Novelty vs. Legacy

Editorial

Novelty vs. Legacy

Prof Christian Lovis
Editor-in-Chief, IT
HealthManagement.org
Head – Division of Medical
Information Sciences |
University Hospitals of Geneva |
Switzerland
Professor of Clinical Informatics |
University of Geneva | Switzerland

Innovations of today are the legacy of tomorrow

The COVID-19 pandemic has affected nearly every aspect of life and work. One of the its consequences has been the acceleration in numerous processes with innovative approaches to be able to face the cataclysmic rise in resource requirements for critically ill patients. Some examples are the emergence of novel approaches to immunization, or the unprecedented rise in virtual care and telemedicine. Healthcare has to change, and it needs to change not only fast but for the better. And with any change, various gaps and discrepancies are created along the way. Implementation of new technology solutions is hindered by existing legacy systems. New processes imply the necessity to acquire new skills. Long-term investment strategies are overshadowed by more urgent needs.

In this issue, we explore how healthcare leaders and healthcare providers address these challenges and what approach works best.

Prof Lluís Donoso-Bach, Prof Tienush Rassaf, Miguel Cabrer, Dr María Jesús Díaz Candamio, Dr Elikem Tamaklo and Dr Ursula Mühle share the most challenging experience of introducing something new in their practice.

Dr Rafael Grossmann talks about the challenges of being a disruptor in healthcare and the prospects of embracing the inevitable progress on the way from 'sickcare' to 'healthcare'. Hans Erik Henriksen talks about innovation and digitalisation in healthcare and how the pandemic has accelerated this process and has provided healthcare systems the opportunity to grab and build on this progress.

Prof Davide Caramella reports the use of a medical app that allows to personalise a digital 3D model of the liver thus highlighting how digitalisation can play an important role in simplifying surgical planning and assisting in the operating theatre. Sameena Conning outlines the strategies of facilitating AI-driven transformation in European healthcare with a new EIT Health Think Tank.

We also report on the Reset 2021 digital conference, organised by HealthManagement.org with Alexandre Lourenço as the moderator and Prof Davide Caramella, Dr Rafael Grossmann, Christian Hay, John Nosta, Prof Robert Vander Stichele and Dr Rafael Vidal-Perez as panellists.

In the Management Matters section, Dr Ton Hanselaar and Matthijs van der Linde look into the success factors that help bring the VBHC concept to practice.

Prof Geraldine McGinty provides an overview of the lack of representation of women and other minoritised populations in healthcare and their relative absence from positions of power and leadership. Bari Berger, Geir Arnhoff and Iris Meyenburg-Altwarg explain why management should be interested in competency rather than 'skills'.

In the Winning Practices section, Dr Thierry Klein shares an experience of a regional hospital in Belgium introducing a disruptive 'only once' approach to deploy a SNOMED CT coded patient summary.

In conclusion of this editorial, I would like to say that changes are also happening in-house. After several years of my being the HealthManagement.org Editor-in-Chief – IT, I welcome Prof Werner Leodolter, CIO of KAGes and Professor at KFU Graz, as my successor, while I continue to be part of the Editorial board. It has been a truly rewarding collaboration with a fantastic, enthusiastic and engaged team and I wish Prof Leodolter all the best in this new capacity.

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

Happy Reading!

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Have your say. Engage!

Healthcare is known for its slow pace of change. Nevertheless, change is inevitable and currently accelerated by the pandemic. Healthcare organisations need to update and upgrade their operations, but along the way gaps are created. Smooth operation is hindered by discrepancies of existing and modern technology. Experienced staff is faced with the need to acquire new skills. Investments are necessary to ensure an organisation's livelihood in the future. How do leaders address these challenges? What approach works best? Should there be revolution or evolution? This and much more in this issue.

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Contributors

Geir Arnhoff, Norway
Holding an MSc from Norwegian University of Science and Technology, Geir founded Dossier Solutions in 2000, developing software competency management for European and U.S. healthcare systems.

Bari Berger, USA
For more than 20 years Bari worked in Paediatric and Adult Emergency Care, Med/Surg Nursing, Orthopaedics, etc. She was clinical director for multiple governing agency programmes in the U.S. and built education programmes in hospitals.

Miguel Cabrer, Spain
Miguel Cabrer is a Digital Health Entrepreneur with a special interest in transforming healthcare though real patient engagement. He is participating in initiatives for image exchange, patient portability and AI & Chatbots to facilitate patient engagement.

Dr María Jesús Díaz Candamio, Spain
Dr Candamio is a specialist in radiology working at the Musculoskeletal Imaging Unit of the Radiology Department of the University Hospital of A Coruña.

Prof Davide Caramella, Italy
A member of the Imaging Editorial Board at HealthManagement.org, Davide Caramella is Professor of Radiology and Vice Chairman of the PhD programme on Clinical and Translational Sciences at the University of Pisa. He is also Member of the "Dose Management Working Group" of ESR.

Sameena Conning, UK
Currently EIT Health as External Affairs Director, Sameena Conning has worked for 25 years in corporate and external affairs roles in the pharmaceutical, biotech and healthcare industries, including Biogen, Novartis and AstraZeneca.

Prof Lluís Donoso-Bach, Spain
is chairman of the diagnostic imaging department at the Hospital Clínic of Barcelona and Professor of radiology at the University of Barcelona. He has has served the European Society of Radiology in various capacities, including as President in 2015–2016.

Dr Rafael Grossmann, USA
Rafael Grossman is a practicing surgeon in the USA as well as a global speaker, healthcare and education technologist and futurist. His view is technology is a complement to the most important qualities of a medical provider: compassion and empathy.

Dr Ton Hanselaar, Netherlands
With background in medicine and medical management, Dr Hanselaar is on the advisory board of VBHC Center Europe and chairman of the VBHC Prize Ceremony. He worked as a pathologist and associate professor at Radboud University and was CEO of the Dutch Cancer Society, Pantein and Syntein.

Hans Erik Henriksen, Denmark
Hans is an independent consultant specialised in healthcare and digital health. Until March 2021, he was CEO of Healthcare DENMARK. He has significant experience from different executive positions in healthcare during the last 20 years.

Dr Thierry Klein, Belgium
Dr Klein is coordinator of medical information and security advisor at CHR Haute Senne Hospital. As scientist collaborator at ULB Public School of Health, he is a lecturer and coordinator of the teaching unit 'Management of the medical information'.

Contributors

Jason Knox
As Solutions Manager for Enterprise Imaging (EI) with Agfa HealthCare, Jason Knox has 25+ year experience in Imaging transitioning from film to departmental PACS and now to EI platforms that provide multiple services including VNA, Enterprise Viewer, diagnostic workflows, etc.

Prof Christian Lovis, Switzerland
A medical doctor and Professor of Clinical Informatics at the University of Geneva, Prof Lovis contributed significantly to the Swiss Federal strategy for eHealth and law on shared patient records. He is the President of the European Federation of Medical Informatics and has participated in several startups.

Prof Geraldine McGinty, USA
Prof McGinty is President, American College of Radiology and a radiologist who specialises in the detection and diagnosis of breast cancer. She is a passionate advocate for quality imaging and its vital role in the delivery of healthcare.

Iris Meyenburg-Altwarg, Germany
A veteran expert in nursing education, Iris has been a consultant for numerous projects and part of ENDA, WANS and STTI. After leaving her senior position at the Education & Training Academy at MHH (Germany), she now runs Com-P-Tense, an independent consultancy.

Dr Ursula Mühle, Germany
Senior expert in health management, innovation, and education, Dr Mühle is supporting the Bavarian Health and Food Safety Authority in the pandemic management. Previously she worked as director of education at EIT Health representing more than 90 partners across Europe.

Sourabh Pagaria
Sourabh Pagaria is responsible for Siemens Healthineers' business in Southern Europe. He is a thought leader on how Data, Artificial Intelligence and joint public-private approach can reshape the future of healthcare.

Stefano Palma, Italy
Stefano Palma is the CEO & Founder of Medical-Note Srl, a start-up that develops software and apps for healthcare professionals. He is also the CEO & Founder of For-Mat Srl, a consultant network providing services in marketing and sales, and Business Development Director at Wolfyr Ltd.

Prof Tienush Rassaf, Germany
Prof Rassaf is the Department Head and Chair at the Westgerman Heart- and Vascular Center at the University of Essen, Germany. He is also the Editor-in-Chief for Cardiology at HealthManagement.org.

Dr Elikem C. Tamaklo, Ghana
After completing his medical studies in the UK, in 2015 Dr Tamaklo became the Managing Director of Nyaho Medical Centre in Accra. He actively promotes cooperation between the public and private healthcare and holds multiple awards as a young leader and entrepreneur.

Matthijs van der Linde, Netherlands
With degrees in Human Movement Sciences and Management & Entrepreneurship in Health & Life Sciences, Matthijs is senior programme advisor of The Linnean Initiative in the Netherlands, with the ambition to accelerate the transition towards a VBHC system.

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Moderator
Christian Lovis

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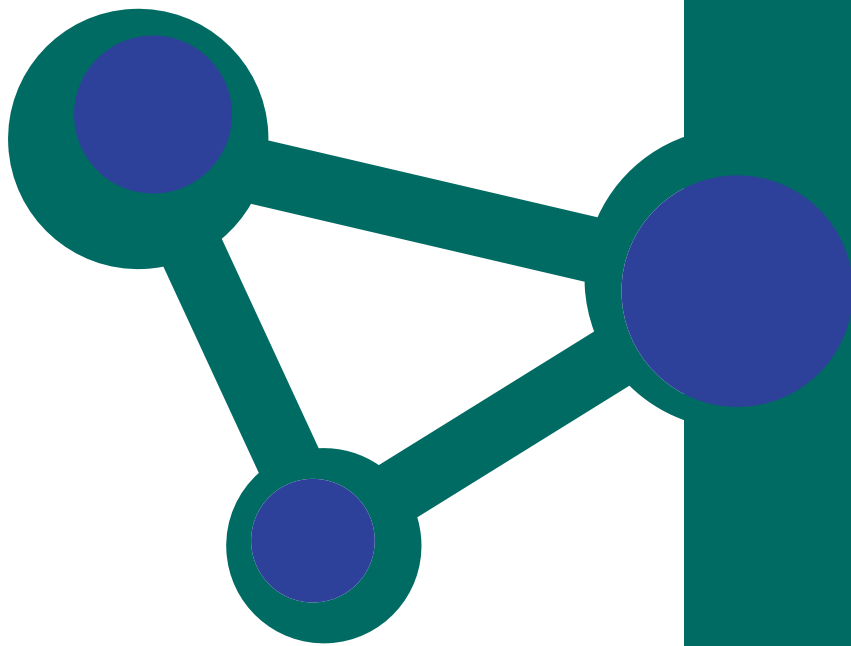
MANAGEMENT MATTERS

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VBHC in Netherlands: Success Factors

⬢ **Author:** <u>Dr Ton (AGJM) Hanselaar</u> **| Advisory Council member | Value-Based Health Care Center Europe | Amsterdam |** Netherlands

⬢ **Author:** <u>Matthijs van der Linde</u> **| Senior programme advisor, Linnean Initiative | National Health Care Institute | Amsterdam |** Netherlands

A team of researchers from the Netherlands expand on their previous findings on issues accompanying the VBHC implementation, looking deeper into the success factors that help bring the VBHC concept to practice.

✓ Key Points

Reported success factors for VBHC implementation are:

- 'Value' for the patient as the core purpose of care
- A responsible, well-balanced Multidisciplinary Team
- A Vision and a Plan
- Good understanding of the Medical Condition and

Outcomes set

- VBHC as a change process
- Involved stakeholders
- Good contracts on Financing – Reimbursement
- An Improve Culture

Introduction

Healthcare is under pressure in many ways. In a recent study, the main problems in healthcare that greatly contribute to the pressure were outlined (Hanselaar and van der Linde 2020). The same study pointed out that many of these problems could be solved by wide value-based healthcare (VBHC) implementation. Since 2018, the Linnean initiative and the Dutch government programme, Outcome-Based Healthcare, try to accelerate the transition to a VBHC system in the Netherlands (Linnean initiatief). Given the great amount of resources that have been invested since, it seems relevant to know what factors are considered to be the most important for successful VBHC implementation. Dutch VBHC expert give their insights and opinions in this paper.

Research Question

The research question is: "Which success factors help to implement the VBHC concept in practice?" With the answers we want to create a best practice for healthcare providers, innovators and policymakers who want to start, have started, or plan to invest in a VBHC initiative, and inform those who have not (yet) come into contact with VBHC.

Methods

In 2019, a series of semi-structured interviews was conducted with 21 Dutch experts. The interviewees were approached by email (n = 3) and by telephone (n = 18) by one of the authors (TH). Each interview was summarised and sent to the interviewee for approval and/or supplementation. The interviewees were healthcare administrators, patients, doctors, healthcare insurers, business people working in healthcare, researchers, advisers and winners of the VBHC Prize. All were well-acquainted with the VBHC concept. Some interviewees appreciated remaining anonymous. Hence, no list with the interviewees' full names has been included in this paper.

The answers to the questions were compiled afterwards and divided into a number of overarching categories. The categorisation was based on common denominators considered relevant by the authors. No breakdown is made by background (director, advisor, etc.) of the interviewees.

Results

137 unique, distinctive answers were provided, which were categorised in 26 categories in 8 clusters. An overview of the clusters and subcategories is presented below.

What are the reported success factors for VBHC implementation?

1. To create 'value' for the patient is at the core of care
   - Organise care around the patient
   - Make sure the patient is informed
2. A responsible Multidisciplinary Team
   - The multidisciplinary team is well-balanced
   - The multidisciplinary team is task-mature
   - Team members are enthusiastic, confident and engaged
   - Good Leadership
3. Start with a Vision and a plan
   - There is a well-thought-out, recognisable Future Vision with feasible planning
   - IT Vision is ready
4. Choose and promote the Medical Condition, Outcomes, and IT Dashboard
   - Good understanding of the Medical Condition
   - Motivational, Reliable Outcomes set
   - An outcomes Thermometer has been developed
5. Behaviour and Culture deserve much attention
   - To put VBHC in practice is a change process
   - Agree on how you want to work together
   - Do what you are good at
6. Involve stakeholders
   - Internal
     - Board, management and medical staff are positively involved
   - External
     - Involve healthcare insurers
     - Engage regional partners

- Involve expertise of pharma and tech companies
- Simplified accountability to society

7. Good agreements and knowledge about Financing – Reimbursement
- Financial stability of Institution and Team
- Risk assessment made and Contracts concluded
- Appropriate remuneration

8. Improving is crucial
- Improve culture
- Good quality registration
- Provide proper training
- Innovations will help

Discussion

1) To create 'value' for the patient is the core purpose of care
Organise care around the patient

VBHC is doctor-driven and patient-centred. Patients must be an integral part of the multidisciplinary team and be involved in the entire development process of the VBHC process, starting with the development of an outcomes set. An outcomes set that has been

greatly from common language. This also applies to communication with fellow care providers. Conversation with patients about quality of life during the entire treatment process often provides direct feedback and valuable suggestions about the care provision and care providers.

"Questions from patients may arise such as: What does the effect of chemotherapy do with my wish to die with dignity? What will it do to me if a large neck muscle is removed for oncological reasons but I have a high chance of not being able to move my head properly afterwards? etc."

"Provide the information that is relevant to the patients. Information about mortality is important, but information about quality of life is firmly number 1 for them!"

2) A responsible Multidisciplinary Team
The Multidisciplinary team is well-balanced

Right at the start of a VBHC process, the composition of the multidisciplinary team and leadership must receive much attention (Porter and Lee 2021). The role of doctors is quite significant; putting doctors in the lead is seen as an important success factor,

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Value-based healthcare is data-driven healthcare. The choice to engage in VBHC also means the choice to adjust/improve the IT system

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developed by both care providers and patients better addresses the outcomes that are most important and relevant to patients. The patient's score on jointly developed outcomes set need to be discussed in the consultation room and patients need to be guided by their care providers to make informed health decision (shared decision-making) that matches their needs (both medically and quality of life). Sometimes several ingrained cultural and organisational barriers have to be overcome. For example, the care path to be followed for patients runs both inside and outside the hospital, something that healthcare providers in hospitals are often only slightly aware of.

"Really involve the patients, take them seriously. Don't talk about them, talk to them! This can be structured in specific patient panels or focus groups per condition. It increases patient participation."

"Not all patients will be able to do this immediately. Build a network of patients who understand this. Involvement of patient associations can be helpful. A patient advisory board can also be deployed to increase participation."

Make sure the patient is informed

Get clear insight of what really matters to patients (medical, psychological and quality of life aspects). Patients must and can indicate themselves what they consider important; they are the experts of their own lives. Focus on patients as being both users and suppliers of information leads to involvement and strengthens patient loyalty to care. Communication with patients benefits

and top-quality expertise in the teams can contribute to a more result-driven healthcare system. If, in addition to medical disciplines, patients, paramedics and nurses are present and motivated, the chance is greater that the implementation will be successful. In the eyes of patients, nurses and paramedics are often at least as important as the physician in achieving patient value. And, just like doctors, many nurses and paramedics want to work with outcomes data and are motivated to measure (meaningful) outcomes. The team must be adequately supported in business and analytical terms and be of sufficient size (8-13 people).

"Involve doctors from different disciplines in the team and in the selection of the outcomes. This way, you get less discussion about procedures and more about outcomes. They get to know each other better, also outside their own specialism, and often enjoy and find it valuable at the same time to communicate with each other, increasing mutual trust."

"Make sure that enthusiastic, renowned, dedicated doctors are involved; this is not necessary in a formal position, they can also play an informal, guiding role."

The Multidisciplinary team is task-mature

Teams must build on the necessary (para)medical and nursing competences with a good knowledge of the effectiveness of treatments and forms of communication with patients. Good knowledge of the VBHC care process with well-established roles, powers and responsibilities contribute to the best care.

Functioning like small companies, competent teams can act fairly independently. Frequent checking of outcomes, costs and improvement initiatives, by means of the Plan-Do-Check-Act (PDCA) cycle, is appropriate. In addition, a good connection with the care institution's Planning and Control system is important.

"A PDCA circle generates attention for improvement potential and can thus form a continuous systematic approach for planning, executing, analysing, learning and improving."

Team members are enthusiastic, confident and engaged

Enthusiasm and motivation about the goal to be achieved is a precondition for the success of VBHC implementation; this applies to everyone, be it a doctor, nurse, director, data analyst, or desk clerk. This is the case for mutual trust, sticking to the set course, and loyalty. Multidisciplinary collaboration means learning to build on each other and looking for solutions, also if these solutions are outside your area of expertise or even outside your organisation.

"Cross-discipline projects often provide insights into each other's working methods and thus increase mutual trust with a positive impact on motivation, cooperation and employee satisfaction."

how do we get the right data at our disposal? how do we want to continuously improve? can you solve it yourself?"

3) Start with a Vision and a plan
There is a well-thought-out, recognisable Future Vision with feasible planning

The actual choice of the hospital or care institution to engage in VBHC implementation is an important success factor for all VBHC projects within the organisation. Therefore, this must be communicated in a recognisable way. Thinking in cohesive connections (not being limited to your own department – hospital, but involving the entire system) can help the ambition. Also, it is important to immediately formulate a clear goal and a well-thought-out feasible plan.

"A success factor is the recognition that VBHC ultimately benefits patients through better diagnostics and treatment; the health of the population is increasing; caregivers become better at their job, with greater job satisfaction and positive well-being; improving costs in relation to quality (decreasing costs, financially and of people and resources)."

A well-thought-out project-based approach is required throughout the entire process of VBHC. Experiences argue against a Big Bang

"The team must be a safe environment so that healthcare providers dare to speak with confidence about their own competences."

Good leadership

Most often, leadership in VBHC is associated with medical leadership. In practice, however, the medical leader is often part of a small leadership team together with a nurse (practitioner) and/or manager. The leadership team is supported by an experienced, dedicated project manager with good understanding of the care process and the internal organisation. This team is responsible for day-to-day management; accountable for the results; prevents that the initiative fades into the background, delayed, or not finished at all; and maintains a good connection with the director who bears responsibility for the institution. The leader(s) must have good substantive knowledge and natural authority.

"Professional support of team and team management works well and promotes mutual cooperation. A Project Manager has to have good knowledge of VBHC and project-based work and have a relevant network to which questions can be submitted."

"Don't be penny-wise pound-foolish; rather bring in someone from outside than muddle through."

"Good leadership is leadership by example and inspiring; it is not bossing around. A leader keeps team members focused by asking questions like: what did we agree? what is the goal?

IT Vision is ready

Value-based healthcare is data-driven healthcare. The choice to engage in VBHC also means the choice to adjust/improve the IT system. The necessary IT systems, business intelligence and data analysis to measure, analyse and present care outcomes in an accessible manner are important and must be anchored in the daily practice of the organisation. An appropriate IT vision includes attention to storage, availability of data and seamless connection with the design of the process. There must be sufficient competent people and resources to implement the IT plan.

