sara Johnson, we

highlighted that your legacy emerges naturally when your vision aligns seamlessly with personal values—a concept central to my work, which I call Values-Driven Leadership.

practical, everyday application. The source question I try to solve is this: How can I engage in a more meaningful way with the people who matter the most?

Today's leaders have the tremendous advantage that organisations increasingly recognise the

> "Your leadership legacy transcends a mere record of accomplishments; it is the lasting impression you leave on those you've impacted."

Values-Driven Leadership: The Core of Your Legacy

Values-driven leadership involves leveraging core beliefs to inspire purposeful action, encourage innovation and enhance organisational well-being. In my best-selling book, "Be the Best Part of Their Day, Supercharging Communication with Values-Driven Leadership" (Schreiner 2024), I emphasise that truly transformative leaders constantly learn, bravely challenge norms and passionately innovate for others' betterment. The power of this philosophy lies not merely in aspiration but in its significance of "soft skills"—traits such as empathy, humility and emotional intelligence—as foundational competencies for executive roles. More companies are prioritising empathy, humility and self-awareness over administrative, financial and technical skills, talent leaders told *Fortune* (Colvin 2023). Becker's Hospital Review (2023) confirms that healthcare boards now seek leaders who excel in emotional and relational capabilities, acknowledging these as vital for sustained success. Such leaders foster psychological safety, where employees freely share ideas, voice concerns and