"Avoid having to enter data on multiple computers in practices; a known source of great frustration among doctors".

4) Select and promote the Medical Condition, Outcomes and IT Dashboard
Good understanding of the Medical Condition

The entire medical condition must be coherent and clearly defined by the multidisciplinary team. Immediately at the start, the care process for the medical condition must be mapped, whereby the various interests are also established, especially if multiple departments/organisations are involved in the care process.

Motivating, reliable Outcome set and cost knowledge

A well-selected, standardised, hierarchical outcome set, with relevant medical outcomes and PROMs is crucial for VBHC implementation (Porter and Teisberg 2006). Patients must and can

indicate themselves what they consider important (medical, psychological, quality of life). The set should be motivating to discuss together in the consultation room. The outcome set must be adequately supported by IT, periodically analysed and discussed in the Multidisciplinary Team.

After the care process and the outcome set are established, the cost price needs to be calculated. The Time-Driven-Activity-Based-Costing (TDABC) system can be helpful (Kaplan and Anderson 2004). The results are used to optimise the care process, for risk assessment and for value-based contracts with insurers.

"Limit the administrative burden to a manageable set and explain the necessity and method well. Low registration pressure is a precondition for avoiding frustration."

"Starting the cost-price calculation too early can demotivate healthcare professionals and not bring solutions closer" (Steinmann et al. 2020).

An Outcome Thermometer
A reliable thermometer is an important tool. Such a dashboard with the set of outcome indicators is useful for sharing in the consultation room and discussing options. A tailor-made dashboard for patients in the consultation room (near-real time) that is understandable is often rewarded with a high response rate of completed PROM questionnaires. For practitioners, the management dashboard provides (weekly/

monthly) insight into the care process, outcomes and costs and their progress, and can be used in team meetings to initiate improvement initiatives.

"Invest in a culture of transparency and benchmarking for (double) loop learning and improvement."

5) Behaviour and Culture deserve much attention
VBHC is a change process
You have to learn to provide value-driven care, invest energy and pay attention to doing the right things well. A well-thought-out project-based approach is required throughout the entire process of VBHC. Experiences argue against a Big Bang; small initiatives have higher success rates than big shows. By not starting big, using what has been proven elsewhere, and positive social interaction, team members can learn with and from one another and from others who have already started implementing VBHC.

"Approach VBHC as a long-term change process instead of a (small) project that you do on the side or that ends after the project deadline has passed."

"Don't make it too difficult; it is not rocket science! Strive for perfection, but don't wait for it! After setting up the team and the results, get started with the other domains of Porter to create progress, and do so ambitiously, but realistically."

"In a medical/nursing environment it is necessary to keep the pressure on and keep the pace up. Good project supervision

is in line with the systematic approach to VBHC initiatives. Healthcare providers often have more difficulty with this than, for example, engineers."

Agree on how you want to work together

By discussing how you want to work together to achieve the best possible outcomes for the patient at acceptable costs, the team must get information on what is important to all involved. On the one hand, such a working method focusses on the patient; on the other hand, also on the wishes and interests of the members of the MDT and, by extension, their care organisation. The guiding principle here must be that the interests must first of all be in line with what adds value for the patient.

"Put the whole system in the room. Sit around the table with patient, doctor, assistant, nurse and manager, and examine the care path together. In the discussion that will arise, the best evidence-based treatment can be connected, the best nursing care practice added, etc."

"Start with defining costs as the energy expended by the multidisciplinary team instead of costs in euro. This is a better source of motivation for the multidisciplinary team."

"A good relationship between care professionals in the workplace with the Board and well-informed and committed managers can result in a safe working and innovation environment."

External
Involve healthcare insurers

Health insurers and government traditionally look at healthcare from a macroeconomic perspective. In order for the macroeconomic effects to occur, several successful VBHC initiatives are needed. At local level, insurers can help move towards desired outcomes and costs control, sharing experiences and asking what they can do to help realise these types of VBHC initiatives. Budget negotiations between healthcare providers and healthcare insurers will then shift from fee-for-service towards fee-for-value, multiyear contracts. These contracts will need to cover, for example, (temporary) loss of income and/or extra costs.

"From a value perspective of the patient and the insurer, reduction of under- and overtreatment saves a lot of wasted care efforts, complications and side effects. On the other hand, a relatively expensive drug or aid can also prove to be a 'cheap' solution when viewed from the perspective of the entire care cycle."

Budget negotiations between healthcare providers and healthcare insurers will then shift from fee-for-service towards fee-for-value, multiyear contracts

Do what you are good at

Multidisciplinary collaboration gives joint responsibility and can facilitate more efficient task differentiation; let people do what they do best. Work redistribution can be stimulating for everyone, be they doctors, nurses, or outpatient staff.

"Have the questioning and discussion of the results done in the consultation room by the person who is best equipped for it."

"Pride is a great inspiration for team and individuals. All team members own the initiative and co-own the success. Experience also shows that top-down implementation and financial incentives do not work sufficiently without this intrinsic motivation."

"Limit administrative burden to a manageable set; explain necessity and method well. Healthcare providers should be concerned with patient care, not filling out lists."

6) Involve Stakeholders
Internal
Board, management and medical staff positively involved

Visible, positive and strong support from the Board of Directors is a great success factor. Also, positive involvement of the medical staff Board and/or highly valued nurses benefit the probability of allocation of resources (time and money) to the VBHC project. This also applies to opinion leaders.

"Health insurers must absolutely be involved; but don't wait for their early commitment if everything is ready internally to get started!"

Engage regional partners

Looking further down the line of what matters to the patients often sheds a different light on a VBHC initiative than primarily from the perspective of the own clinical environment. For example, it could highlight the need to expand the scope of the medical condition that may be limited to the own organisation to involving other institutions in the region. It can also mean not starting a VBHC initiative on a stand-alone basis if a neighbouring institution happens to be a world-class institution in the same area. At the start of a VBHC process, it may be useful to primarily limit the medical condition to hospital care, but it quickly pays off to think more broadly towards primary care and home care. Conversely, regional primary care practices can independently take VBHC initiatives that have an impact on hospital care (Lee and Myers 2018). Scale size and perceived urgency (e.g. new construction or another major adjustment) can provide a good opportunity to work together.

"Health benefits can be achieved in, for example, frail elderly people, through a targeted collaborative partnership between

hospital, primary care and home care. Everyone recognises bottlenecks in the workplace, even if this is from various points of view."

"Health gains through such partnerships can be achieved by using remote monitoring to prevent readmissions in, for example, heart failure. This has already been addressed in several places" (*Hartwacht*).

Involve expertise of pharma and tech companies

A larger role for pharma and tech companies is not (yet) an obvious success factor. They often have workers who have much knowledge of goal-oriented organisation of activities, and there are many dedicated employees who are willing to cooperate in the field of VBHC.

"Match the choice of involving an external company in a VBHC process with the expertise and choices that already exist there".

Simplified accountability to society

Good quality registration based on standardised outcome sets simplifies accountability to society, such as to the Healthcare Inspection, government and health insurers. Regional healthcare insurers can also use this quality information when purchasing healthcare.

7) Good knowledge and agreements about Financing – Reimbursement

Financial stability of Institution and Team

There must be financial stability at the care organisation. The importance of stability applies to the organisation as a whole, to the intended multidisciplinary team and to other involved parts of an organisation. A movement towards promoting health instead of disease with a focus on appropriate care at the right place will help transform to more sustainable financing.

"Ensure transparent (financial) relationships between medical specialist groups and hospitals, with sufficient investment capacity."

Risk assessment made and Contracts concluded

A contract team, with good (internal) organisational connections, and aligned with the VBHC and organisational goals, assesses the scope of the agreements, determines risk profiles, defines gradual profit and loss to minimise risk and monitors them (Porter et al. 2015). In good coordination with the multidisciplinary team, financial incentives are now placed at the MDT level. Contracting means that the team no longer only feels responsible but can also be held accountable for the value achieved.

"Also include risk protection in the contracts (stop – loss/termination provision). In this way there is always a solution available."

"Include incentives for learning, improving and sharing in the team."

Appropriate Reimbursement

If the care chain wants to take the VBHC steps, the reimbursement for the organisational units involved and the care professionals involved must also be appropriate.

"The financial reimbursement should be a reward for creating patient value."

8) Improving is crucial
Improve culture

A culture needs to be created in which improvement initiatives are made attractive and are rewarded. By organising feedback on the actions of the team and individual professionals, knowledge is gained about what is effective to create value for the patients. Quality improvements can arise in conversations between healthcare providers and patients, and between healthcare providers themselves. Learning from one's own experiences and best practices (benchmarking) makes work more enjoyable and helps create an improvement culture, whether or not including appropriate remuneration. Other organisational units and structures, such as financial and IT systems, can also grow and be adapted and improved in this way.

"Learn from each other, from the best, e.g. by studying previous VBHC Prize winners, and from fellow institutions with experience, such as Santeon" (*VBHC Prize 2020*).

"An example of a consultation structure is the one used at the Martini Klinik, with daily work consultation, weekly and monthly multidisciplinary team discussion with interdisciplinary discussions about complications, morbidity and mortality, and discussion of new data from the professional literature. And an annual Quality Review of outcome results at team level with benchmarking and recent research results" (*Martini Klinik*).

Good quality registration

Good quality registration of an outcome set paves the way for improvement initiatives. The core is good accessible quality registration, transparent reporting, appreciating criticism and rewarding feedback.

"Make quality agreements about outcomes a standard part of the PDCA cycle and the Planning & Control cycle. Frequent standardised review of the results achieved creates structural attention for the improvement potential."

Provide proper training

Training in the field of VBHC and project-based working ensures, especially at the start of a VBHC process, that care professionals are informed about (what, when to expect during) the VBHC process. This also applies to the Board, managers and department heads. Supervised learning within a care institution can be done through structured meetings and agreement- and decision-making procedures.

"On the one hand, the role of the Board is important in the choice of VBHC training, on the other hand, administrators and opinion leaders often need help to be really involved."

"It is important that everyone 'speaks the same language' and interprets VBHC in the same way. This includes the language used with patients. Training is essential here."

Innovations will help

Innovations can help to further improve healthcare. Predicting health effects based on the use of wearables and artificial intelligence can help doctors and patients make better decisions (Tana et

al. 2017; Van der Meulen 2019). Research data on, for example, clinical trials of comparable patients that until recently were reserved for researchers are more widely available. These kinds of data, brought together per patient group, may predict health effects for an individual and can help patients and their doctors make better decisions. These are illustrations of developments that are going on and that are (will be) available to the patient and the doctor.

"An adequate (R&D) budget is required; in healthcare institutions this is now often no more than 1-2%."

Conclusion

With the answers to the question "Which success factors help to implement the VBHC concept in practice?" we want to offer a best practice for those who want to start or have started a VBHC initiative and inform those who have not (yet) come into contact with VBHC about this. Divided point-by-point into three perspectives, patient, care providers, and costs and IT, we conclude as follows.

Patients:
• The organisation of healthcare must be set up in such a way that a) the agreed outcomes can jointly be discussed in the consultation room between patients and caregivers, both from a medical perspective and from the perspective of the personal life of the patients, and b) personalised decisions can be weighed and be taken together.
• Patients must be included in the multidisciplinary team, right from the start. Really involve them, don't talk about them, but to them! Not all patients will be able to do this immediately, so build (upon) a network of patients who are already engaged, and provide education for the others.
• Focus on patients as both users and information providers. Get clear what is really of value to patients (medical, psychological, quality of life). Patients are the experts of their own lives. Tailor the information to what really matters to them.
• Communication with patients benefits greatly from the same language. This also applies to fellow care providers!

Care providers:
Directors and opinion leaders:
• Focus on VBHC initiatives that can really lead to improvements. Allocate resources and guidance. Commitment of the Board and opinion leaders are beneficial to the VBHC initiative. Provide training/coaching for all involved.
• Board and opinion leaders should not want to solve everything themselves, but rather put responsibility back to the teams. They must, however, safeguard the desired culture.
• Adjust the organisational structure, give direction and support innovation with the patient care cycle as point of view. Take your time; it might take five years before you are well on the way.

The Multidisciplinary Team:
• First find out who should be involved; make a good team composition with the right people, who can and must bear the consequences of the team's actions.

• Keep in mind that the care path for patients runs within and outside the care institution.
• Arrange support from competent external parties, and training. Make time (not 'just add' VBHC to the already too busy schedule).
• Start with a step-by-step, thoughtful approach and only start if you can do it well, not if, for example, there are not enough patients, or if your team is simply not distinctive enough.
• Define the key outcome measures that matter to patients and caregivers and are motivating for patients to discuss in the consultation room with their practitioner. Make use of well-thought-out, standardised sets of outcomes and stick to them.
• Start measuring outcomes in a standardised way, but proceed pragmatically and limit the administrative burden.
• Be transparent; collect, analyse and share the results (often first internally); make the implications visible and open to discussion for parties and individuals.
• Learn from the outcomes; it is not a tool for assessing people, but for improving outcomes for patients.
• Innovate and improve in areas where there is room for improvement, e.g. communication with patients, unwanted variation, treatment-related changes, and measure the quality improvement and costs results.

Costs and IT:
• The care delivery value chain is about the range of activities that add value. All (clinical and supportive) activities that do not add value to the patients must be identified and removed from the care pathways.
• Provide cost price calculations and appropriate IT and data analysis setup. They will really be needed in different phases of the VBHC process. Hiring top expertise in these areas can help enormously.
• Change the money flow accordingly and link VBHC care to payments through contracts with external parties such as healthcare insurers.

In this way, doctors and other healthcare providers can increasingly become the guides that are badly needed in today's healthcare. The difficulty lies not in the appropriateness of the VBHC concept, but in breaking free from our old ideas.

Conflict of Interest

None reported. ■

Responsibility: The opinions expressed in this paper represent those of the authors/interviewees and do not necessarily reflect those of their employers.

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Managing Diversity - Pathways to a More Inclusive Future

● **Author: Prof Geraldine McGinty** | Weill Cornell Medicine Depts. of Radiology and Population Science | **President | American College of Radiology |** USA

An overview of the lack of representation of women and other minoritised populations in healthcare and their relative absence from positions of leadership and power.

✓ Key Points

- The World Health Organization reports that women are overrepresented in the healthcare workforce but are absent at senior levels.

- The absence of women and other minoritised populations has long-term negative implications for healthcare.

- Diverse teams perform better, with the caveat that the members of those teams must be intentionally empowered to participate effectively.

- The pathway to a more inclusive future must start with leadership and a clear articulation that diversity is valued and viewed as a key metric for organisational excellence.

According to the World Health Organization (Global Health Workforce Statistics), women are overrepresented in the health care workforce but too often are absent at senior levels. Their relative absence from leadership and that of other minoritised populations has long-term negative implications for the delivery of high-value healthcare, especially in times of crisis. Failure to include the perspectives of the diverse healthcare workforce and indeed to reflect the goals of the populations we serve has contributed to well-documented system failures,

from stakeholders that comprise a majority of those delivering care will, in fact, provide meaningful insights.

Rather than dwell on gaps in the current state, I prefer to identify pathways to a more inclusive future. This must start with leadership and a clear articulation that diversity is valued and viewed as a key metric for organisational excellence. To quote Ron Heifetz at the Kennedy School of Government, "Attention is the currency of leadership" (Flower 1995). The example set by leaders such as Francis Collins, Director of the National Insti-

A skills-based approach to recruitment rather than relying on the controversial notion of "cultural fit" and looking beyond the typical candidate pool is important

including, for example, the disparate impact of the pandemic on communities of colour in the U.S.

It is well documented that diverse teams perform better, with the caveat that the members of those teams must be intentionally empowered to participate effectively. Yet too often, policies are developed and decisions made by teams that are anything but diverse. Also, too frequently, we see expert panels convened to discuss the future of healthcare which include no women or people of colour. While each of the panellists is undoubtedly experienced in their field, one has to ask whether a discussion in the absence of any representation

tutes of Health, who has stated that he will no longer participate in "manels" is extremely influential (Collins 2019).

Organisational strategy is a foundation of more inclusive decision-making. We use strategy to allocate resources and effort and how we do so sends a clear signal about what we believe is important. For example, the American College of Radiology (ACR) strategic plan seeks to "Improve diversity and inclusion" and "partner with patients". This plan is used to inform a regular process of programme assessment to determine which initiatives are well aligned with the organisation's goals and should be supported and which should be marked for sunset.

A skills-based approach to leadership recruitment rather than relying solely on the controversial notion of "cultural fit" and a willingness to look beyond the typical candidate pool is also important. The ACR partners with historically Black colleges and universities (HCBU) and offers scholarships to medical students (ACR PIER initiative) from underrepresented minorities to develop a diverse talent pipeline of future radiologists. Likewise, when we are crafting committee rosters, speaker line ups and panels, we need to resist the reflex to reach out only to those with whom we are familiar and consider what perspectives will make for an engaging and impactful discussion. Radxx, an informal organisation whose goal is to increase the participation of women in radiology and imaging informatics, has established a Speakers Bureau to support more diverse panels and speakers.

When we do create more diverse leadership groups, we need to acknowledge the stress on those who are the "first" or the "only". Mentorship programmes at every level, including for new Board members, can accelerate a new member's transition to feeling comfortable and able to fully contribute. I've shared how at my first ACR conference, I stood at the back and missed several events because I wasn't sure which I was invited to. A priority for me as Board Chair was to create a mentoring programme (ACR Bulletin 2019) for first-time attendees so

that they could engage in the important work of the organisation as quickly and effectively as possible.

The challenges of the past year have left all of us in healthcare weary. Those who commit their scarce and often unpaid time to developing educational programming might feel as if asking for them to not only find subject matter experts but also to ensure a diversity of gender, ethnicity opinion and lived experience on their panels is setting the bar, too high. I'd ask us to consider, however, whether we can afford not to make that effort if indeed we are to move our profession closer to our goals of equitable access to high-value healthcare for all.

Conflict of Interest

None. ■

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Competency: Is It the Wonder 'Drug'? Part 2

Author: **Bari Berger** | Dunedin, FL | USA

Author: **Geir Arnhoff** | CEO and Founder | Dossier Solutions AS | Oslo | Norway

Author: **Iris Meyenburg-Altwarg** | Managing Director | Com-P-Tense Germany GmbH | Hannover | Germany

In the first part of this article (Berger et al. 2021), we started by defining competency and then discussed burnout, competency acquisition and the link between competency and retention. We also did a comparison between Europe and the United States. This article will delve further into competency and why management should be interested in competency rather than 'skills'. We will relate competency to quality and outcomes at the bedside, which is the bottom line for everyone, including the patient.

Key Points

- From an organisational perspective, systematic competence management is an important part of any organisational change. Creation of balanced work environment based on thorough assessments and analyses is a key element.

- The staff perspective on competence management is affected by their time in the profession. New and experienced nurses require different approaches.

- When it comes to patients, their perception is completely different from that of the personnel and organisation. This is especially true for culturally different patients.

- Transitioning to value-based healthcare is more complex than in other sectors, in particularly because of the standardisation challenges.

- Combining standardisation benefits with the subject matter experts' insight would allow for more efficient implementation of competence management strategies.

Competence Management: Organisational Perspective

On the meta-level, organisations often use the Healthcare Quality Competency Framework (Framework Wheel) with its 8 dimensions and 29 competency statements and 486 skills ([NAHQ Framework Wheel](#)) when it comes to the topic of competence in the organisation. This tries to encompass all aspects of quality offensives in the healthcare sector. In this article we will primarily pursue the aspects of competence management in connection with personnel and leadership, with the aim of ensuring effective and efficient provision of service, improving employee satisfaction and minimising burnout.

Importance of competence management in change processes

Systematic competence management is particularly necessary for successfully coping with change processes. It does not matter whether it is about the introduction of new production processes, new software or IT solutions, or the introduction of management systems such as quality management systems.

Often the different competencies of the employees are not considered in a differentiated manner and the employees are trained according to the 'watering can principle' as part of the change process. In this way, knowledge is formally imparted, but without addressing individual needs to develop competencies. This leads to frustration for almost everyone involved. Despite the training, employees may still be overwhelmed by the upcoming changes. The management is dissatisfied with the performance of the employees and the results of the change process and, ultimately, employee resources have been used unsuccessfully.

Many change processes simply fail because of rejection by the employees. This rejection often develops from
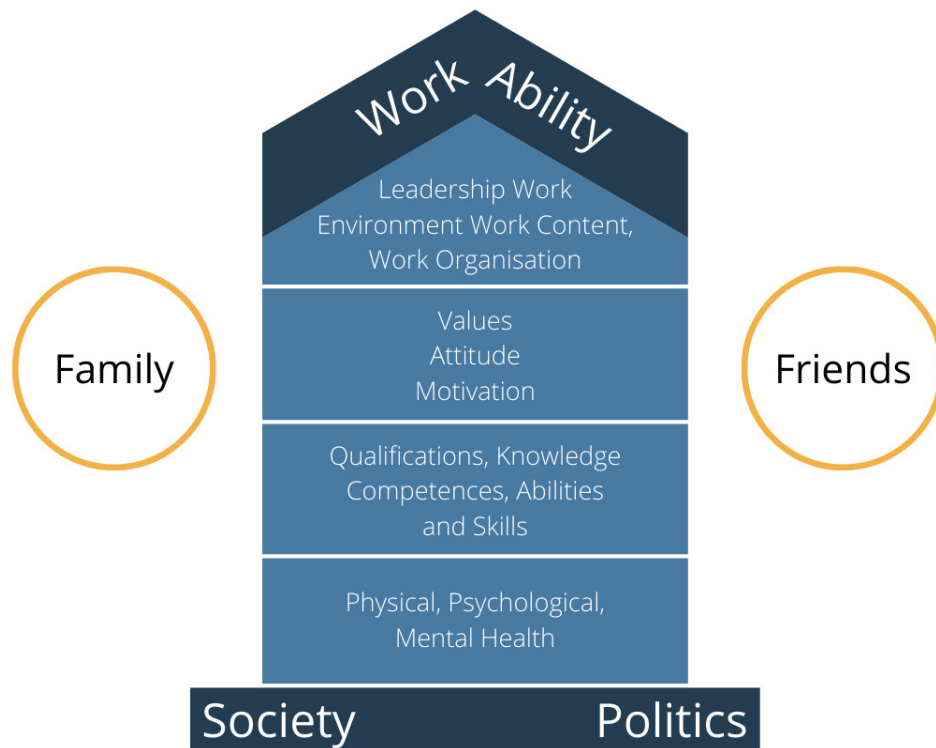
Figure 1. The House of Work Ability (Tempel and Ilmarinen 2012).

excessive demands on employees or a lack of integration into the change process. Burnout and high fluctuation can be the result.

At an early stage in the context of change processes, it is necessary to define the requirement and competence profiles for the individual work areas and the different role profiles. This ensures that employees are prepared in time, with the necessary skills for the new challenges.

Occupational health and safety as part of managerial responsibility
Occupational safety and health protection form the basis for implementing competence management and living it in real life. In combination with stable values, this creates a model that combines operational behaviour with strategic impact and corporate success.

The House of Work Ability
It is the responsibility of employers to design work requirements (possibly stresses) in such a way that, as operational resources, they contribute to the fact that employees can and want to perform their tasks well without major risk. 'Work (coping) ability' describes the extent to which employees can perform their work considering the work requirements, health, mental resources, qualifications, values and attitudes. Ability to work is the correspondence between what a company demands in the long term and what a person can and wants to achieve. The factors that influence this correspondence are explained in the 'House of Work Ability' model (Tempel and Ilmarinen 2012) (Figure 1).

Reduced working capacity means reduced performance and productivity at the company level and human suffering for the person concerned.

Occupational safety and risk assessment
The institution, and consequently the management level, has a statutory duty of care towards its employees. In addition to the necessary safety measures, this includes the liability for objects and the maintenance of workplaces as well as resolving conflicts and observing the rights of employees. The European Framework Directive on Health and Safety at Work (passed in 1989) obliges all employers to carry out risk assessments, which (since 2013) have also included psychological stresses. Suitable tools and assistance are available in several languages via EU-OSHA.

Competence management analysis and competence survey
The starting point, competence management is the actual competence of the employees, the so-called actual competence mix. Only those who know their foundations can build on them.
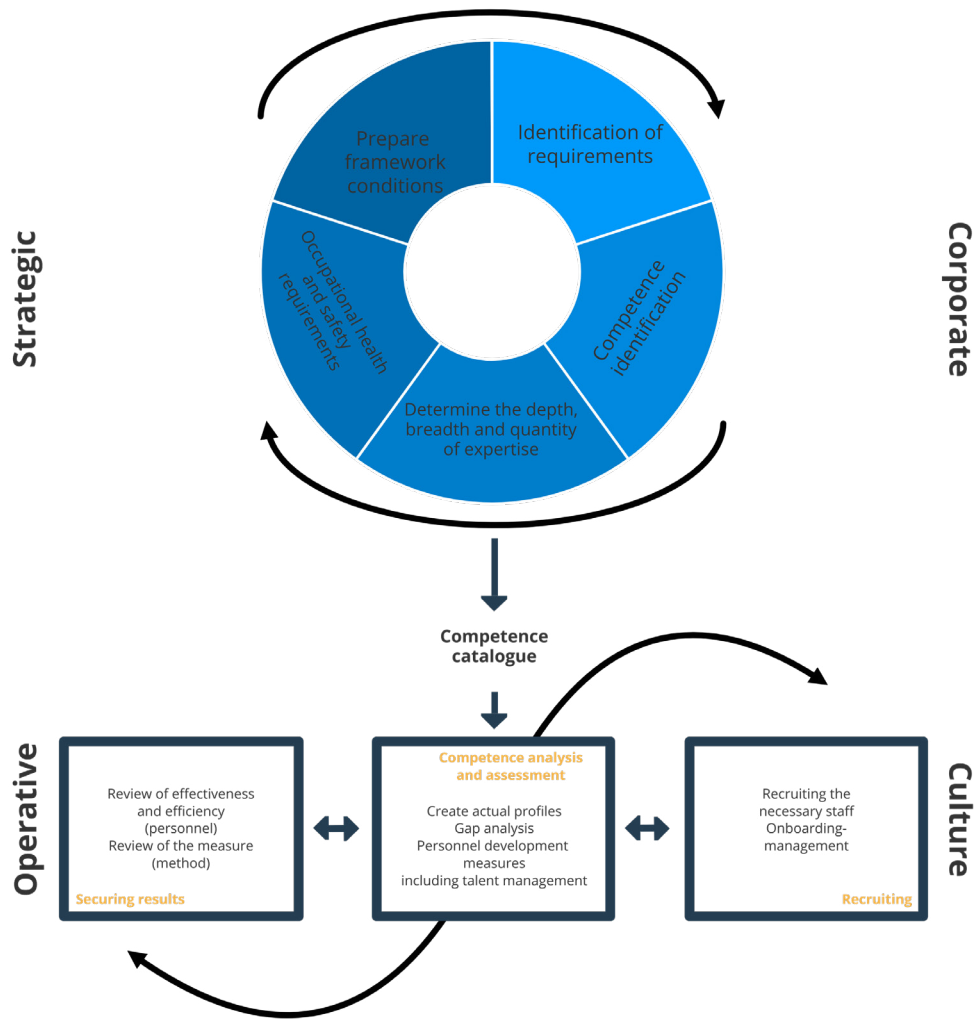
Figure 2. Competence Management – Analysis and Survey Flow.

The second step is to determine the target state – also known as the target competence mix. This includes all employee skills that will be important for the company in the future.

Particular attention must be paid to the areas of the company that enable and create value and the skills required thereto.

The target/actual deviation indicates the personnel development requirements that need to be managed with a systematic approach. This can be achieved by way of personnel development of existing employees and/or additional new employees.

Another important step: competence perspective
In addition to the target/actual situation, the company perspective must also be considered. First, the different competence dimensions (technical competence, methodological competence, and personal and management competence) are analysed. In addition to this, it is also important to determine the breadth and penetration depth of the respective areas of competence dimension. The fourth aspect is the level of competence. This describes the theoretical and practical experience of exercising competence. This then results in a competency map of the company with the potential of a competency planning map.

Such competence analysis and survey enable, in addition to talent management and personnel retention, timely succession planning and supports the future of the company. For this purpose, however, employee skills and needs must be maintained and kept up-to-date. Due to the quantity and complexity requirements, only a digital solution is seriously recommended. This software should in turn be compatible with other HR software tools to avoid duplication, increased error problems and waste of resources due to multiple entries.

Implementation of competence management

To set up competence management successfully and efficiently, close coordination between management, HR and employees is necessary. For the necessary acceptance by the employees, it makes sense to always involve the employees in the development of the competence management. Since the initial effort can be very extensive, it is essential that the management actively supports the project and provides the necessary resources. The larger the number of employees in a company, the more complex it becomes to manage the skills of the employees. Systems that are based on process slips and spreadsheets quickly reach their limits and develop into a confusing bureaucracy. This is inefficient, costs money and has a demotivating effect on the employees involved.

Concentration on essentials and emphasis on core issues constitute decisive elements of a modern competence management. In the past, competence models were often designed with a great love to detail and extensive with

that accompanies the number of competencies for a new nurse. In the U.S. some of this burden has been lifted by sending the new nurses to a simulation lab to complete their competencies.

Competencies for a more seasoned nurse should be tailored to the needs of the nurse or the unit. The bedside nurses should be involved in this so they have a say in what their competencies for the year will be. When they are involved, there will be better compliance with competencies, increased education, and decreased procrastination.

Competence: Patient Perspective

Patients view competence much differently than healthcare personnel. Their views are that the person is competent and empathetic, in other words, if the person taking care of me knows what they are doing and whether they are spending enough time with me and being kind. This is especially true with culturally different patients ranging from people who do not speak the local language, elderly,

Particular attention must be paid to the areas of the company that enable and create value and the skills required thereto

as many business aspects and functions as possible. In the future, it makes sense to focus and, above all, to take account of the time that it takes to modify competency models to correspond to current needs. The solution lies in the mapping of roles in which less explicit requirements are defined, but above all strengths, potentials and necessary meta-skills are the basis. A dynamic adjustment of competencies is vital for many companies, especially in relation to the rapidly changing requirements.

Competence Management: Staff Perspective

The staff perspective of competency changes depending on the amount of time in the profession. New nurses will need a variety of competencies to show that they can be safe on a unit by themselves. These competencies should be worked on during an internship with their preceptor. Ideally, the preceptor should meet with the new nurse weekly to go over the competencies that have been completed, to discuss how well the nurse has done with these and what could have been done better. The nurse also needs to be told what competencies are left to be completed and about the plan for the week. The preceptor should also meet with the nurse manager to update them on the new nurse's progress and status in the competencies. The problem with this from the staff perspective is that it is very time-consuming to complete the information

to the LGBTQ community. These populations will be especially critical of the staff competency and the facility. These competencies for the patients are interpreted to soft skills such as communication and patient-centred care. These competences will translate into a change in the HCAHPS scores in the U.S., or patient satisfaction scores (Howe et al. 2019).

Healthcare as Value Chains

Healthcare systems as any other enterprises are production systems. Using input factors are transformed into output through a value chain, very much in line with the theories established by Michael Porter and later refined and applied to the healthcare context (2006). The explanation of healthcare systems as value chains has increased in recent years with the result of high numbers of lean production initiatives, aiming to maximise customer value and minimise waste (Poksinska 2010).

Traditionally production goals have been efficiency measured quantitatively, in terms of cost per unit, or, in the healthcare context, as price per procedure completed. In recent years, there has been more focus on the effects of treatments. Different measures and methodology have been put in place to understand and quantify increased quality of life for patients, which is a significantly more complex concept than counting completed knee surgeries

according to specific procedure. The trend is captured in the concept of value-based healthcare (discussed in our first article) with a higher focus on curve data, which monitors the posttreatment aftermath for a patient.

Standardisation Dilemma

Patient satisfaction and their well-being during the treatment have raised on both the political and the providers agenda over the last decade. 'Patient journey' provided in collaboration (or despite lack of collaboration) between different actors and stages in the holistic treatment journey, such as transfer from primary healthcare to speciality healthcare, and community. Countries with a high degree of uniform national healthcare systems, such as many European countries, have been implementing healthcare reforms in order to standardise healthcare within an end-to-end perspective as fully integrated value chains. Countries with a high degree of private and independent

are different, with hidden symptoms, unknown and unsure response to medication, mixed diagnoses and huge variance in mental, physical and social health conditions.

In our first article, we discussed the different levels of competency and proficiency (Dreyfus 1986). Standardisation plays an important role in healthcare, but can result in fatal outcomes without the application of analytical approaches onto new situations and deep tacit knowledge.

Empowering Subject Matter Experts

When building out their competency management strategies, employers need to balance the benefits of standardisation with the need to adjust to situational context and variance. The practical consequences of this is that employers can benefit largely from identifying those areas and competencies that are generic and cross-functional, while subject matter experts play an important role in owning and maintaining specific niche competencies. Ulti-

It makes sense to focus and, above all, to take account of the time that it takes to modify competency models to correspond to current needs

healthcare systems have experienced large consolidations of providers, aiming for optimisation through standardisation. Standardisation is one of the oldest tools in the toolbox for business process optimisation, and served as key to quality and profitability improvement throughout industrialisation and post-industrialism, from the theories by Taylor (1911) all the way to Toyota, IKEA and Apple, public services and financial services, education, healthcare and more.

The dilemma is that while standardisation assumes stable and predictable context and environment, healthcare operates with a mix of planned procedures and high degree of volatile workload and variance. The latter requires deep knowledge at the point of care to understand situational context. As a comparison, car body parts in a factory can easily be scanned toward industry standards. Patients

mately, department heads are the key resource in terms of ensuring competencies for the best outcomes. The competency management framework and tools should be their toolbox and help them curate, manage and maintain competencies for their staff members. They are the first to know about the unmet competencies, better learning content available, the availability of their staff, etc. They need tools tailored to their context, not the one-size-fits-all-t-shirt. Think about the employers competency management as a combination of the global encyclopaedia paired with high-quality crowdsourced content by your subject matter experts on the frontline.

Conflict of Interest

None. ◼

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Enterprise Imaging and XERO® Universal Viewer
Enhancing Accessibility and Collaboration

🟥 **Author:** **Jason Knox** **| Solutions Manager at Enterprise Imaging |** Agfa HealthCare

An overview of Agfa Healthcare's Enterprise Imaging platform and the XERO® Universal Viewer and how it can be embedded in EHR/EMR/Portal and enable the creation of patient-centric longitudinal imaging records from across departments, systems and locations. This allows healthcare providers the ability to share content and discuss treatment strategies for optimum patient care.

☑ Key Points

- Enterprise imaging is a set of strategies, initiatives and workflows that can be implemented across a healthcare enterprise to capture, index, manage, store, distribute, view, exchange and analyse clinical imaging multimedia content.

- XERO® viewer creates a longitudinal imaging record that is viewable from a single screen and that you can access right in your electronic health record (EHR).

- XERO® viewer offers flexible integration capability. It can be embedded in almost anything, and the integration is so seamless that the user will not even realise where the viewer starts and ends.

- Virtual collaboration and consultation is the future of healthcare, and that is where Enterprise Imaging and XERO® viewer can play an important role in enhancing the collaboration capability within the healthcare system.

A timeline view of the patient's imaging record across departments, including clinical photography, ophthalmology, radiology, cardiology, ECG, etc. Different types of images are viewable on a single screen embedded in the EHR/EMR/Portal.

Enterprise imaging can be defined as a set of strategies, initiatives and workflows that can be implemented across a healthcare enterprise to capture, index, manage, store, distribute, view, exchange and analyse clinical imaging multimedia content optimally and consistently and enhance the electronic health record.

Enterprise imaging is a complete technology stack that, in addition to the XERO® viewer, provides services such as VNA and diagnostic PACS for both radiology and cardiology. While this convergence of services helps reduce the IT footprint and complexity, the real benefit of enterprise imaging is the impact it has on the end-user. It is

or application. They should not be expected to search for patient information in another system. The goal of enterprise viewer is to make this process more efficient, therefore it must be integrated properly and should allow users to see automated results inside the EHR. Agfa HealthCare's XERO® viewer offers this flexible integration capability. It can be embedded in almost anything, and the integration is so seamless that the user will not even realise where the viewer starts and ends. The user will only see that the EHR has a viewer, thus maximising their experience and use.

The ultimate goal of Enterprise Imaging and XERO® viewer is to support dynamic collaboration, including

XERO® Universal Viewer creates a longitudinal imaging record that is viewable from a single screen and that you can access right in your EHR

important to understand that in healthcare, images are everywhere. Images cross departments, specialties and locations. If we really want to benefit and optimise the use of images in a patient's care continuum, we need to ensure that healthcare providers have a longitudinal view of a patient's entire imaging record and can access it easily, from a single place. This is where an enterprise viewer comes in. Agfa Healthcare's XERO® viewer creates a longitudinal imaging record that is viewable from a single screen and that you can access right in your electronic health record (EHR).

A truly efficient enterprise viewer is one that is technically advanced and offers the most flexibility. It should be powerful and should have seamless integration capability. In addition, an enterprise viewer must be intuitive, easy to use and easy to navigate. This is crucial because the platform is designed to be used by a number of different people. It should not be complex and should not require an extensive rollout of training services to teach users how to use it. It needs to be user-friendly, and at the same time, it needs to be powerful and should offer advanced functionalities to those that need it. XERO® viewer's advanced functionality is designed to be used by groups such as orthopaedic surgeons and vascular surgeons who require more complex toolsets. These specialists need advanced functionalities such as measurement capabilities, MIP, MPR, 3D and so on. A truly useful and effective enterprise viewer should have the power, and the toolsets that these healthcare providers need.

Today, healthcare systems rely on EHRs. Hence, for an enterprise viewer to be fully utilised, it must be integrated with an EHR, and this integration should be seamless. Users should not be required to launch another window

instant messaging capabilities and screen sharing. The system is designed to offer healthcare providers the ability to instant message and consult on an exam in real-time. If a healthcare provider needs a second opinion, they can simply share a link to bring another physician to the same exam and share the same screen. Virtual collaboration and consultation are the future of healthcare. Enterprise Imaging and XERO® viewer can play an important role in enhancing the collaboration capability within the healthcare system. ∎

At Agfa HealthCare, we support healthcare professionals across the globe to transform the delivery of care. Our focus is 100% on providing best-of-suite Imaging IT software solutions that enable secure, effective and sustainable imaging data management. From product development to implementation, our unified Enterprise Imaging Platform is purpose-built to reduce complexity, improve productivity and deliver clinical value. We use our proven track record as an innovator, our in-depth medical knowledge and our strategic guidance to help healthcare providers achieve their clinical, operational and business strategies.

COVER STORIES

The Challenge of Being Novel in Healthcare

Healthcare is known for its slow pace of change, but the pandemic has its own, much faster one. Leaders are compelled to deal with novel solutions, processes and skills. However, numerous gaps and discrepancies still exist and must be addressed. HealthManagement.org asked healthcare experts what has been the most challenging experience of introducing something new in their practice and why.

Prof Lluís Donoso-Bach

Head of Diagnostic Imaging | Hospital Clínic of Barcelona | University of Barcelona | Spain |
HealthManagement.org Editor-in-Chief, Imaging

Possibly the most interesting challenge has been the process of modifying our leadership 'style'. During the COVID-19 pandemic, we have all been under immense pressure to manage high patient flow, ensure the safety of healthcare staff, patients and families, and deliver quality care. In this situation, the role of leadership has been crucial, and empathy, flexibility, generosity, and the use of a multidisciplinary approach a must. We have been able to meet the immense challenges of this crisis by empowering the Department members.

I believe that the COVID-19 era has exposed the areas that we need to improve upon in healthcare. At the same time, it has also highlighted the crucial role of leadership and how healthcare leaders need to promote collaboration. Several aspects have to be considered as we change for the better: improving the way we communicate, ensuring the well-being of healthcare staff, encouraging professional development and prioritising and improving healthcare leadership. COVID-19 has shown us that we are all interconnected and interdependent on each other. The current healthcare models need to be transformed, and we need engaged leadership, a team-oriented approach and greater collaboration across key institutions and healthcare partners – both locally and internationally.

Prof Tienush Rassaf

Department Head and Chair of Cardiology | Westgerman Heart and Vascular Center | University Hospital Essen | Germany **| Healthmanagement.org Editor-in-Chief, Cardiology**

Cardiovascular disease is one of the leading causes of death worldwide. However, during the pandemic, our biggest challenge has been the need to learn how to continue providing care to patients with cardiovascular disease amid the restrictions of the COVID-19 era. The provision of cardiac services has suffered as we have all had to shift our focus to manage the surge of patients with COVID-19. Also, patients with cardiovascular disorders or those who might be at high risk have been reluctant to seek medical help during this crisis.

Hence, for us, the biggest challenge has been to ensure we continue to diagnose, treat and manage cardiology patients. In this field, clinicians have had to adopt new methods of care delivery, including telephone and video-assisted consultations and determining which procedures are urgent and which are non-urgent. Another major challenge has been dealing with the fact that patients with pre-existing cardiovascular diseases are at a higher risk of complications from a COVID-19 infection. We've had to manage all this while adopting virtual care models, redeploying staff, rescheduling procedures and ensuring the health and safety of our staff and patients.

Miguel Cabrer

CEO | Idonia | Spain | Medical Image Exchange | Spain

We have been helping medical centres and practices to facilitate the exchange of medical documents and images through our cloud-based platform.