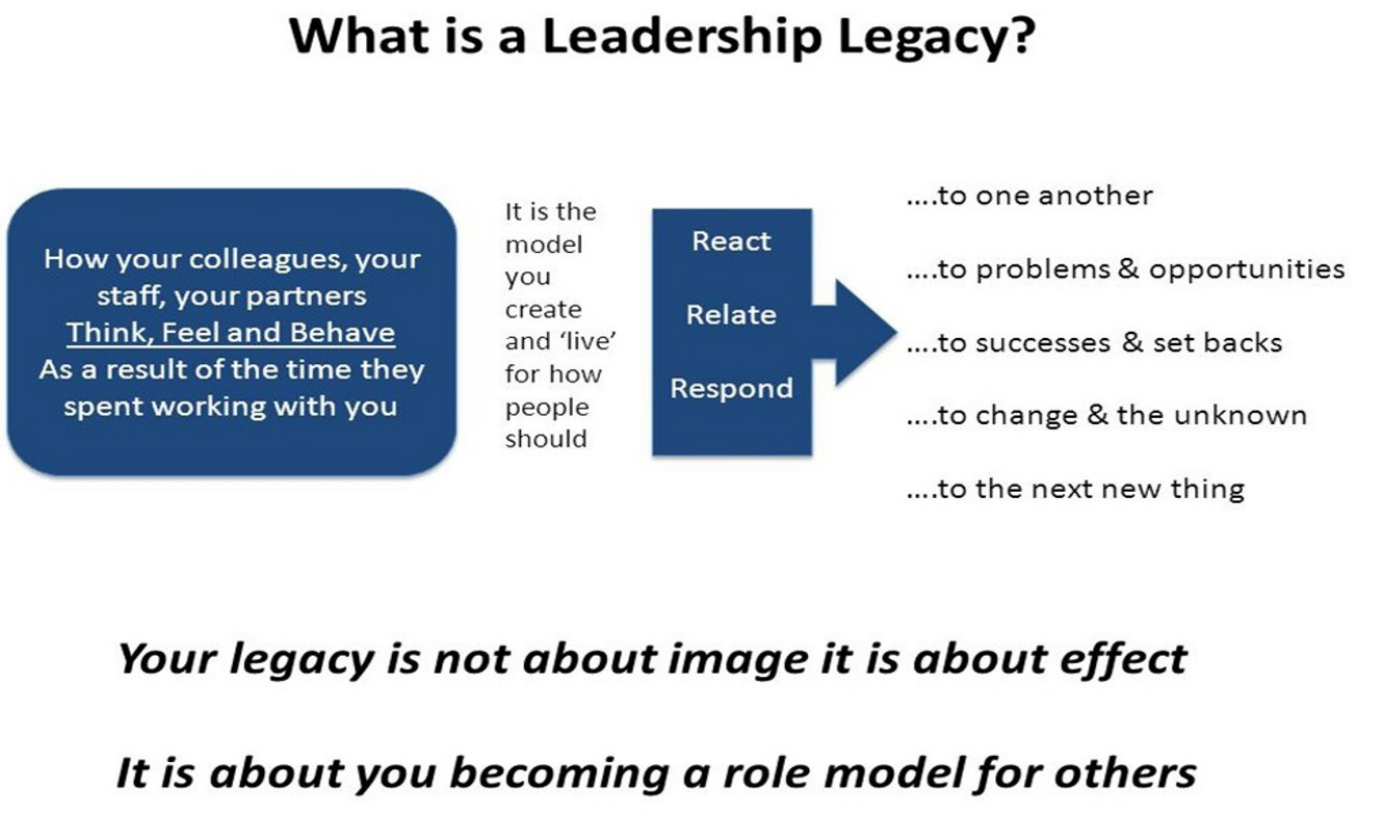

Figure 1. What is a Leadership Legacy? Source: HIMSS. (2025). Creating Your Leadership Legacy [Conference Presentation]. HIMMS Executive Summit.

innovate without fear—an environment critical to growth and resilience, as highlighted by Amy Edmondson's extensive research (Nembhard & Edmonson 2006).

Crafting a Legacy with Intention

To construct a meaningful, enduring legacy, leaders must begin with deep self-awareness. Reflect on this question: "What unique contribution can only I provide?" Whether you excel as an Ambassador smoothing challenging relationships, an Advocate fiercely promoting essential causes or a People-Mover adept at nurturing talent, your leadership style should reflect your authentic self.

Building Psychological Safety and Trust

Legacy-minded leaders deeply understand the role of psychological safety in organisational excellence. Amy Edmondson's groundbreaking work (Nembhard & Edmonson 2006) demonstrates that teams excel in environments built on trust and openness. Employees must confidently express their thoughts, concerns and innovations without fear. For healthcare leaders, cultivating this psychological safety demands deepens and organisational effectiveness skyrockets. Such leaders are cherished not just for their professional accomplishments but also for their authenticity, warmth and kindness.

> "The source question I try to solve is this: How can I engage in a more meaningful way with the people who matter the most?"

In my own experience, I've embraced my roles as a Relationship Builder and Change Leader, anchored deeply in the ACE model—Ask, Connect, Energise. This framework has profoundly influenced my ability to cultivate meaningful relationships. By consistently asking insightful questions, connecting authentically on a personal level and energetically engaging stakeholders, leaders transform ordinary interactions into extraordinary opportunities for lasting impact.

Personal Connections: The Lifeline of Leadership

Creating genuine personal connections is particularly crucial in healthcare settings. Hospitals are not merely institutions; they're often community lifelines facing unique and daunting challenges—from financial instability to staffing shortages. Effective leaders recognise that their legacy is intricately woven through these empathetic, personalised interactions.

My research on rural hospital leadership underscores that the most effective leaders intentionally engage diverse stakeholders—employees, physicians, board members, executives and community members—through genuine, heartfelt interactions. When a leader makes every interaction a positive, memorable experience—truly the best part of someone else's day—a powerful shift occurs. Morale improves, loyalty vulnerability and transparency. Leaders who candidly admit mistakes, actively seek feedback and genuinely listen to it build trust, invite innovation and ensure organisational agility. Such transparency isn't a weakness; it's a profound strength.