The main challenge has been the security and data privacy concerns when using the cloud. It is a maturation process that may occur, and most centres are making steps forward, but some still think it's not fully secure.

Replacing a tangible CD to deliver an MRI or CT scan study with a simple link is very well-received by patients since they avoid unnecessary queues and visits to hospitals. It also facilitates exchange between hospitals for referral and second opinion. Oncology patients are also benefiting from these kinds of tools when medical tests and documents must be exchanged.

In other words, professionals and patients see the value, therefore managers need to embrace those workflows and technologies that facilitate the exchange of medical records.

Dr María Jesús Díaz Candamio

Specialist in Radiology | Musculoskeletal Imaging Unit | Radiology Department | University Hospital of A Coruña | Spain

No radiologists? No changes! The nerd-like stereotype about radiologists lacks a key element: our ability to adapt to changes. We, medical imaging specialists, live in a historically incessant metamorphosis.

I have experienced many transformations in radiology. The introduction of PACS may have been the greatest revolution to me. Digitalisation in Radiology meant a kind of 'democratisation' of cutting-edge imaging diagnostic techniques, which were initially in the hands of a privileged few. Hospital Radiology Departments reorganisation by subspecialty (neuroradiology, musculoskeletal radiology, etc.) instead of by technique (ultrasound, CT, MRI, etc.) represented another extraordinary shift, making it easier for radiologists to better address the imaging requests of patients and referral specialists. These changes, which led to essential advances in diagnostic radiology, were welcomed with enthusiasm by most radiologists. I only met a handful of radiologists reluctant to these innovations.

Historically, radiologists developed imaging techniques and imaging-guided procedures subsequently utilised by other specialists. Seeing other specialists 'colonising' your previously exclusive field of action is sometimes not easy to accept, but collaboration with other specialists, especially regarding interventional radiology techniques, is another acknowledged change.

Maybe the worst challenge we face up to is the increase in the workload and complexity of radiologists' work, reimbursements getting smaller and smaller at the same time. The radiologist is known to be one of the most burned-out medical specialists. Therefore, we largely embrace the stealthy gradual addition of much-needed artificial intelligence, especially to tedious tasks, such as measurements.

The adaptability of radiology departments is being put to the test during the current COVID-19 pandemic. We are making changes in our practice based on new evidence and guidelines. We have learned to improve the handling of these patients' workflow without delaying the care of the rest of our patients. One of the enduring changes that the pandemic will bring is the absolute take-off of teleradiology.

Therefore, the most striking challenge a radiologist could undergo is the absence of change. This is the reason why radiologists are the true leaders of the healthcare digital transformation.
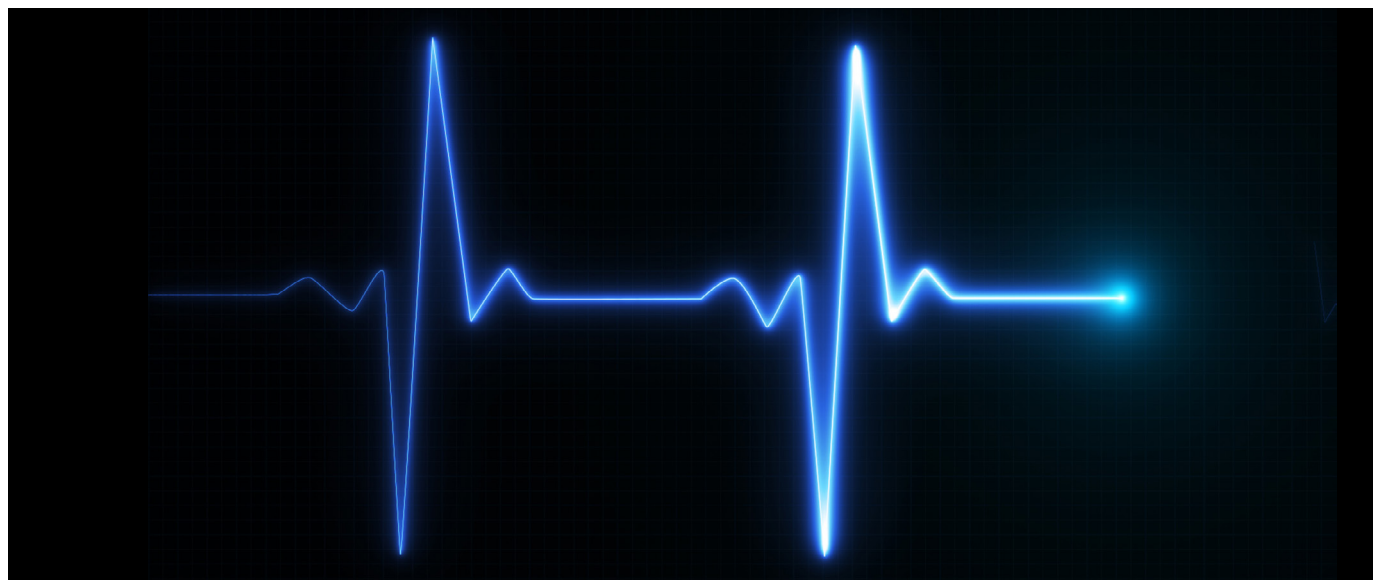
Dr Elikem C. Tamaklo

Managing Director | Nyaho Medical Centre | Accra | Ghana

2020 was our 50th anniversary. As a milestone year, we planned to launch new innovative solutions in our healthcare IT system as part of our digital transformation. Some of these included enabling patients' access to their health records through a new patient portal in a newly implemented electronic medical record system.

As the impact of the COVID-19 pandemic increased worldwide, it became necessary to accelerate several projects we had planned with significant resource constraints.

We had to prioritise our virtual care platform, which was at the beta stage, to address the immediate need of consulting with patients remotely, and this required speed, agility and much coordination.

The result was a functional solution that did the job. However, the user experience was convoluted and frustrating. Despite all the dedication and hard work, our most challenging experience of innovation was acknowledging that the solution did not meet our standards and we needed to rework the solution.

We engaged our users by asking difficult questions, and we had to humble ourselves, receive the feedback and move on.

I believe that facing the reality of our situation, letting go of our original plans and adapting in the midst of crises, whilst keeping the users in mind was an important lesson for us.

Dr Ursula Mühle

Senior Expert in Health Management, Innovation and Education | Head and Coordinator | Task Force Care Home, Bavaria | Germany | Founding Member | Digital Health Campus | Germany

Since March 2020, the COVID-19 pandemic has turned the world upside down. It has been a threat for many people, and especially the most vulnerable ones, such as the elderly living in long-term care facilities (LTCFs). As soon as the pandemic started, I volunteered to make a contribution to battle this danger. Due to my background and long experience in the innovation space and the health sector, I knew that I could offer some help. This soon led me into the position to help setting up the Task Force Care Homes in Bavaria, which I currently lead. The most challenging has been to know that we were constantly running against the time, and being too slow could cost lives despite the facts we already knew. We knew, for instance, that we needed to bundle forces to be able to overcome the danger until the vaccination programme started. We also knew that we needed a) a legal and management structure that allows for having the right principles in place, b) the right experts being able to advise the LTCFs what to do in terms of hygiene and other protection measures, and c) have the data available for knowing where to help fast. However, knowing alone was only part of the solution as we needed to make sure that we offer our support where it was needed. Thanks to the agility, an open mindset and the shared goal of the team, and the support of our decision-makers, we have been trying as hard as we could to come ahead of the situation, and hopefully, we can draw lessons that will make us and others even faster in the future.

Going from 'Sickcare' to 'Healthcare'

Author: **Dr Rafael Grossmann** | **Healthcare Futurist, Technology Innovator, Surgeon & Educator |** USA

If there is a person who knows all about being at the forefront of health innovation, that would be Dr Rafael Grossmann. Since becoming the first surgeon in the world to use Google Glass during an operation, he has been an avid advocate of digital health technologies. HealthManagement.org talks to Dr Grossmann about the challenges of being a disruptor in healthcare and the prospects of embracing the inevitable progress.

Speaking of introducing something new in your work, what is the most vivid episode that comes to mind?
Every time there is a paradigm change, or you try to introduce new ways of doing or approaching things, there is some resistance. It's hard to change the traditional way of acting and behaving, and that is normal. But sometimes, the reaction that we see doesn't seem to make much sense.

I've tried many times to change people's behaviours. I'm a full-time trauma surgeon. On the side, I try to be an evangelist of digital health, especially of using technology in a smart way to connect and communicate better, augment and enhance how we do healthcare. One example that comes to mind is my experience with Google Glass.

In 2011, when the iPhone4 came out with FaceTime, with the ability to do video right from a smartphone, that was revolutionary. I thought it was an ideal way to connect to other physicians who required expertise with trauma patients. I had that 'Aha!' moment when I saw that app.

When Google Glass came, I had another 'Aha!' moment, as that could be a revolutionary tool to connect and communicate. A couple of months later, I did the first operation with it in my hospital. I asked permission from the patient and the team, and I planned to use the device to stream what I was doing to a group of students rather than them being behind me trying to see what I was seeing. That was using the technology in a smart way.

It went very well. My good friend John Nosta wrote a piece about that, which went viral. That gave me a push to become a preacher, an evangelist of digital health all over the world. For the next several days, I had calls from Italy, Argentina, China, etc. It was phenomenal! I ended up doing four TEDx Talks about similar topics. All was good, except that I could not convince my hospital to change their ways and engage in the use of this technology, or any other technology that was not 'traditional'. I almost got fired because I did this operation with Google Glass. This is how it turned out for an idea that went viral and almost became the first step in the use of any head-mounted display (HMD) in the operating room or in healthcare, for that matter.

I always say that Google Glass is the Model T of this HMD revolution. We have gone very far since then, and that would probably be my legacy, having that first operation with Google Glass while locally I couldn't use any technology. That operation with Google Glass started a movement regarding how we use HMD – there are so many devices today, and back then, there were none. So the very act of doing that created a snowball effect that is still growing. A year after I did that operation with one patient and two students, some of my colleagues had thousands of students connected via Google Glass to an operation and made it a tool to improve access to global health education. The potential here is unlimited.

What innovative projects are you following?
There are many projects right now. Some of the technologies out there are still in their early stages and NDA-bound, but projects in AI algorithms are really taking off, the use of

natural language processing, machine learning, robotic assistance platforms – all those things are becoming more and more important in healthcare as we speak. There is also a lot of interest in the brain-computer interfaces and in how we can integrate devices and algorithms to have a better symbiotic equilibrium with how we communicate and connect. There are projects with wearable devices that are not the simple devices that measure the heart rate or temperature, but devices that track many physiological variables, such as galvanic skin resistance.

The important thing is not just getting the data but also analysing them; such AI analysis can bring much predictive information that is very useful to preserve or regain health. All those things are growing and obviously the pandemic has accelerated the development of many of these projects because now everyone is thinking of how we control this difficult problem that we have in our hands.

What 'next big thing' are you anticipating in the near future?
The use of AI in a more visible way is going to be very critical. There is no limit to what AI can be tasked with. At the same time, the virtual, augmented and mixed reality will have a tremendous impact not only on education and diagnostics, but even on treatment of diseases. As the problems with mental health and well-being are being increasingly recognised, and they will be getting worse, especially due to the pandemic, these tools will become more and more important to prevent, re-establish, or heal mental health issues. We've only touched the tip of the iceberg, and we'll be seeing more and more of these technologies in the future.

Has the pandemic boosted innovation in healthcare?
Absolutely. The 20th-century economist, Milton Friedman said that if there was a cataclysmic event happening, the solutions that we used to get better from it involved the use of technologies that we already had had in the past, before the cataclysmic event happened. This is exactly what we see today.

Look at telemedicine or telehealth, for example. We have been trying to do telehealth for many decades, and there were all sorts of obstacles and hurdles coming from every party, from the government, the local government, the hospital administration to the physicians, the patients, the users. Everyone always saw the negative side of it, like how I get paid for this, how I protect the patient's privacy when I do it. Everyone was looking at those instead of using this technology to connect and communicate better, save resources and prevent that old lady from coming from far away for a 10-minute visit in the hospital.

The pandemic has forced us to use these tools. We have all heard about necessity being the mother of invention. I say that sometimes desperation is the mother of invention, and that's what happened with COVID-19. Within a week of the pandemic, everything had gone remote. Healthcare, education, retail – everything, even tourism, is being done remotely now. It's ridiculous, in a way, but it's a way to make us wake up.

In healthcare we were very slow to adapt this technology and now we are using it in ways that we could not predict before the pandemic. We're still slow in many regards, but because of the pandemic everything is now focussed on healthcare – because of this desperation that we have for doing things that we cannot do in any other way.

Who is driving innovation in healthcare now? The providers? The patients? The industry?

I don't think there is a main driver. Innovation comes from many different perspectives. To innovate you need to have a problem, and the perspective to solve that problem may come from the person who's directly suffering from it, or the person who's treating someone who's suffering – many different perspectives are needed. As much as I hate to say it, even the administrations and the governments are innovating. It's coming from everywhere, not from a specific segment.

That would probably be my legacy, having that first operation with Google Glass while locally I couldn't use any technology

Saying that the pandemic has prevented us from innovating, I just don't see how one can argue in favour of that. From the development of vaccines to how we do genetic analysis and contact tracing, how we innovate the ventilation systems in buildings – all this has been accelerated because of the desperate need to have a solution for whatever problem we are trying to solve. In every aspect of communication, connectivity, innovation what we are seeing is just unbelievable.

It is often said that healthcare is slow to change. Does the above mean this is no more relevant?

It still is, but it's less relevant than it used to be. We have accelerated a lot of things. Think, for example, about virtual meetings. We've been doing those for a number of years through companies like WebEx, Cisco and Skype. It wasn't uncommon that you connected with someone via Zoom to have a meeting or an interview. We did it for business meetings in my hospital but very rarely with patients. I kept telling for years and years that telemedicine is not telemedicine, it's just medicine. We can connect with patients by mail, email, phone calls, texts, chatbots, video, or we can bring them to the office. These technologies are not exclusive of each other, they are complementary. At some point I might need to send a patient a letter, at another point I send them a text, or at still another point I'll have to bring them to the office and examine them, but also, sometimes it may be better to connect through a video call so that they don't have to waste their whole day on a visit to the clinic.

You see the things patients are doing to protect themselves, or how hospitals are creating these different ways of connecting with patients, or protecting their staff, or rearranging the surgical schedule. And obviously, the industry. A company used to make boxes that sterilised HMDs for VR. Then the pandemic came and what did they do? They almost flipped around and started making these machines that would sterilise many headsets, hundreds of N95 masks. They started thinking differently and innovating because of the desperation, because people needed those tools. At the same time, they thought of different ways in which they could be useful. That is a clear example of how industry innovates. So it comes from every angle.

What is your take on the 'uberisation of healthcare' that many are afraid may cause a decline in the quality of care?

I often say that we do 'sickcare', not 'healthcare', that is, we only treat patients who are sick, sometimes so sick that it's almost too late. The best way to use technology would be to have all these ways of measuring ourselves, keeping the data with ourselves and make sure we protect the privacy of our own health data. And those data are not just one-time, obtained as you go to the doctor once a year; they are from every single minute of every single day. You have all those data, which are being monitored and analysed by an AI algorithm, and whenever something is going into the wrong direction you might

get advice about what to do to restore and keep your health where it should be, rather than wait till the last minute.

Therefore, 'uberisation' of healthcare is probably just a fancy term that has a lot of negative connotations, but in a way it's a good thing because it will make our jobs easier when you only have the patients who are sick because they have a genetic problem or an infection. Those patients need to be treated, but you are going to do, in a way, more selective healthcare, and 'healthcare' indeed, not 'sickcare' like we do all the time for most of the population. I think that's the right way to approach that term.

What has the pandemic changed in your area of work? In healthcare in general?

I am a trauma surgeon, so for us things kept going in the same way, it just was more cumbersome and difficult because you had to protect yourself, don the PPE and be very careful about not becoming infected or infecting others. But the routine was pretty much the same because of the nature of my work, which is emergency surgeries and trauma surgeries. Everything else at the hospital, the way we move around, the emphasis on preventing infection like washing our hands or covering our face and eyes – that is all now a routine that we couldn't even imagine 10-11 months ago. Even at home I sometimes think, where's my mask?!

There's still a tremendous opportunity in healthcare to rethink how we design the brick-and-mortar hospitals. For example, we have an ER in the hospital with 80 people, and of those 60 may not need to be there, they could be seen by telehealth, talk to a provider or AI-enabled digital human over a computer. That would prevent them from going to the ER. In how we communicate and connect with patients, there is much room for improvement. The pandemic is showing us this is possible, and it's not only about connecting two humans via a camera, but connecting a human who needs an answer to where they can get it. There are not enough humans on the provider side; the resource balance, the supply and demand is completely out of synch. There are many more patients than providers, experts meaning nurses, or technicians, or physicians. And digital humans that are enabled by AI algorithms to give a simple advice, to guide a patient through a disease process is an opportunity that many people are seeing – and that would be a future. We're going to have a digital human chatbot that is smart and can answer any question with regard to your health problem or health condition preventing you from seeing the one human in the hospital who is very busy and whom you might not need to see. Communication and connectivity is the main area that we need to continue to innovate, and there's a lot of opportunities there.

In view of healthcare being 'invaded' by many non-healthcare companies, what challenges do you see in preserving patient data privacy?

I definitely support patient privacy. This is a very important issue. What I don't support is making patient privacy an insurmountable obstacle to progress. We need to try and protect patient's privacy as much as we can with the tools that we have to prevent any invasion of that privacy and dissemination of that private information. This is very important, not just for regulatory but for ethical reasons as well. That is part of the core doctor-patient relationship.

At the same time, it cannot be an obstacle to progress. There are many ways in which we can protect privacy and still progress, and telemedicine is a good example here. The use of data, any data that come from a patient, is theirs. It's their right to give those data to anyone they want. It doesn't mean that they just agree to the microscopic print on a digital page when they click 'Agree'; what they are sharing has to be explained more clearly. This is not what companies like Facebook, or, back in the day, Cambridge Analytica, or Walmart, or Amazon are doing. Unfortunately, there is always a business gain that they are looking for. At the same time, with companies like Google, Amazon and Apple, in their healthcare divisions, there is a lot of good intention, I think. But where is the line?

It's a difficult question – good intention vs. profit. Data, especially health data, are like oil was in the 20th century; it's very valuable. It is important that we protect those data by any means – without interfering with progress. Data could help medicine progress to what it should be, which is 'healthcare' and not 'sickcare'. Furthermore, if there's any profit from a patient's data, that patient should be compensated. Some companies are doing that, for example, paying trial participants. That's a very good way to advance science. We can do a trial with hundreds of thousands of patients very quickly and get very good results that would help medicine and help fight disease very quickly. But it really has to be up to the patient. Insurance companies is another topic here, they thrive on that. But can your data be used to prevent you from being covered for a disease that you might have in 10 years from now? That's a very delicate matter. This is again about how we use technology, in a good way or in a bad way. There has to be a very ethical balance out there.

When pushing some innovative solutions that you are fascinated with but your environment not so much, what do you do to succeed? What would be your advice to someone who is similarly struggling?

The best way to make an idea prosper is to try and crowdsource many minds to see if you're really on the right path. And if you are, use the technology to spread the message and pull people into your team. The power of technology helps connect and communicate with others, correct you if needed, or back you up if you are going in the right direction. That's crucial.

Teamwork is essential. If you are in a team or an environment that does not seem receptive to your ideas or potential, then probably you need to move forward and try to find a place that will embrace that. You need to be in a place that doesn't keep you down but elevates you, so that you can really bloom as a dreamer, or a thinker, or a creative disruptor and innovator. It's important not to get stuck in the present but reach out.

What role do the hospital management and the leadership play here?

It depends on where you are. Certain places are innovative to the core. They have that atmosphere of teamwork and innovation, and they care for people, not just say that they do. Some places are not like that, unfortunately. The problems in healthcare are created or exacerbated by the hospital administration, and you see, especially in healthcare, how doctors, nurses, technologists are burned out, or have issues with mental health, drug or alcohol abuse, or even suicide. The rate of suicide in doctors in the U.S is twice the average, and that is unacceptable in healthcare that is about protecting health and well-being. Much of this comes from the bad use of technology. We're separating ourselves from the patients who are the core of our passion. We're separated from the patients by the forced use of digital health technologies in the wrong way, by the work environment, by the administration that is just putting the billing, or documentation, or their own agenda above the well-being of their employees or even their patients. That's very dangerous and unfortunately all too common, probably in the whole world, but especially in the U.S.

Is there anything that is being neglected in terms of innovations and technology? Where should we look deeper?

Not that it's been neglected, but I think we must push for whatever innovation in healthcare to have a focus on global access to whatever solution we are planning. We need to make solutions that are inclusive, not just for healthcare but also for education technologies out there. Every time people are trying to innovate, they are looking for a business solution that will grow into an Apple or an Amazon. But any solution has to improve the lives of the populations that don't have access to all the things that we have and take for granted. That is very important and I don't think there is enough happening in this regard. It's unacceptable in a world that has so many possibilities and fascinating technologies and at the same time, where most of the population do not have access to those blessings. That is probably something that we all need to be doing, thinking about our friend and neighbour more.

Conflict of Interest

Dr Grossmann reported to have compensated advisory roles with NanoxVision, MagicLeap, FundamentalVR. ∎

Watch the full interview here.

The Importance of Technology and Novel Solutions in Healthcare

Author: Sourabh Pagaria | Executive Vice President & Head of Southern Europe | Siemens Healthineers

The COVID-19 pandemic has taken the world by storm. In particular, the crisis has revealed different aspects of healthcare that need to change and improve. HealthManagement.org spoke to Sourabh Pagaria, Head of the Southern European business of Siemens Healthineers. He is also a thought leader on how Data, Artificial Intelligence and joint public-private approach can reshape the future of healthcare. In this discussion, Sourabh talks about technology and novel digital health solutions and how they can help the healthcare sector improve its response to a similar crisis in future.

✓ Key Points

- COVID-19 made the healthcare world do a 180° shift on the adoption of telemedicine.

- In the new normal, teleconsulting and virtual care will become part of healthcare delivery.

- Stakeholders in healthcare need to go beyond digitalising existing physical processes and start thinking digital-first.

- Technology alone cannot cure all the ills of current healthcare systems. It will also require new leadership thinking and patient-centred health systems.

In your opinion, what weaknesses in healthcare were revealed during the pandemic?

This pandemic has exposed many systemic weaknesses in our healthcare systems. The most important ones are:

1. **Weak primary healthcare infrastructure:** In the past, GP offices and clinics played a big role in providing primary healthcare support to communities. However, in the last few years, we have seen a shift in primary healthcare into hospital settings, which is understandable given the drive to have infrastructure efficiencies and synergies. However, in pandemic situations like the one we are in now, this represents a major challenge as large healthcare facilities like hospitals themselves become the source of infections in the initial phases of the spread of infections.

2. **Underequipped public healthcare systems:** Over the last few years, government investment in public healthcare systems has seen a decline in Europe and healthcare was often seen as a cost factor rather than as a key component to keep the economy productive and growing. As a result, those factions of the society that most depend on the affordable public healthcare systems are often unable to gain equal access to healthcare facilities. The elderly population is heavily impacted, as are the people inflicted with chronic sicknesses.

Thus, when the pandemic hit, many public healthcare systems found themselves ill-prepared to face it from a technology, infrastructure and staff point of view.

3. **Lack of disease surveillance infrastructure:** Pandemics have happened before, but what is different this time is that our world today is deeply interconnected. Hence, the speed at which this pandemic spread through the globe was extremely fast. On top of that, in most parts of the world, there is no disease surveillance infrastructure which can monitor the spread of such an infection in the communities in real-time.

4. **Lack of capability and coordination among healthcare service providers to manage a crisis of this scale:** Healthcare service organisations are complex and have typically firmly structured hierarchies and silos of information. This hinders cooperation and collaboration even within one system, let alone the ability to do cross-system collaboration across public and private institutions. Moreover, most healthcare administrations never trained themselves for such a crisis through systematic processes like conducting disaster management drills regularly and having rapid action plans to respond to emergencies like this. Hence, when the pandemic hit, the local healthcare systems found themselves ill-prepared and uncoordinated.

5. **Interdependency in the healthcare supply chain:** In this truly interconnected and interdependent world, COVID-19 exposed the key vulnerabilities that a global supply chain can create. At the beginning of the pandemic, many European countries struggled to provide basic PPEs and life support equipment like ventilators because sources of such critical supplies were located outside Europe. This doesn't mean that we dial the clock back on globalisation, but in the context of healthcare, we certainly need to take a hard look at the supply chains of critical materials and technologies.

We have seen a rapid increase in the use of virtual care and telemedicine during the pandemic. Why do you think telemedicine wasn't appropriately utilised before COVID-19? What future do you foresee for virtual care now that we have seen its many benefits?

Telemedicine and virtual care are not new concepts. They've existed for at least the last two decades. Before COVID-19, many aspects prevented virtual care telemedicine from becoming a mainstream alternative to physical interactions between doctors and patients. These include a lack of proper infrastructure and devices globally, lack of adoption by physicians and patients alike because of the fear of losing a personal relationship and even doubts about the reliability and effectiveness of telemedicine interventions.

However, COVID-19 made the healthcare world do a 180° shift on the adoption of telemedicine because this was the only way patients could access care during the lockdown. Additionally, as people got used to remote work and education, the idea of talking to your doctor over video consultation and sharing data over the internet started to not sound alien to patients and consumers of health. One of our customers reported an increase in the share of telehealth visits from <1% of total visits to 70% of total visits, reaching more than 1000 video visits per day in just four weeks.

If you think about the effectiveness in the environment where you need to manage a patient continuously, especially patients who have gone through recent episodes of surgery or who are chronically ill, telemedicine provides an efficient way for physicians to get this data and use various telemedicine platforms to remain more connected to the patients rather, than being episodically connected. This is also what the pandemic really helped people to discover.

As the world slowly recovers from the pandemic and settles into the 'new normal', I expect teleconsulting and virtual care to become part of healthcare delivery mainstream with applications like remote care, home monitoring, enabling more real-time and continuous collaboration between patients and caregivers and virtual visits combined with AI-powered triaging solutions helping to provide fast triaging and timely care to critical patients.

However, challenges around the adoption of these technologies by elderly patients and data security concerns of patients and healthcare consumers' needs would still need to be overcome.

Technology is being hailed as the saviour for all our problems in healthcare. What is your opinion?

If we examine what role technology plays today in healthcare, it is mainly employed to digitalise the analogue processes, which were done before with pen and paper. This is how technology started to get adopted in healthcare. However, as I mentioned, even before the COVID-19 pandemic, global health spending was around $7.0 trillion a year, but out of that, only 1% is spent on technologies that boost the overall efficiency and productivity of healthcare systems. Clearly, we are not leveraging technology enough in making our healthcare processes more efficient, agile and less labour intensive like many other industries are doing.

If you think about the major trends which are impacting the quality of healthcare globally, we can see we have a shortage of skilled resources both from technician level

way, more patients get access to quality care. The human aspect and the technology aspect need to work together if we have to bring a new healthcare system across the world.

Out of this $7.0 trillion, where do you see saving potential in order to put more money into technology?

There are three main areas where we can actually create efficiencies and redirect resources for this amount into building better technology backbones for healthcare infrastructure. The first category is waste removal. The biggest waste that comes in healthcare today is because of duplication of effort. For example, a patient goes into one healthcare system and undergoes a certain set of exams. A few months later, the same patient goes into another healthcare system, and another set of exams is performed on the same patient. Most often than not, the clinical value of repeating that is not so high, and hence, we have created waste in the system. There is a large amount of waste created only because of duplication of such efforts, which can be streamlined if we leverage technology to make patient data available and interoperable between healthcare systems.

As the world recovers from the pandemic and settles into the new normal, I expect teleconsulting and virtual care to become part of healthcare delivery mainstream

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all the way to physician level and specialist level; we have an ageing population that requires more care and all of that care cannot be provided inside a hospital because this becomes too expensive. There are also chronically-ill patients who require timely intervention to prevent increasing the burden on healthcare systems. All these things require healthcare providers to leverage technology. Technologies like virtual consultation and robotics-assisted procedures can help improve access to higher quality healthcare to a large population across the globe. Remote monitoring can make healthcare more continuous, and last but not least, technologies like AI could drive triaging, and AI-powered clinical decision support systems could help free up precious physician and specialist time which could then be used by them to provide more emphatic and personalised care to the patients as comprehensively and productively as possible.

Having said this, technology alone cannot cure all the ills of current healthcare systems. It will also require new leadership thinking among healthcare leaders to create more agile, more integrated and patient-centred health systems. Technology is a tool to assist a physician in doing their work more effectively so that they can spend less time with machines and computers and more time with patients. This is one

The second area with great potential for improvements and savings is to provide more timely diagnosis to every patient or every prospective patient. Most of the money that healthcare ends up spending is typically on people who were diagnosed quite late. This often may result in terminal patients who need to be managed with expensive therapies. If we work together with the governments to implement early detection programmes, especially in the area of oncology, we can find a huge amount of savings which can trickle down because we would be detecting early and hence those patients could be managed with less costly interventions, while providing a better quality of life to them.

The third area is digitalisation, as it can provide efficiencies in our processes. For example, improper triaging results in 20 to 30% more cost on the patients arriving in the emergency room. Here, artificial intelligence-based algorithms have enormous potential to enable proper triaging of patients and direct them to the right specialties so that they could be properly treated and then further directed in their care journey. Another example would be using AI-aided clinical diagnostic support tools to accelerate readings of radiology images and interpretation. This way, radiologists wouldn't have to spend too much time reading imaging data of a broken hand or a broken leg which could easily be read by an algorithm. Instead,

they could do a quality check and approval in a fraction of the time that they would have taken. Hence, by driving efficiency, health systems can create more savings downstream and allow this money to go back into the system for further technology investments.

What is the future of digital health? What novel solutions can change the way we provide care?

Digital will be the 'new normal'. The experiences of this pandemic have inspired many stakeholders in healthcare to go beyond digitalising existing physical processes to start to think digital-first. I clearly identify four main areas where digital health will continue to shape healthcare in the 'new normal':

1. **Tools for increasing efficiency of medical processes:** for e.g. screening and triaging supported by AI-based screening tools. Many countries, at the peak of the pandemic, deployed AI-based screening tools to help identify high-risk patients of COVID-19 and provide timely care. Similarly, new AI-driven solutions are being introduced to improve administrative processes like coding and billing.

2. **Tools for improving access to care:** Virtual doctor visits to avoid unnecessary travel to and wait at doctor offices and remote monitoring solutions which help caregivers & doctors to be close to the patients round the clock. Similarly, remote-controlled robotic surgery systems could provide patients in remote areas access to expert surgeons.

3. **Tools for improving clinical outcomes and reduce unwarranted variations:** AI-based algorithms will increasingly help physicians identify, characterise and diagnose ailments much faster. It will also speed up workflows by automating time-consuming manual tasks, thereby allowing physicians and caregivers to focus on tasks AI cannot take care of and establish a trust-based relationship with the patient and make better-informed clinical decisions.

4. **Accelerating innovation cycles in drug discovery and diagnostic test development:** A great deal of pre-clinical work for new drug discovery or lab test development is being done using AI algorithms that are potentially able to reduce the cost and time of pre-clinical work to a fraction as compared to traditional methods.

The vaccination rollout is in process across the globe. What is your opinion about the way things are being done? What has been done well, and what could have been done better?

It is important to acknowledge that this is the first time as we know in human history that we were able to leverage science and bring a vaccination for a viral disease in record time. We should not underestimate the efforts that went in there and the achievement that we as a human society got out of it. The difficult part was that we were all pressed to get the vaccine out in time and have enough doses ready to vaccinate seven billion people on this planet who are logistically dispersed across the globe. This is a mammoth task that has

never been done and challenges are inevitable. We see that some countries are doing better while others are struggling, and there are many factors influencing this.

We must understand that vaccination is to be done with the objective of stopping the spread of the virus in the communities which are most affected. That is how governments have categorised people. If I were to do it differently, I would also categorise them by geographical area and by their disposition towards such an infectious disease. This would allow to target more crowded and more densely populated areas first where the incidence rate can be high. This might not be an easy approach to take, but if local, national, and global governments work together, they can identify certain communities which need to be vaccinated irrespective of age group and then move to the other ones.

Also, if you think of countries that have developed their own vaccines, many of them are stepping up to support other countries. The question is, again, where do we direct those programmes? Do we direct them to the at-risk communities effectively, or do we actually do them based on diplomatic relations? There is no easy answer to it. But we need to be patient enough to let governments do their job, join the dialogue, and when the time comes, to come forward and get vaccinated because this is also an important issue. 100% of the population is not ready to take the vaccine, but it is important that each of us makes a conscious decision around this. We are responsible not just for our own health but also for the health of the community around us.

How do you see the growth opportunities in your region and beyond?

When you talk about growth opportunities in, for example, Southern Europe, the region I'm currently working in, there are a lot of opportunities where we can make an impact through our portfolio. If we look into the big task of building and rebuilding certain healthcare systems, it is important for us to be ready when the new programmes from national governments or from the EU will come in. We should be able to step up as the key strategic partner to help them build infrastructure that is efficient and effective and designed for the future, which leverages technology to extend access to care and improve the quality of care and the patient experience. It's not about selling more equipment because the equipment is a means to an end, and the end is providing better care at an affordable cost at the access point.

The biggest growth opportunity and challenge for our industry is to work collaboratively with our customers and co-create solutions that can help them step into the future and into this new normal with solutions that are not just a copy-paste of what we did in the past but something which takes them into the future. The opportunity for companies like us is to be the partner to realise those visions. We want to work, not with a product mindset, but instead, with a solution and co-creating a future mindset. ∎

Never Let a Good Crisis Go to Waste
Strategic Opportunities After COVID-19

🔷 Author: **Hans Erik Henriksen** | **Independent Consultant** | Denmark

The COVID-19 pandemic has challenged countries to accelerate innovation and digitalisation in healthcare in order to find new ways to cope with the crisis. As we hopefully soon can lay the pandemic behind us and get back to a new normal, there is a window of opportunity to grab and build on digitalisation and innovation progress made during the pandemic which can lead to significant long-term benefits.

✓ Key Points

- In 2021 Denmark has progressed healthcare transformation in many areas through a number of well concerted and coordinated strategies over the years.

- The current Danish strategy for Digital Health (2018-2022) includes 27 initiatives, and it is designed to support eight political targets and reach five main objectives.

- The eight targets aim to raise the bar to create better coherence, higher quality and greater geographical equality.

- Digitisation is an important element and a key driver of change.

- The Digital Health strategy will make digital health more available to citizens and patients, enable the use of new technology and prepare for future innovation within AI, apps and wearables.

- Healthcare will return to a new normal after the pandemic, but only those healthcare organisations, which grab the window of opportunity after the pandemic, will gain the full potential of the progress made during the pandemic.

The Danish Healthcare Transformation Strategies
The Danish public sector and healthcare structure reform in 2007 initiated a number of healthcare transformation strategies focusing on healthcare-IT and e-health, but also initiatives to establish the future hospital and acute care landscape in Denmark.

In 2021 Denmark has progressed healthcare transformation in many areas through a number of well concerted and coordinated strategies over the years. This, of course, includes healthcare-IT, where nine different strategies have been completed since 1999, leading to a current situation, where a national EHR has been established in Denmark with full and secure access to healthcare information for all citizens and clinical professionals. And – with the future hospital initiative - reducing the number of hospitals in Denmark from 98 in 2000 to 32 today.

The current Danish strategy for Digital Health (2018 – 2022) includes 27 initiatives, and it is designed to support eight political targets and reach five main objectives.

The eight political targets have been established through an ambitious political agreement: "National Targets for the Health System". The agreement aims to ensure that all sectors of the health system – hospitals, municipalities and GPs – pursue a clear and common goal of higher quality.

"National Targets for the Health system" is defined by one clear crossbar: better coherence, higher quality and greater geographical equality in the health system. And for the eight targets, which jointly aim to raise the bar to create better coherence, higher quality and greater geographical equality, digitisation is in certain areas an important element – and in other areas a key driver of change.

The Digital Health strategy is a paradigm shift, which will make digital health more available to citizens and patients, enable the use of new technology and prepare for future innovation within AI, apps and wearables.

Implementing the strategy has led to a remarkable shift in the way Danish citizens and patients access their electronic

Figure 1. The eight national targets. Source: Digital Health Strategy 2018-2022, Danish Ministry of Health, Danish Ministry of Finance, Danish Regions, Local Government Denmark

healthcare information – from using a PC and a web browser and to now relying on an ecosystem of apps, where access to healthcare information is everywhere and from the smartphone and pocket of the patient.

The Digital Health strategy and the political targets are supported by the national roll-out of telehealth on a national level, where the first step – during coming years - will be national telehealth for all COPD patients.

Strategic Development in Times of a Pandemic

The reactions and consequences of a serious pandemic like COVID-19 at first make all healthcare authorities focus intensely on handling capacity in order to manage an expected and massive increase in hospitalisation and avoid a serious overload and breakdown of healthcare services.

Existing strategic plans and developments are typically affected, and they are often delayed or put on a temporary hold as all attention is on handling the pandemic. However, those initiatives which were immediately introduced to handle the pandemic have later proved to be fundamental drivers, which can progress existing strategies and plans considerably – and not only during the pandemic.

leaders came together to fight the outbreak, developments became possible in a very short time, which would normally take a long time to implement successfully. Because everybody had a strong will to take new measures, the pandemic cut through the usual organisational boundaries and silos, and it changed the culture. All the mechanisms, which usually hinder new innovation and progress, were suddenly taken out of the equation.

On 26 March, shortly after the lockdown of Denmark on 11 March, the option to have a teleconsultation (video meeting) with the GP was introduced through the Danish My Doctor app. Immediately, all Danish patients could choose a teleconsultation as an alternative to visiting their GP. This is a massive success. During the first month, 30,000 video consultations were performed, and a total of 270,000 video consultations have been performed in Denmark between March and November.

During the same period, the Danish Healthcare Regions experienced a general increase in the number of teleconsultations, and one region reported a 36% increase.

Introducing the video consultation option helped healthcare authorities control the outbreak and increase effi-

The pandemic is an opportunity to strengthen and improve existing strategies ... those who grab this opportunity will gain the long-term potential of the progress

Increasing the level of digital health and the use of telehealth are obvious initiatives that help reduce personal contacts in the healthcare system and control the outbreak. During the pandemic, already planned teleconsultation services were implemented immediately in Denmark - much earlier than outlined in the Digital Health Strategy.

The reason why big progress in digitalisation and telehealth occurred during the pandemic can not only be attributed to the extreme sense of urgency and determination from healthcare leaders. When all healthcare professionals and

ciency. Patients are extremely happy with the new option, and especially among elderly citizens – who are typically very concerned about the risk of COVID-19 – there was a solid increase in the proportion of patients who used the teleconsultation option.

In many other areas, there are similar examples of how the measures in Denmark to control the outbreak progressed and expanded existing digitalisation initiatives. Hospitals, which already had implemented advanced Realtime Logistics Solutions, were soon able to combine information to

Figure 2. The five main objectives of the Digital Health strategy. Source: Digital Health Strategy 2018-2022, Danish Ministry of Health, Danish Ministry of Finance, Danish Regions, Local Government Denmark

provide a precise overview of their capacity and ability to receive COVID-19 patients. Through the existing Danish digitalisation infrastructure, which connects all hospitals in Denmark, a national overview of capacity was established, and the same digital infrastructure was used to connect the COVID-19 test centres in order to also provide a national (and real-time) overview of positive tests.

From a strategy perspective, initiatives during COVID-19 helped accelerate the already planned implementation of teleconsultation in the MyDoctor app, which is one of the initiatives in the Digital Health Strategy. Teleconsultation was introduced much earlier than originally planned, but more importantly, the rapid uptake, where both GPs and patients immediately switched to teleconsultation, was something that strategists could only have dreamed about. Without the pandemic, the uptake period would have taken a much longer time.

The COVID-19 pandemic is an opportunity to strengthen and improve existing strategies that were already in place before the pandemic. Even though healthcare will return to a new normal after the pandemic, where we will generally make more use of digitalisation and telehealth, it will only be those healthcare organisations, which grab the window of opportunity after the pandemic who will be able to gain the full long-term potential of the progress made during the pandemic.

The window of opportunity after the pandemic is about updating existing strategies according to shifts and gains during the pandemic, but the most important factor of value is the special culture and determination by health-care leaders and professionals to make changes, work in new ways and in new roles. Healthcare organisations, which are able to prolong and preserve this special culture to implement future and long-lasting progress, will be the real winners of the pandemic.

Conflict of Interest

None. ■

A Novel App to Assist Liver Surgery

⬢ Author: **Prof Davide Caramella** | **Chairman** | **Radiodiagnostica 1** | **University Hospital of Pisa** | Italy
⬢ Author: **Stefano Palma** | **CEO** | **MEDICAL-NOTE Srl** | **Pontedera (Pisa)** | Italy

Parenchyma-sparing liver surgery (PSLS) is becoming increasingly important as a salvage surgical therapy for patients with hepatic metastases from colorectal cancer. We report our experience with a medical app that allows to personalise a digital 3D model of the liver on which radiologists manually draw hepatic lesions as if using a digital "notepad", thus summarising the full preoperative CT and/or MRI datasets that are stored in the picture archiving and communication system (PACS). The app provides an ideal link between preoperative imaging and liver surgery, since it simplifies surgical planning and it assists PSLS by providing quick reference in the operating theatre. Moreover, this app can be used in training as an effective educational tool.