The Legacy Mindset: Daily Actions

Crafting your leadership legacy requires purposeful daily actions guided by clear intent. One powerful practice I advocate is developing and consistently updating a Leadership Tree—a personal legacy statement and values roadmap. Updating my leadership tree quarterly ensures clarity, alignment and intentionality. A favourite legacy statement of mine states, "Understand and continually assess my 'Why.' When initiating change, start small, remain authentically myself in every setting and maintain curiosity, openly challenging my own assumptions."

Regularly revisiting your Leadership Tree anchors your purpose, guiding daily decisions and behaviours toward positive organisational and community outcomes. With this intentional clarity, your actions naturally align with your broader vision, transforming daily leadership into enduring impact.

Leaving a Lasting Impact

Your leadership legacy ultimately reflects your courage to challenge norms, your ability to forge meaningful connections and your unwavering commitment to empower others. Exceptional legacy builders embrace a philosophy of "And" (see Fig. 2), recognising it's possible to uphold high standards rigorously while caring deeply for individuals. They innovate creatively and constantly question limiting beliefs.

Think of your leadership as an ongoing dialogue between teacher and learner, perpetually ready to adapt, evolve and grow. Each interaction becomes a powerful opportunity to positively affect someone's life. Tomorrow, as you engage colleagues and staff, pause momentarily and ask yourself, "Did I genuinely make today better for those around me?"

Healthcare leadership legacy isn't merely historical; it actively shapes the future. Passionately, authentically and intentionally embrace your role. Let every decision, every conversation and every meaningful connection reflect your enduring legacy vision.

A Legacy Worth Building

In my decades leading Katherine Shaw Bethea Hospital, I've discovered the profound impact of values-driven leadership. My legacy is measured not by titles or accolades but by lives improved, futures shaped and communities strengthened. The beautiful reality of creating a leadership legacy is its everyday accessibility—every moment holds the potential to create a meaningful, enduring impact.

> "Your leadership legacy is the story others will tell long after you've stepped away."

Ultimately, your leadership legacy is the story others will tell long after you have stepped away. Make it a story filled with purpose, passion, compassion and transformative impact. Your legacy isn't merely something you leave behind; it's something vibrant, alive and continuously unfolding through the lives of those you have influenced.