✓ Key Points

- Parenchyma-sparing liver surgery (PSLS) is an important salvage surgical therapy for patients with hepatic metastases from colorectal cancer.

- Using the principles of PSLS, hepatectomies can be performed with specific indicators of the tumour position and vessels to resect.

- In Pisa, a clinical and technical multi professional team developed a medical app that allows radiologists to personalise an electronic 3D model of the patient's liver.

- Graphically simplifying the complex radiological information into a patient personalised 3D liver model has the potential to improve planning and performing challenging procedures such as PSLS.

Introduction

Parenchyma-sparing liver surgery (PSLS) is a highly sophisticated surgical approach which is becoming increasingly important as a salvage surgical therapy for patients with hepatic metastases from colorectal cancer. It allows a small volume of resection (less than three adjacent segments) with the goal of ensuring an adequate volume of the liver remnant and an adequate vascular outflow (Urbani et al. 2017).

This surgical procedure overcomes the concept of traditional surgical subdivision of the liver along longitudinal lines, going beyond the Brisbane 2000 Nomenclature (Strasberg and Phillips 2013). Using the principles of PSLS, hepatectomies can be performed with specific indicators of the tumour position and vessels to resect (Torzilli et al. 2017).

However, since PSLS is very difficult to standardise, surgeons often feel the need to have a comprehensive albeit simple visual representation of the liver with the exact position of each metastatic lesion to resect, together with the pertinent vascular information.

The 2D and 3D radiological images routinely provided by CT and/or MRI may fail to adequately meet the surgeon's needs. In fact, a relatively simpler three-dimensional model that graphically summarises the complete radiological data-sets provided by CT and/or MRI is easier to be used in surgical planning as well as a quick reference in the operating theatre.

In Pisa, a clinical and technical multi professional team developed a medical app that allows radiologists to personalise an electronic 3D model of the patient's liver - using
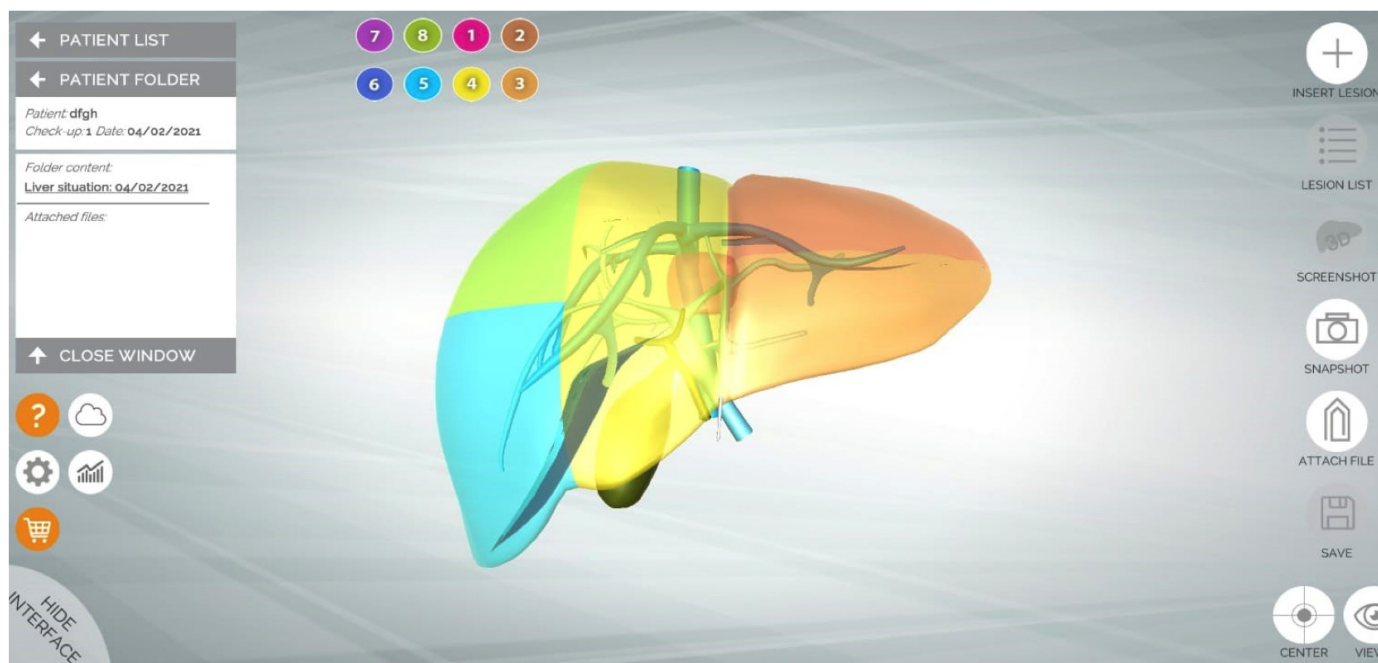
Figure 1a. Normal hepatic 3D model, with highlighted liver segments
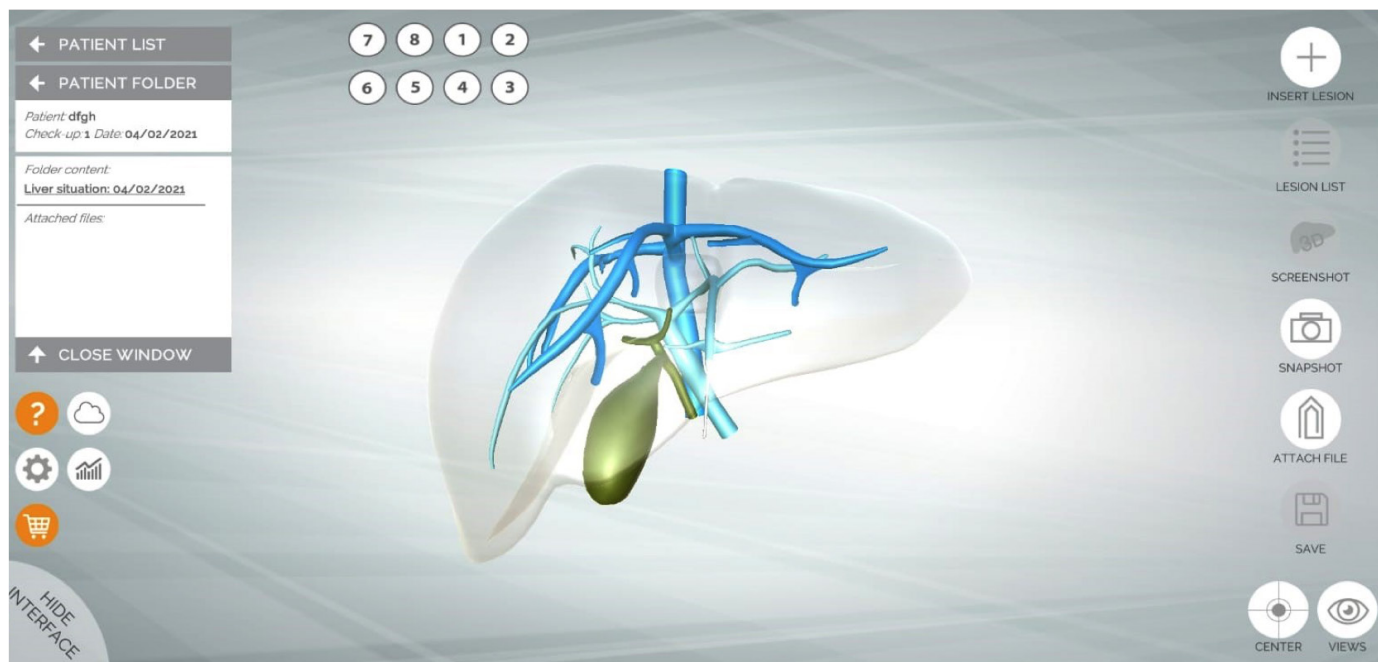
Figure 1b. Normal hepatic 3D model, with a standard map of portal and venous vessels that can be personalised to the individual anatomy of the patient

the whole imaging information stored in the picture archiving and communication system (PACS) - by manually drawing and placing the hepatic lesions into the model liver as if using a digital "notepad".

We report our experience in using the medical app for planning and intraoperative guidance in PSLS and also as an educational tool for surgeons in training as well for other junior doctors and students.

The App
A multidisciplinary group of radiologists and surgeons collaborated with software developers to create and progressively
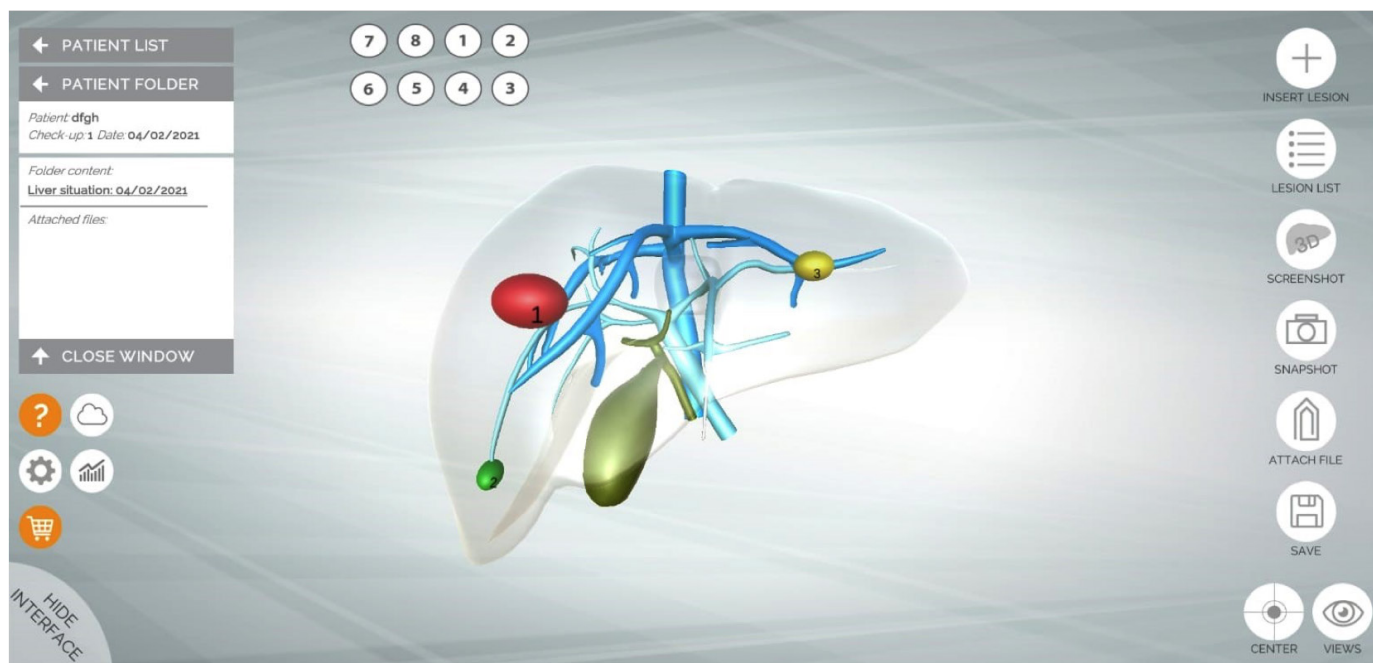
Figure 1c. Hepatic 3D model, with two solid nodules (benign, yellow and malignant, red) and a cyst (green)

improve a medical app that has been developed for Android and iOS, and a software for Mac OS and Windows. It mainly consists of:
• an editable 3D model of the liver realised with Unity3D;
• a rendering engine which makes it possible to browse through the model and move the lesions;
• a system for managing and archiving patient data, and for statistical compilation.

The default liver model has a standard map of venous vessels (venous portal system and hepatic veins) and a schematic biliary system (common bile duct, right and left hepatic ducts and gallbladder). In this digital 3D model of the liver the eight segments - according to the classification of Couinaud - are displayed in different colours (Figure 1a).

In order to accommodate individual variations of the hepatic vascular architecture, the app allows to insert intra-hepatic communicating veins or accessory hepatic veins, thus achieving personalisation of the liver model (Figure 1b). This is extremely useful for the exact positioning of the lesions within the liver and for predicting post-surgical venous outflow.

Once the 3D model of the liver and its hepatic outflow has been personalised to the individual anatomy of the patient, lesions are manually added by radiologists on the basis of preoperative CT and/or MRI datasets. The following colour code is used: red lesions are malignant, green lesions are simple cysts, whereas yellow lesions are solid benign hepatic lesions such as focal nodular hyperplasia, nodular regenerative hyperplasia, haemangioma, and adenoma (Figure 1c-d).

During the clinical workflow, all medical members of the multidisciplinary team involved in the oncologic management of patients with colorectal cancer liver metastases can consult and modify the notes wherever they are (even offline). All the app information is safely stored on a cloud server. A reliable storage of the information is ensured by iCloud.

Our Experience

Over the past three years, we have used this app in the clinical management of patients eligible for PSLS as well as in teaching applications. Concerning the latter, the app was tested as a teaching tool for residents, fellows and surgeons in PSLS training.

Concerning clinical applications, we noticed that graphically simplifying the complex radiological information into a patient personalised 3D liver model has the potential to improve planning and performing challenging procedures such as PSLS.

In fact, the app shows the hepatic lesions in an easy and intuitive way, using display devices that can be introduced into operating rooms without disrupting surgical workflow. It allows surgeons to focus on findings that are of key importance in designing liver cut surfaces and to simulate surgical steps. Moreover, the app may help elucidating complex cases involving several lesions or lesions close to blood vessels.

Another useful feature of the app is its immediacy for all users, including patients. In our experience, this app facilitated communication between healthcare personnel and patients, particularly when it came to obtaining informed consent. The 3D model intuitively shows to the patients
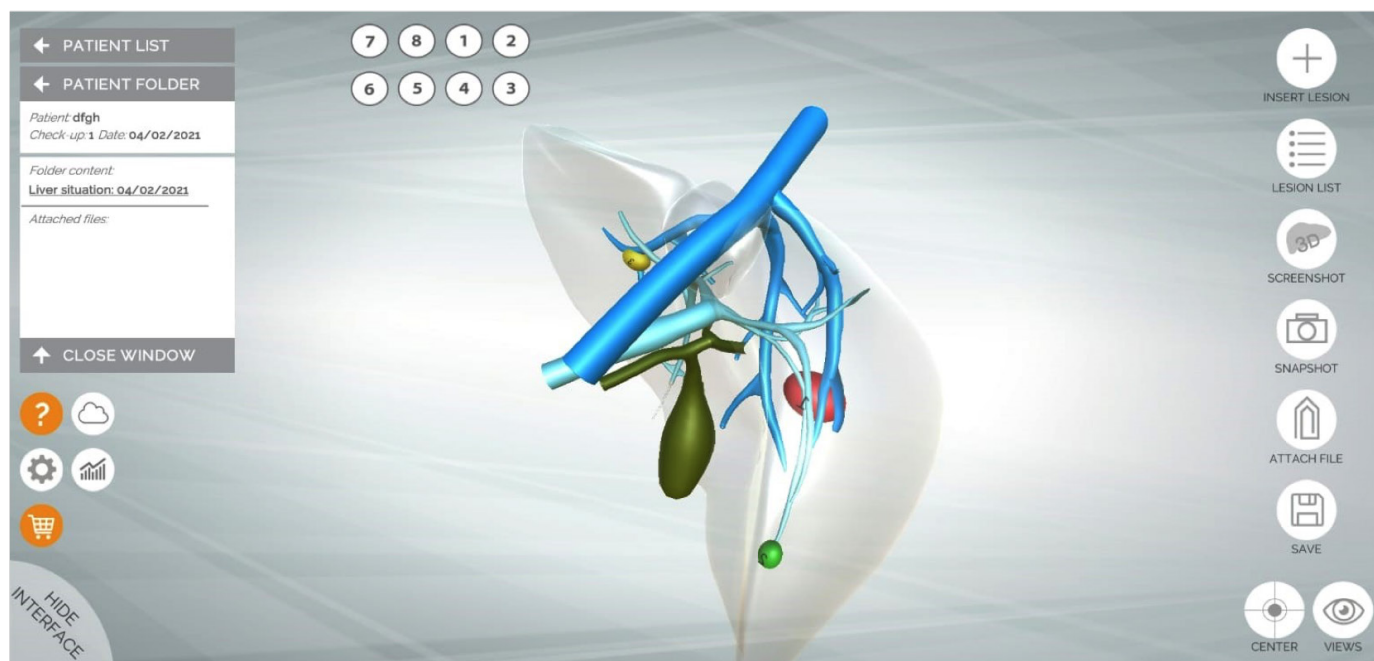
Figure 1d. Rotated hepatic 3D model, for better visualisation of the hepatic venous vessels and the inferior vena cava

their "hepatic situation", making it easier to explain surgical options as well as to justify the need for a lengthy procedure and the possibility of complications.

We observed that informed consent obtained after showing this cartoon-like 3D model was associated with a lower level of patient anxiety in comparison to the consent obtained by showing actual radiological images which are often perceived as incomprehensible and menacing.

A potential weakness of the app is the amount of time that radiologists have to spend to summarise the whole information contained in the preoperative CT and/or MRI datasets (consisting of thousands of images) into the 3D model containing just the key information required by the surgical team. However, such investment of radiologists' time is compensated by the reduced request of clinico-radiological consultation in the different phases before and after surgery. Moreover, the personalised 3D model of the metastatic involvement of the liver can be used in communicating with patients as well as in training applications.

Conclusions

Our preliminary experience showed the added value of the efficient sharing of 3D liver models that was made possible by this user-friendly platform which can be run on devices that are increasingly integrated with the daily activities of medical professionals.

With the use of this app, it is possible to support the training of surgeons in planning and performing PSLS. Furthermore, this medical app can be an important educational tool for many trainees since it can be utilised by radiology residents as a test for positioning hepatic lesions on the basis of CT and/or MRI datasets and by surgery residents for simulating cut surfaces resection on the liver model. A slightly modified version of the app was even used to improve teaching the CT anatomy of the liver to medical students.

Conflict of Interest

None. ■

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Point of Care AI for Digital Radiography

How Agfa's SmartXR puts artificial intelligence in the technician's hand to boost efficiency, consistency, safety and care in radiography.

☑ Key Points

- SmartPositioning augments a live camera stream by projecting the image area and the AEC x-ray feedback sensor positions onto the patient's body.

- SmartRotate uses deep learning to auto-rotate images to their standard orientation based on the image content.

- SmartAlign uses advanced sensing to give live feedback on the accuracy of the tube-to-panel alignment during bedside or out-of-bucky exams.

- SmartDose uses 3D machine vision to determine the thickness of the patient, and then tailors the exposure parameters.

- Agfa's SmartXR portfolio, comprising SmartPositioning, SmartRotate, SmartAlign and SmartDose, is underpinned by artificial intelligence (AI) solutions that help radiology departments meet their workflow challenges by improving operational efficiency and clinical consistency.

Introduction

X-rays are the single most performed imaging diagnostic: every year more than two million radiographic exams are carried out on Agfa equipment around the world. Radiology and radiography workloads are continuously growing, while the move to evidence-based medicine is simultaneously increasing the pressure on healthcare budgets, efficiency and quality of care standards.

With its SmartXR portfolio, Agfa has directed its development of artificial intelligence (AI) solutions towards helping radiology departments meet their workflow challenges. These AI upgrades for digital radiography focus on supporting operational efficiency and clinical consistency. We interviewed Gert Merckx, Product Manager Radiology Solutions, and Jeroen Cant, Research Team Lead, from Agfa, to find out more.

You have described SmartXR as an "intelligent radiography workflow assistant". Why did Agfa choose to focus its artificial intelligence efforts on workflow, rather than diagnostic AI, for example?

Gert Merckx: Artificial intelligence has opened up a lot of possibilities for radiology. One area that has received a lot of attention is diagnosis, for example, to detect tuberculosis or pneumothorax. This is a very important functionality; there are a number of vendors working on it.

But, we chose to take a different approach, and to use our strengths and 120-year legacy in radiography. Since the era of film, optimising workflow and reducing waste have always

Meet Liv, the friendly face of Agfa's SmartXR Imaging workflow assistant.

been a key focus for our solutions and services. So, it made sense for us to develop tools and functionalities that address the most pressing challenges facing radiology departments.

One of these is a shortage of skilled technicians, combined with the fact that students these days receive fairly limited training on x-ray radiography. This raises problems that impact quality and efficiency, including avoidable errors, high exam variability and more. For the technicians, the situation can also create a lot of nuisance. They have to spend more time fussing with equipment, rather than focusing their attention on what really matters: the patient.

What exactly is SmartXR, and how does it help overcome the challenges facing the radiology department?

Gert Merckx: SmartXR is a portfolio of software upgrades for our direct radiography (DR) solutions. It uses the power of AI to assist the technician with very specific tasks that can be time-consuming or open to variability or errors.