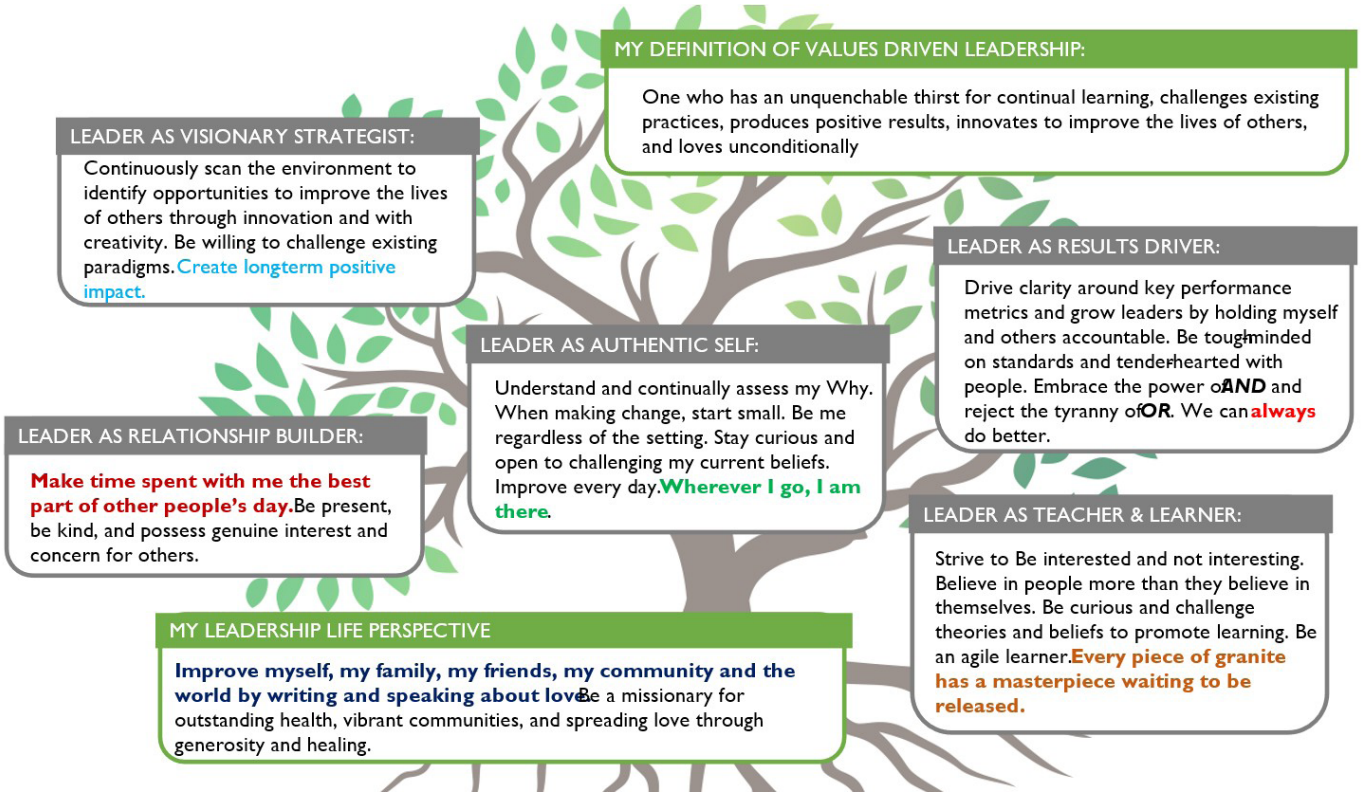

Figure 2. What is Values-Driven Leadership? Source: Schreiner DL (2024)

Conflict of Interest

The author receives royalties from Advantage Media. He also holds the position of Executive in Residence in Vizient, Inc.

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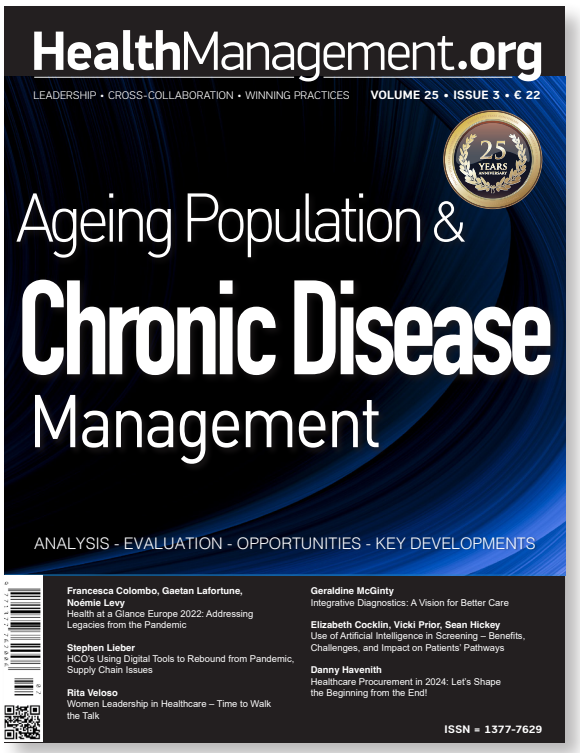
WHAT'S COMING NEXT?



COVER STORY:

Ageing Population & Chronic Disease Management

Innovative strategies in chronic disease management, addressing the challenges of an ageing population, are in the spotlight. This issue will highlight advancements in technology, personalised care, new care models, multi-disciplinary approaches and health system integration aimed at improving outcomes, reducing costs, increasing value and enhancing the quality of life for patients.

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