We like to say that medical image acquisition is both a science and an art. SmartXR lightens the radiographer's workload, and, at the same time, enables greater consistency in imaging, even between different technicians. So, it helps to improve the operational and clinical performance of the department, technician and radiologist.

SmartXR does this by combining hardware, such as integrated sensors and cameras, with AI-powered software, 3D machine vision, deep learning and machine intelligence. By reducing the need for retakes at different points in the technician's workflow, SmartXR helps to eliminate waste, support quality care and enable a more efficient workflow.

Some of the technologies come from the military and gaming industries, which are quite advanced and proven. So, we could focus our minds and resources on making sure it meets today's healthcare needs.

In the era of digital radiography, why do we have to worry about retakes?

Gert Merckx: In the classic film era, retakes had a very obvious cost: the expense of the film, time and products needed to develop the images. We created programmes to help technicians reduce the number of retakes, by optimising their imaging techniques.

But, when digital radiography was adopted, there was no longer an "out of pocket" expense for retakes. Technicians could take as many images as needed to get the right one.

However, retakes still have hidden costs: in efficiency and safety, for example. Academic studies show that hospitals can have as high a retake rate as 20%. That works out to 24 days of surplus work for an x-ray system each year. Clearly, this is an area where there is a real opportunity for improvement.

How did you select which features to include in SmartXR, and how did you incorporate the "voice of the user"?

Gert Merckx: My original role at Agfa was as an image processing researcher, working with x-ray equipment in the laboratory. I was not trained to deal with the intricacies of radiographic positioning or parameter setting. So, I made a lot of mistakes. I realised that AI offered ways to overcome these types of errors and inefficiencies. Not only for me in the laboratory, but also for technicians in the radiology department.

We started by looking at existing data to see if there was a real opportunity for AI solutions to play a role. We data-mined our workstation usage patterns, for example, to see how many retakes are caused by specific issues: positioning, alignment, etc. We also checked the academic data available. Based on this, we identified first ideas for functions.

Then we took these ideas to some of our customers directly to see what they needed and wanted. We started discussions, organised workshops to talk about their pain points and presented some possibilities to them. We confirmed that the greatest interest was in AI tools for optimising dose, improving radiographic positioning, reducing variance and enabling consistent imaging.

How did you turn those ideas and interests into practical solutions, for consistent imaging, for example?

Jeroen Cant: Improving consistency has always been a priority for Agfa: MUSICA image processing has been doing it for decades. With SmartXR, we are widening the concept of consistency to other parts of the image acquisition workflow.

The very first AI applications involved teaching an algorithm to recognise something from an image: a dog versus a cat. In healthcare, some of the first applications for radiology were to recognise specific pathologies in lung images: pneumonia, pneumothorax and others. These are known as "A to B" systems: you give the algorithm a certain number of images ("A"), and then a label comes out ("B"). It's like a child learning to recognise different animals in their environment.

For us as well, we started with image recognition, with SmartRotate. Correct image rotation is a real pain point for radiologists when they are comparing images from different days, for example. So, SmartRotate recognises the image content: is it a hand or a lung? It then rotates the image to the standard orientation for that type of image. It is a simple idea: it enhances the consistency which the radiologist needs, while simplifying the technician's workflow.

Studies have shown that poor x-ray positioning leads to as much as 68% of rejected images. How does SmartXR address that?

Gert Merckx: Indeed, the data led us to another key priority for SmartXR: patient positioning. Ensuring correct radiographic positioning can be quite difficult for the technician, who, for

dose they actually require. This is just one example to illustrate why ensuring the correct exposure parameters is critical.

Back in the days of film, the technician would use callipers to measure the patient's "thickness" and then work out an appropriate, tailored dose. This practice has largely been forgotten, and incorrect exposure parameters now account

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With SmartXR, we have given our DR systems eyes: we have made them aware of their environment and we have taught them to act accordingly

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example does not know the exact angle of the x-ray panel to the tube. This is especially true for bedside imaging. But, the radiologist can better compare images taken from the same angle. Again, consistency is crucial. Our SmartAlign helps the technician ensure that the x-ray beams have a consistent angle towards the panel.

In x-ray rooms, patient movement and the position of the Automatic Exposure Control (AEC) cells pose another challenge: the patient's body blocks the technician from seeing the AEC placement. SmartPositioning solves this by projecting the AEC cells in augmented reality (AR) onto the patient, enabling the technician to immediately see if the configuration is correct.

The camera livestream with AR overlays allows the radiographer to check the positioning from the viewpoint of the system remotely, before pressing the exposure button.

AEC and Shielding: The Role of SmartPositioning

One problem with AECs identified by the AAPM and the American College of Radiologists (ACR) and discussed in a 2020 debate is gonadal shielding. When the shielding covers an active AEC cell, the cell does not receive radiation. Thus, it never indicates that adequate exposure has been achieved. The result is overexposure, and the need for a retake. This situation has become so common that the ACR has changed their recommendations to omit the use of foetal and gonadal shielding.

SmartPositioning, however, solves this problem by clearly showing the technician that an active AEC cell is covered by the shield. The technician can then disable the cell, while still using the shielding. In contrast, an active cell that is not covered by the patient will lead to underexposure: again, requiring a retake. SmartPositioning notifies the technician that the cell is uncovered, so it may be disabled.

Dose matters, regardless of patient size: what is SmartDose, and how does it work?

Gert Merckx: At Agfa we know: dose is everyone's business. For instance, one publication showed that a "lean" patient who receives the standard dose can receive up to six times the

for 18% of retakes. With SmartDose, there is no more need for callipers. SmartDose gives our systems "depth vision" to estimate the patient's thickness and then suggests the best dose to the technician.

A Case in Point: SmartXR in the ICU

The global COVID-19 pandemic has placed additional strain on already busy ICUs. SmartXR helps to reduce the pressure, by easing the technician's tasks, speeding up imaging and cutting retakes.

A patient with extreme COVID-19 symptoms will be admitted to the ICU, and will need to be x-rayed at the bedside. If the patient is obese, viewing the collimation zone on his far side will be more difficult. Using LiveVision, the technician can position the system quickly and correctly. The SmartAlign sensors help to ensure accurate and consistent alignment, while speeding up the process.

As the technician sets up the SID measurement point, SmartXR indicates the distance from the source to the detector, providing the technician with critical information for repositioning.

SmartDose uses 3D vision to suggest a tailored dose for this patient, which reduces the risk of a retake due to over- or underexposure, and increases image consistency. The technician accepts the dose modification with just a click: much faster than manually changing the exposure parameters.

As soon as the technician makes the exposure, SmartRotate uses its deep learning neural net to determine the image content, and then rotates the image to the correct orientation, automatically.

Will SmartXR replace technicians?

Jeroen Cant: Technicians are an important part of healthcare and the patient's experience. This is something that we and the hospitals agree on 100%. SmartXR is not meant to take over the technicians' role. It has to help them complete their tasks in a way that improves their productivity, and provide images to the radiologist optimally. SmartXR can help a less

experienced technician to avoid errors, while lightening the load of a more experienced technician. It is a helping hand: a smart assistant.

This is something our customers appreciate. **Professor E. De Mey**, who is the Chair Radiology at UZ Brussels, noted that: "If you have people with less training, technology can help them get the correct positioning or avoid retakes. It can support them to make sure that the image is consistent, with a good dose. Technology like SmartXR can offer the solution for this."

How did you pilot SmartXR during COVID-19?

Gert Merckx: We actually began piloting SmartXR with some of our partner hospitals in Europe right before the COVID-19 outbreak. While this situation, of course, created additional challenges, the pilots provided very important learnings, and enabled us to prove the value of our AI portfolio in addressing the real and everyday challenges of radiography.

We received some excellent feedback from pilot hospitals, such as "Automatically getting exposure parameters that are correct for the specific patient, ensure the radiologist can get the most information from the image, saving both the radiographer and the radiologist time," according to **Prof. Dr. med. univ Thomas Lehnert**, Chief Physician of RNS Gemeinschaftspraxis Radiologie, Wiesbaden.

"SmartXR has fine-tuned some of our examinations. When we leave the room to go behind the screen, we still can see the patient via the camera. If we see them move, we can correct this before we do the exposure, saving the patient a dose of radiation," said **Harrison Jenefer (RLN)**, Senior Radiographer, City Hospitals Sunderland.

What is in the future for SmartXR and artificial intelligence at Agfa?

Jeroen Cant: With SmartXR, we have given our DR systems eyes: we have made them aware of their environment: we have taught them to act accordingly. This is a very big step forward, and now the possibilities are only limited by our imaginations.

Gert Merckx: We are committed to following the path towards supporting our customers with intelligent solutions that enhance efficiency and quality of care. There are certainly additional challenges where artificial intelligence assist radiology departments and hospitals to continuously boost productivity and quality, while at the same time improving comfort for caregivers and patients as well.

SmartXR at a glance

- **Smart Positioning** augments a live camera stream of the patient by projecting the image area and the AEC x-ray feedback sensor positions onto the patient's body. This helps the technician speed up positioning, while making it more accurate and consistent to reduce retakes.
- **Smart Rotate** uses deep learning to auto-rotate images to their standard orientation based on the image content. Fewer post-processing actions are needed, while image presentation on both workstation and PACS is more consistent.
- **Smart Align** uses advanced sensing to give live feedback on the accuracy of the tube-to-panel alignment during bedside or out-of-bucky exams. Alignment is faster and more accurate, with fewer retakes due to grid cut-off and more consistent projections.
- **Smart Dose** uses 3D machine vision to determine the thickness of the patient, and then tailors the exposure parameters. This helps the technician to speed up the configuration of exposure settings, reduce retakes, improve image consistency and ensure the ideal dose for the patient.

Conclusion

The SmartXR intelligent radiography workflow assistant is available for the DR 600 x-ray room. At ECR 2021, SmartDose and SmartPositioning were announced as well for the DR 100s, Agfa's high productivity, ergonomic, mobile DR imaging solution. ■

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# Healthcare Workforce and Organisational Transformation with AI – Enacting Change

🔴 **Author:** **Sameena Conning** | **Director of External Affairs** | **EIT Health | Munich |** Germany

Implementing AI technologies in the healthcare setting has been a priority interest for many in the field, from clinicians to investors. EIT Health, being at the forefront of health innovation in Europe and bringing stakeholders together to advance the progress, has focussed on the topic within its Think Tank, aimed at facilitating AI-driven transformation in European healthcare.

✓ Key Points

- AI is already being used in healthcare, but its applications remain limited. Addressing it at systematic level will lead to the realisation of its full potential.

- EIT Health has been working with various partners to explore the possibility of translating AI-driven technology into practice and identified several key barriers and enablers.

- Integrating AI into the clinical settings will change the very nature of work and require new skills and knowledge.

- AI adoption must be supported by strong leadership.

- Financing of AI for healthcare faces many issues including reimbursement challenges and the need to invest in the broader ecosystem.
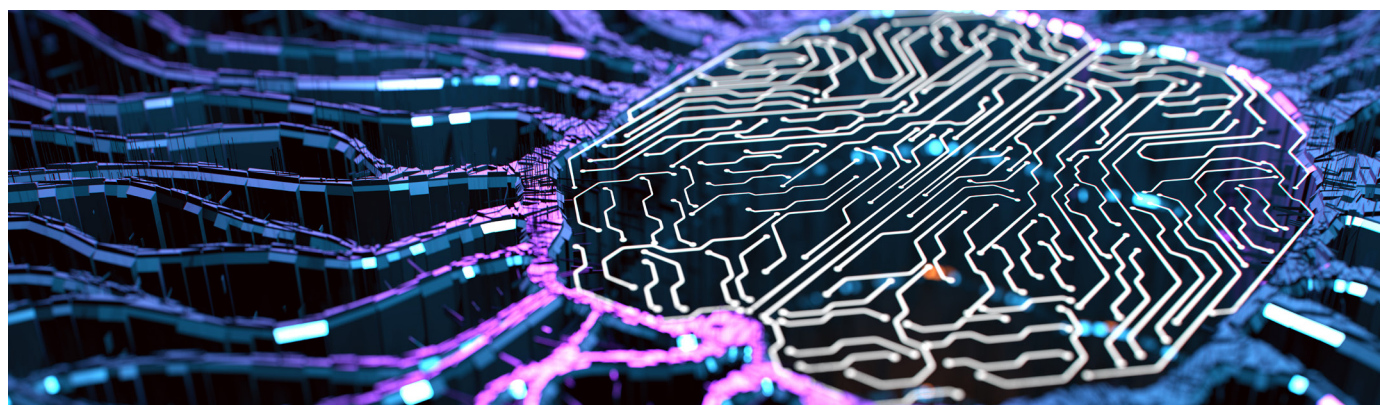
Artificial intelligence (AI) has the potential to revolutionise healthcare in Europe by augmenting a range of clinical activities and driving productivity and efficiency across almost every facet of care delivery.

Although AI is already being utilised in many healthcare settings, demonstrating its broad applicability, from online symptom checkers to prediction of the risk of hospital admissions, the scale of such solutions remains small. The potential to fully embrace the real benefits of AI can only be realised when it is embedded at systematic level – across disease areas, clinics, geographies and disciplines. Whilst the rate of adoption at the health system level is increasing, moving to widespread adoption of AI requires the consideration of financial, ethical, regulatory and operational factors, which could all make or break its success both at the European and national level.

In March 2020, a joint report between EIT Health and McKinsey & Company, 'Transforming healthcare with AI: the impact on the workforce and organisations,' was launched, which aimed to go a step further in the AI debate by helping define the impact of AI on healthcare practitioners, and the implications of introducing and scaling AI for healthcare organisations and healthcare systems across Europe. As the report takes a broad pan-European perspective, the EIT Health Think Tank Roundtable Series set out to explore how the report's findings and recommendations could be translated at the national level with input from subject matter experts.

The Round Table Series meetings took place across the seven EIT Health regional hubs in Europe, and while the final report, consolidating the insights generated from each of the meetings, is yet to be published, we have some immediate perspectives to share. In this early stage of AI evolution, it is hard to predict all the ways in which healthcare delivery will change, but to do so successfully will require new roles in training, remodelling workflows and communication.

Rethinking Education and Skills

The impact of AI on the healthcare workforce through the integration of AI will be much more than jobs lost or gained – the work itself will change. New activities and skills will be brought into the sector, changing healthcare education – shifting the focus away from memorising facts and moving to innovation, entrepreneurship, continuous learning and multidisciplinary working.

The biggest leap of all will be the need to embed digital and AI skills within healthcare organisations – not only for clinicians to change the nature of consultations, but for all frontline staff to integrate AI into their workflow. Multiple roles will emerge at the intersection of medical and data-science expertise. Yet, traditional medical curricula do not incorporate digital skills into clinical training. This creates a gap in medical education, and such a gap is widened when also considering the existing workforce and ongoing learning needs. The speed of innovation significantly outpaces the speed with which education – training, upskilling and reskilling, can correspond.

To make the most of the opportunities AI offers to improve patient care, healthcare practitioners need to start changing their approach to education, lifelong learning and teamwork, and integrate new categories of professionals, with hybrid 'clinical+data' profiles, or entirely new profiles, such as data scientists. However, it is not yet clear how exactly that should be achieved through human resources.

Leadership and Collaboration

The adoption of AI in clinical settings demands changes in processes, ways of working and crucially, the mindset of healthcare teams. Strong leadership is required to champion AI and create positive associations with the move to digital technologies. But the key question is who should be driving such change in an area that crosses many disciplines. This is the reason why leadership and interdisciplinary collaboration are closely linked for this topic – we certainly need leadership in order to spearhead, but we equally need collaboration in order to actualise.

Educating existing leadership about the benefits of AI and enabling them to become well-versed in both digital skills and biomedical and data science, will support them to effectively communicate these benefits to their clinical staff. In doing so, these leaders become advocates that will catalyse change. Likewise, we must recognise that clinical staff are already extremely time-pressured, and so leadership must make space (i.e. with formal frameworks) for clinical teams to dedicate to digital innovation. Whilst clinical leadership is key to effectively manage such a transformational change, ensuring end-users understand the context, strengths and limitations of AI upfront, is critical to implementation.

Funding

In the healthcare setting there are some unique financial hurdles to widespread adoption of AI, spanning investment in the development of solutions to the reimbursement frameworks in existence for AI tools.

Part of the difficulty in securing investment in the healthcare sector is demonstrating the full value and possible return on investment. This may partly relate to the black box nature of AI (i.e. being unable to see or fully understand its inner workings), which can make investors uneasy and increase perceived risk. A solution could involve the consolidation of funding to support rapid testing and scaling of AI solutions in critical areas.

Of course, investing in AI for healthcare goes beyond financing the development of AI tools. Funding is also needed to create an ecosystem of innovation in which the advantages of AI can be best exploited. For example, there must be investment in infrastructure that can support the digitisation of healthcare systems, in education and training to enable healthcare professionals to use AI in their practice, as well as in scientific research to test new AI solutions within the clinical setting.

On a more practical level, it can also be challenging to secure reimbursement for an AI solution once the technology has been developed, to enable its deployment. Clear criteria for the potential reimbursement of AI applications will be crucial for its adoption at scale, alongside creative funding models that ensure the benefits are shared across organisations.

A full overview including the recommendations made by national decision makers who have a role to play in developing and implementing AI approaches will be presented in the aforementioned report. In the meantime, however, please visit the AI hub on the EIT Health website to read more and sign up to our newsletter to receive alerts about when new content is published.

Conflict of Interest

None. ■

RESET 2021 – What Worked, What Failed, What Comes Now

DigiConf

A report of the [digital conference](#) on Reset 2021, organised by HealthManagement.org with Alexandre Lourenço as the moderator and Prof Davide Caramella, Dr Rafael Grossmann, Christian Hay, John Nosta, Prof Robert Vander Stichele and Dr Rafael Vidal-Perez as panellists.

✓ Key Points

- In 2020, there were many lessons to learn from the pandemic experience, including inefficient planning and communication strategies, and inadequate use of available resources and infrastructures, e.g. in telehealth or vaccine management.

- Digital health technologies have huge potential, but their applications are still far from the optimal level, their focus is often skewed, and the overall ecosystem is fragmented.

- There is a high probability that the unprecedented vaccination programmes around the world may be undermined by the lack of proper monitoring. Technology is available but underutilised.

- In terms of management, there is much room for improvement. Healthcare systems need to be more dynamic, pay more attention to the staff and patients' needs, and better appropriate existing technologies.

The best thing about 2020 is that it is over. Undoubtedly, it was a seismic shock to most healthcare systems around the world to deal with the fall-out of COVID-19. Inevitably, the way we deliver care has fundamentally changed. During the Reset 2021 DigiConf webinar, our panellists looked at the challenges and issues facing healthcare providers in Europe and the rest of the world in the aftermath of the pandemic, and explored the lessons that we learned and how the healthcare model could potentially be improved to better deal with a similar (or worse) crisis in future. With so many questions to answer – the vaccination rollout, the use of technology, telemedicine, vaccination passports, personalised care, patient safety, the safety of healthcare workers, staffing shortages, etc., there was a lot that was shared and explored by the participants. Here is a quick overview of the proceedings.

2020: Year of Challenges

[Davide Caramella](#), Professor, Diagnostic and Interventional Radiology Department of Diagnostic and Interventional Imaging, University of Pisa (Italy), opened the discussion as he shared his hospital's response to the COVID-19 challenge. He pointed out that since the first outbreak of the pandemic in Italy was in the Northern region, Pisa had some time to prepare. In terms of what failed, Prof Caramella acknowledged that they

probably overdid it a little bit, particularly as far as radiology was concerned. A big chunk of radiology resources was devoted to the COVID-19 hospital, and the resulting issue was that some patients with problems other than COVID-19 had to suffer a waiting time that was much longer than usual. However, this was an important lesson to learn for the future. He pointed out that vaccinations were going very well in their region, and this should hopefully bring a positive change for everyone.

[Rafael Grossmann](#), Healthcare Futurist, Technology Innovator, Surgeon and Educator (USA), highlighted that communication was certainly one of the first things that did not work initially. There was a lack of connectivity between all the different players around the world. Speaking from his experience of dealing with the pandemic in the U.S., Dr Grossmann said that they were late to alert themselves or prepare for the pandemic. After that, several weeks were wasted, and the process of mobilising resources, getting ventilators ready, and providing hospital staff with personal protective equipment (PPE) was significantly affected by this lack of preparedness. This was especially true for the major metropolitan areas where most of the population lived and where most of the hospitals were overwhelmed very quickly. All this could have been done better. However, Dr Grossmann also explained that eventually, things picked up, and COVID-19 offered a great

Reset 2021:
What worked | What failed | What comes now
2 MARCH 2021 @ 14:00 CET

Moderator
Alexandre Lourenço
President Portuguese Association
of Hospital Managers, Coimbra,
Portugal

Speakers

Prof Davide Caramella

Dr Rafael Grossmann

Christian Hay

John Nosta

Dr Rafael Vidal-Perez

Prof Dr Robert Vander Stichele

opportunity to communicate and connect better in a world-wide way to crowdsource information, to organise from the big players to the smaller players, and certainly the degree of innovation that was seen and that is still being practiced. The pandemic has been phenomenal, from vaccine development to the development of PPE and contact tracing applications to ventilators and ways to sterilise environments and much more. The use of telecommunications, telemedicine and telehealth has been a very positive response, and that is one of the good things that is going to stay to some degree, in an adapted way, after the pandemic, said Dr Grossmann.

Christian Hay, Senior Consultant Healthcare, GS1 Global Office (Belgium), brought a different perspective to the discussion. He acknowledged the fabulous job done by all the healthcare professionals in so many regions throughout the world. Speaking from the standardisation side, which has been his area of speciality for the last 30 years, Hay highlighted that the positive aspect of the crisis in 2020 was that the toolboxes regarding medicinal products were ready. Nothing had to be invented at the last minute. Architecture to capture information existed and registered with regulators, the manufacturers, medicinal dictionaries, etc. This architecture was available and published. Regulation of the supply chain was also ready. The U.S. Drug Supply Chain Security Act (DSCSA) regulation already imposes a certain number of tools to be used to have a safer supply chain. In Europe, there is a relatively similar system with the Falsified Medicine Directive. That means there are tools to protect against falsification, which

is a big issue at the moment. That was the positive lesson. As for the negative, one has to wonder where the toolboxes were, according to Hay. They have not been used much, and it was a huge disappointment, considering how the immunisation process is running at the moment. Writing the vaccine batch number by hand on a piece of paper is error-prone, Hay emphasised, and if one wants to collect information from that, it will be a disaster. A barcoding system is available, and all the architecture is available, but none is being used effectively at this point.

John Nosta, President, NostaLab; Founding Member, Digital Health Roster of Experts, World Health Organization; Google Health Advisory Board, (USA), provided a strategic perspective to the discussion. He explained that COVID-19 had shined a light on good things and on bad things in clinical practice and pharmaceutical drug development. He pointed out that the essential observation of the day, as one looks to clinical care and the evolution of the virus, was that all eyes were on one thing: the mutation of the virus. While one acknowledges the wonderful success of the vaccine, one continues to observe and wonder what would happen if this mutates to a more virulent strain. That is the defining element of COVID-19 introduced to our world: the need for agility. It is not only clinical agility but also functional agility and intellectual agility. That is the good news. The bad news is if one wants to be agile and know what one is changing to and planning for, what the next emergency is and – it very well may be mutations in the spike protein – but it might also be something completely

unrelated, e.g. the next natural disaster or clinical emergency; it may be about water purification, iodine supplies for a radiation emergency, etc. Nosta emphasised that we need to have intellectual and functional agility, and that was largely mediated by technology. We need to be connected, and we need to build a platform where we can think fast, act fast and solve fast. COVID-19 has been an inflection point in technology where things are changing rapidly. The question is: how can we capitalise on that to build a path forward for the next disaster, which may have nothing to do with COVID-19? Actual healthcare is not for incremental changes or innovations. In healthcare, we like to think things through and play it safe. That is understandable. Nobody wants a nuclear-powered heater for their house; they want a gas heater because they know that technology. It is the same with medicine. It is that duality of wonder and fear that is a bit of an obstacle.

Robert Vander Stichele, Professor Senior Research Consultant, European Institute of Innovation through Health Data (i~HD), Ghent University (Belgium), offered his perspective from Belgium. The pandemic hit very hard in the vulnerable elderly and in the long-term care facilities. Two-thirds of the deaths in the first wave were among this population segment. They were cared for by unprotected personnel, who were not prepared for the difficult ethical decisions they had to make in this challenging situation. We realised that we knew so little about the disease, the elderly patient population, and their risk profile. We had to observe that the digitalisation of medical documentation in this sector of healthcare was extremely poor. This is one lesson learned and something we need to remediate. The second point is that post-pandemic and now with a never-seen-before vaccination programme coming up, we need to have an overview of distribution. There are 200

The COVID-19 pandemic resulted in "discovering" telemedicine, even though it has been around for many years

Rafael Vidal-Perez, Cardiac Imaging Consultant, Cardiology Department, Hospital Clinico Universitario de A Coruña (Spain), spoke about telemedicine and how the COVID-19 pandemic resulted in "discovering" it, even though it has been around for many years. It was always there, but we were not using it and, therefore, had no real experience with it. Hence, when we had to use it immediately, we were not prepared. We thought that we had the right tools, but probably they were not right because we had to deal with many elderly patients who were not ready for that care model. Many office consultations were conducted by telephone, and it was quite poor. Hence, we need more improvement on telemedicine technology because in a situation similar to COVID-19, when you cannot deal with the patients directly, it can be a problem. We discovered the need for telemedicine, but the technology we have is not advanced enough to execute it properly. Another important lesson was the integration of these tools into electronic health records (EHR). We realised that this was not easy to do because it is always difficult to introduce something new in a short time when it comes to EHR. This obviously depends on the country you live in. We have apps for contact tracing, but, for example, experience in Spain was not so good because the app was not installed properly or on a mass scale, and there was no plan to involve the patients and include them in this process. Therefore, the use of contact tracing apps was not a successful strategy in Spain – in fact, it was more or less a failure. The next step for 2021 and the main challenge is how to deliver things in a faster and proper way. In Europe, we are behind if you compare with other areas of the world. Everything moves at a very slow pace here, and that might be one of the biggest challenges for us.

vaccines in development, and in most countries, already five on the market, beginning first with the very centralised cold chain distribution and then gradually spreading out to other forms of distribution and several different vaccines through hospitals through to GPs and pharmacies. How will we know who got which vaccine and when? How will that be recorded? What is the digitalisation of the immunisation act? It is so easy to do if the vaccines carry barcodes. The doctor or the vaccinator can, in a few seconds, digitally record the identity of the vaccine, the identity of the patient, their own identity, and send a full structured message to the e-health infrastructure. From there, you can warn the immunisation registry, and you can make the certificates, etc. However, we must be sure that the recording of the vaccination act is correct and done in an interoperable way. There is a risk that the distribution, but also the recording of the distribution, will run into chaos soon, and we need to remediate that. The quality of the documentation of the vaccination act needs to be much better than it is today.

Why Digital Innovations Fail

During the Question & Answer session moderated by Alexandre Lourenço, several other issues were discussed. First was the question as to why healthcare had the digital tools that had been there before the crisis but was not using them. Was this a matter of literacy, strategy, or implementation? In response, the panellists provided their point-of-view. Christian Hay observed that IT in the healthcare industry is underestimated if you compared the investments for IT in the healthcare systems to the banking sector, for example. We have the tools, and we

are practicing telemedicine, but found limitations. One of the biggest issues we face is the lack of a visionary programme or an ambition to make healthcare safer. If we look at cybersecurity, we do not see major issues with banks but have issues in healthcare systems. On a positive note, this crisis has opened the eyes of the people, and maybe strategies will evolve and take more consideration for the IT investments and the standards of implementation.

John Nosta also provided his perspective on this issue. He talked about telemedicine and how COVID-19 has presented a wonderful opportunity for us to learn. We can advance telemedicine and make it telemedicine 2.0 and 3.0. We cannot just translate telemedicine that simply – we have to advance it and make it more robust and more engaging. That is the challenge now.

Rafael Grossmann highlighted the fact that that we had tremendous failures in leadership at the senior level and the local level. We also had a tremendous failure regarding innovation. We certainly have the digital tools, but at the same time, those technologies did not translate. He pointed out that we had very advanced IT systems in hospitals, at least in the U.S., but in IT our focus was on the wrong things. It is all about billing and documentation, and we do not even look at the patient - the human patient. We just look at the computer, the EMR and the EHR. That is probably one of the issues. We were caught off-guard, and despite having disaster plans, we could never imagine that something like this could happen, to a level to be prepared with all the tools that we had.

Rafael Vidal-Perez highlighted the fact that a big problem was the interoperability of electronic records. For example, in Spain, there are 17 regions, and each one has a different electronic health record solution – within one country. We have tools, but we are not able to put them together to come up with a greater solution.

Digital Support for Vaccinations

On the issue of vaccination, another question that was raised was how to promote the digitalisation of the vaccination process. Robert Vander Stichele pointed out that pharmaceutical companies who developed the first two vaccines were faced with demands for mass production and mass distribution and asked for exemptions of the normal labelling procedures. Vials were shipped without information, without proper recognition on them, and certainly not facilitating this at the point-of-care documentation. He hoped that with the new vaccines, there would be data metrics on every vial, and that would change, from a very practical point of view, the ease with which the vaccination act could be recorded. In the beginning, this was completely overlooked, and companies were exempted from doing this. They had to produce the vaccine in very big boxes but did not care about the detail of the identification, which also goes with the problem of falsification. It may not seem to be a big problem in the beginning because everything is going through very centralised distribution channels,

heavily checked and controlled, but very soon, there will be other distribution channels, and issues of fraud and falsification will come up, both in rich countries and certainly already in developing countries where the need is higher.

Every nation is struggling to get its population vaccinated as quickly as possible. In three or four months, there is likely to be a situation that the rich countries will have four or five times the vaccines that they need. At that point, the issue of equity will come up. This pandemic will not go away if not every country has reached herd immunity. Therefore it is in our interest to make sure that equity in vaccination is at the forefront of what we do now.

Christian Hay also supported this perspective. The manufacturing process must be done right – the quality of the medicinal product, its labelling and sequencing, the process, marketing, virtualisation, etc. and the outcome for the patient. If a patient has an adverse reaction, how can we retrieve the information? This must be done in a coherent way. In the U.S., there are activities dealing with this question in conjunction with the FDA, but in Europe, it is a bit slow, and Europe is more fragmented. One initiative in this area is UNICOM, an EU-funded project with the purpose of fostering the implementation of those standards. This project aims to bring the regulators and the authorities together and use a system of identifiers. If we can agree on a common language in the supply chain, we will gain efficiencies because we will be in a much better position to aggregate this information, develop intelligence and better understand what happens, what is good, what is less good, and so on. The tools are there, and the stakeholders will start to understand the value of the standards, bridging into our property, etc.

John Nosta highlighted the role technology could play in this area. Many of these methodologies are well established, and they can be used for vaccine distribution and tracking as well as telemedicine. In many instances, we are not seeking innovation, but we are just trying to get an innovation accepted. That is an important dynamic.

Room for Improvement

Asked about areas of improvement in healthcare management, Davide Caramella stated that healthcare needed to rethink where to make the relevant investments and how to make good use of the investments. Rafael Grossmann also agreed there was much room for improvement. Certain areas responded and are still responding very well, but to be more efficient, the healthcare system needs to be more dynamic, versatile and flexible, with better allocation of resources, and with true innovation, from idea to implementation. Healthcare organisations need to think about patients and healthcare providers. We have seen a shameful and frustrating reaction of the healthcare administrations towards healthcare staff which is impossible to justify. People are working in the trenches, without proper equipment, without the tools they need in order to protect the patients. This needs to change.

Robert Vander Stichele emphasised that the system should respond to the needs of patients better, but we also have to know the needs better, their expectations and wishes. Elderly people have comorbidities, and they will be the victims of the next pandemic – the victims of pollution, accidents, of all the big catastrophes. The healthcare management systems are simply not equipped yet to face this. The ethical aspect of advanced care planning must be in focus to be ready for the next catastrophe because this has painfully failed.

Rafael Vidal-Perez reiterated the problem of the gap between regional and central systems. Central organisations were not ready to organise the local systems because the locals were working on their own, and they were working well. Therefore, recentralisation turned out to be more of an error. Local management is essential because many good solutions came from local ideas, not from the central system.

Christian Hay touched upon innovation in healthcare and explained that people who embrace innovation as a strategy probably think that innovation was something that had not existed before. Innovation is not there because things do not evolve at that speed. Innovation sometimes is ten years old and not implemented, so the fruits of that innovation have not been really seen on the ground. We have not explored it sufficiently; hence there is room for improvement. Innovation is the way you implement an existing technology to be very efficient, secure the proper care and save lives.

Overall, the panellists concluded that what was needed were good leadership, flexibility and agility. We need true innovation which is based on scientific data. We do not need complex innovations but simple ones that healthcare systems must follow. Healthcare solutions in the future need to be scientific, largely driven by technology, but with a focus on real issues and challenges.

To listen to the complete digital conference, please visit https://iii.hm/17w1.

WINNING PRACTICES

Coded Patient Summary in Practice: A Hospital Challenge

⬡ **Author:** <u>Dr Thierry Klein</u> **| CMIO | CHR Haute Senne | Soignies |** Belgium

Faced with the necessity to share information from the electronic patient record across different systems, a regional hospital in Belgium introduced a disruptive 'only once' approach to deploy a SNOMED CT coded patient summary and minimise the relevant burden on the clinical staff.

✓ Key Points

- The information from the electronic patient record has to be reused in different contexts, which requires excessive copying and burdens the clinicians.

- To address this time-consuming challenge, the 'only once' approach was introduced.

- Based on the SNOMED CT codes, the use of diagnosis codes had significantly increased within the first year of implementation.

- There are several success factors, including the ease of use and increased time efficiency.

CHR Haute Senne is a regional hospital of 246 beds with 8,400 in-patients per year, 7,100 daily hospitalisations, 180,000 consultations and 26,500 emergency visits. 150 physicians fill out an integrated electronic patient record (EPR) on a daily basis. Each medical speciality customises their own sections and fields in this medical file. The main advantage of this software is that each contact with the patient is online, documented by the clinician, which promotes the continuity of care.

However, at some point it became apparent that some key information such as diagnostics, procedures and medications, needed to be reused in different contexts. This led to unnecessary copying, which is a source of errors. For example, the admission diagnosis must be transmitted from the emergency department to the downstream hospitalisation unit, the public paying agency, the national register of emergency department visits and medical coding.

To meet this challenge, in 2017, we proposed to the physicians two alternatives:

1) We retain a classic data-driven approach by not changing anything in the EPR, but by requiring the same re-encoding in all applications where diagnostics is needed.

2) We ask for a minimal effort from the doctor (3 clicks and 30 seconds) including highlighting the relevant diagnoses, pressing a keyboard key (F10) and selecting the coded diagnosis(es) to be fed into a Patient Summary.

Our emergency physicians and ward physicians quickly did the math: it was the second option that was both the fastest and the most productive with its 'only once' approach.

Technical Characteristics

We named this project RCMax ("Résumé Clinique Maximum" in French).

The chosen coding system is SNOMED CT (Systematized NOmenclature of MEDicine – Clinical Terms). SNOMED CT has been defined as the most comprehensive medical terminology and allows a consistent representation of the clinical content of electronic health records. It is a terminology close to the common clinical language and is intended to accurately match the information provided by the clinician. It is an input-based system structuring the data entry.

The software called 'Snomedizer' displays a list of SNOMED CT-coded diagnostic candidates extracted from a terminology server based on a free-text entry highlighted by the physician.

We have set the goal of having at least one SNOMED CT-coded verified admission diagnosis per hospitalisation. After a pilot year in 2017, with a dictionary limited to 6,000 diagnosis codes, we proposed a much wider range of 170,000 entries in French, covering a large majority of the pathologies encountered. If certain diagnoses are not found, we have the possibility to locally enrich the terminology server with, in particular, the use
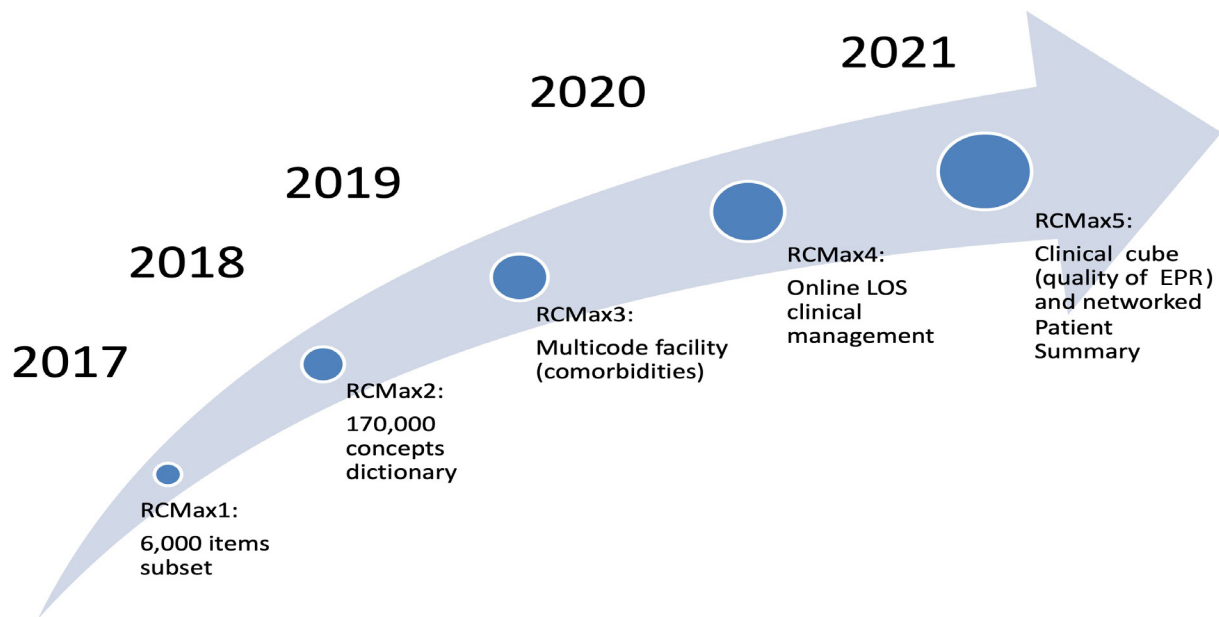
Figure 1. Evolution of RCMax.

of synonyms applied in common clinical language that point to the official SNOMED CT preferred terms. In 2018, 25,000 diagnoses were recorded by physicians in the patient summary, with approximately three codes per hospitalisation.

It should be noted that this Patient Summary follows the patient in their clinical history, with links to the documents behind the coded choice of the physician, for example, a hospitalisation report.

This makes it possible to return at any time to the authentic source detailed in free text. On the other hand, the system manages the start and end dates dynamically, which allows to automate the notion of antecedents: an antecedent is a diagnosis that has an end date in the past, which makes it inactive and therefore filed by the programme in a separate section. In addition, the context data can be modulated: degree of certainty, laterality, notion of family antecedent. By default, to be quick, the chosen diagnosis is supposed to be confirmed, there is no laterality, and it concerns the patient and not their family.

The system has enabled the systematic display of the Patient Summary when a file is opened, which immediately informs the clinician of the patient's active diagnoses. The reuse of codes has automated the sending of the admission diagnosis to the public paying agency and to the various disease registries involved. But where the added value was the most dramatic, was that we reused the diagnoses in SNOMED CT to automatically convert them via an international mapping table into ICD10 codes, used for the management of funded length of stay (LOS). Indeed, since 2020, in real time, the hospitalisation unit physician can see the pathology profile (DRG: Diagnosis Related Group) to which a national average LOS corresponds, as soon as the main diagnosis and possible co-morbidities are encoded. The coding thus provides a bridge between the clinical documentation of the Patient Summary and the management of the LOS, which serves as a basis for funding. This is all the more strategic since almost half of the hospital's (and thus, indirectly, the physicians') income comes from the financing of the pathology profiles (DRGs) of hospital stays.

Success Factors

The success of the deployment of this online coding system can therefore be explained by four factors:

1. Clearer EPR through the shared medical management of a Patient Summary common to all physicians.

2. It saves time for the clinician who does not have to re-encode the diagnoses in different applications ('only once').

3. Ease of use (3 clicks in 30 seconds)

4. Online management of the financed stay.

The road travelled by the RCMax project is already long, but there are still steps to be taken (see Figure 1). The first one is the extraction of data for strategic management purposes (quality of the Patient Summary, LOS management) via a clinical cube in the data warehouse. The second step is the harmonisation of the hospital's Patient Summary with that of the first line of GPs (General Practitioners) via Health Networks.

In conclusion, the implementation of a SNOMED CT-encoded Patient Summary has allowed, through a disruptive 'only once' approach, to change the encoding of diagnoses in a Patient Summary in favour of continuity of care; an overall time saving through the reuse of encoded diagnoses; and a medical optimisation of stays towards better quality and justified financing.

Conflict of Interest

None. ∎

Upcoming Issue

Cover Story:
Human Matters

The COVID-19 pandemic has put human resources under a huge challenge. In our upcoming issue, our contributors discuss key matters related to people, whether they are healthcare workers, patients or their families. They look into mental health, burnout, discrimination, violence, personal protection equipment, patient safety, well-being and resilience, sexism, racism, unfair allocation of resources, health equity, personalised care, patient voice, humanism, and all other matters that we, as humans, consider important in healthcare.

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