



Data utilisation
and data integration;
telehealth and digital
tools in healthcare

SPECIAL SUPPLEMENT ON
DECISION SUPPORT

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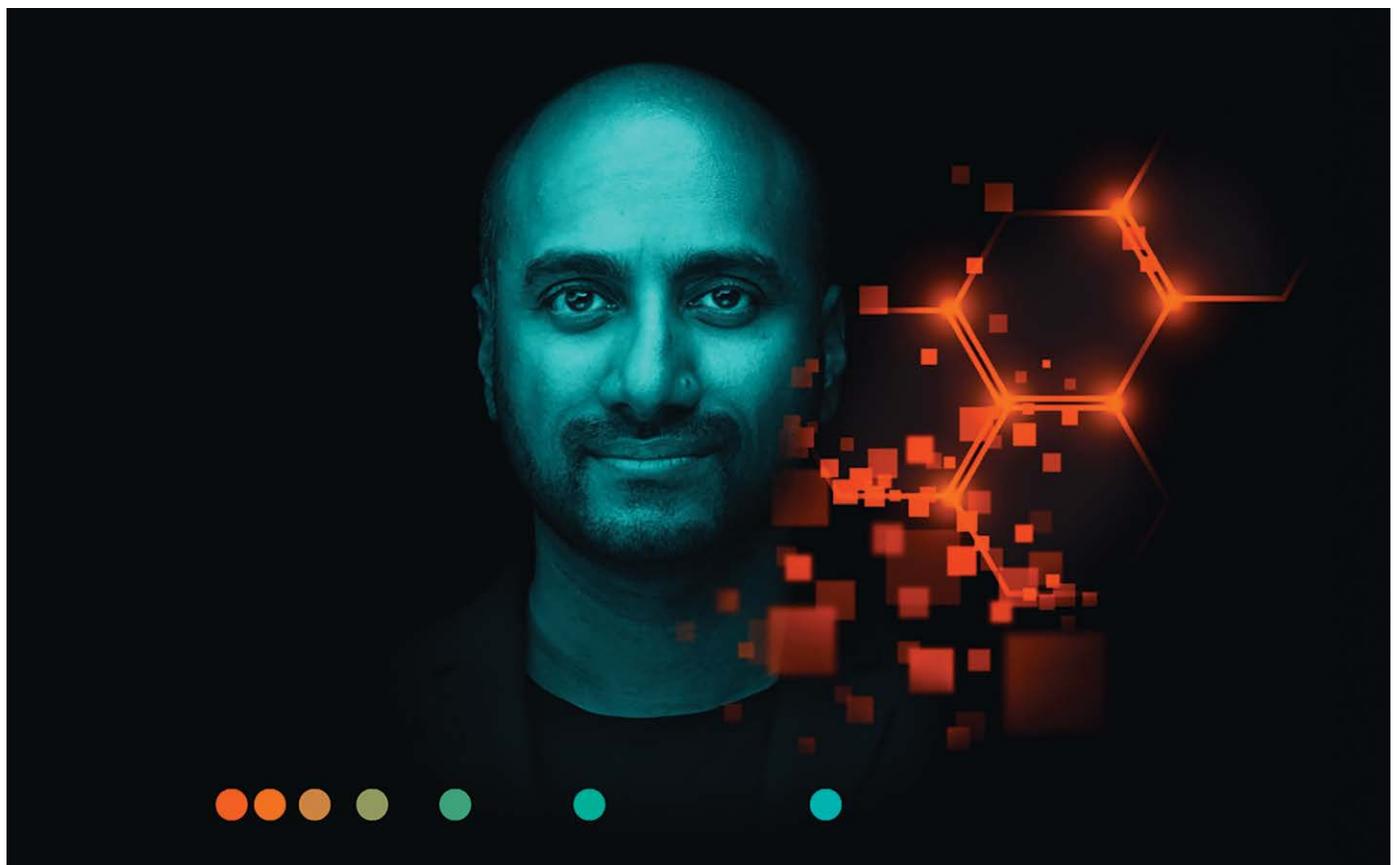


Data Integration and Decision Support Along the Patient Pathway

An overview of a decision support platform that offers holistic decision support along the continuum of care, bringing together a wide variety of healthcare data from diverse IT systems with a vendor-neutral design and user-friendly solutions.

Key Points

- As healthcare processes become more digital, there has been tremendous growth in health data from electronic medical records, image databases, and other fragmented IT systems.
- Clinicians could benefit from data integration from various sources, including clinical, radiological, laboratory, genetic and pathological findings, and an overview of behavioural and social conditions.
- Siemens Healthineers' Teamplay digital health platform offers features and applications that support operational decision-making, improved workflow and more informed diagnostic and therapeutic decisions for optimal outcomes.
- Siemens Healthineers' AI-Pathway Companion integrates clinical guidelines, individual risk stratification and patient preferences.



In a healthcare system that is rapidly turning digital, smart integration of data has now become increasingly important. However, there are several barriers along the patient pathway that make this task challenging. Often, data is inaccessible or too extensive to evaluate or analyse. There are also instances when information is overlooked and guidelines are ignored. This results in inefficient management of data that could otherwise be utilised more effectively for more informed and improved clinical decisions.

What is needed is a unifying approach that utilises digital applications powered by Artificial Intelligence (AI). This model could better support operational decisions, optimise care processes, and improve diagnostic and therapeutic decisions. Also, a more holistic approach would enable greater interaction and coordination between care teams and patients and help healthcare systems realise the goal of patient-centred care.

Healthcare has been, and will always remain, a process of healing that is not only dependent on data but also a strong patient-doctor interaction. However, as healthcare processes become more digital, there has been tremendous growth in health data from electronic medical records, image databases, and other fragmented IT systems. This data can play a critical role in facilitating complex healthcare decisions when clinicians are faced with multiple conditions, complicated symptoms and difficult diagnostic and treatment options. During such times, clinicians could benefit from data integration from various sources, including clinical, radiological, laboratory, genetic and pathological findings, and an overview of behavioural and social conditions.

This can be achieved by using digital technologies that can help improve decision-making and provide healthcare providers with the decision support they need along the patient pathway. This data should ideally be delivered in a user-friendly manner through a platform that is simple and flexible to use, and that can bring together patient information from diverse IT systems and data sources. The goal of such a platform would be to provide clinicians with a more comprehensive picture of the patient so that they can make decisions more holistically.

Challenges of Data Integration

While this concept seems easy to implement in theory, there are several challenges and barriers to overcome. First, there are often situations where relevant patient data is not available, or it is too labourious to retrieve it when needed. Studies show that doctors in intensive care units often have to sift through thousands of individual data points to extract the information they need (Herasvich et al. 2018). There is also sufficient evidence to show that a large proportion of electronically stored patient data is never used in the inpatient or the outpatient setting (Pickering et al. 2013; Hirbar et al. 2018).

There are several reasons why patient data is still underutilised. There is a lack of analytics expertise. Also, clinicians have to deal with a large volume of data. This can be difficult to handle and can lead to distraction, dissatisfaction and burnout

(Ruppel et al. 2020). Healthcare is more or less facing an information overload, making the data integration and digitalisation process more complex. There is also inefficient filtering of the data that is available (Shirky 2008). Therefore, what healthcare needs are advanced digital solutions that can improve the analysis of patient data and present this data in a user-friendly and clinically meaningful way.

Using Smart Data Integration and Decision Support

Digital decision support can help overcome these barriers. Advanced clinical support systems have the ability to encompass clinical guidelines, patient data summaries, condition-specific order sets, diagnostic support and relevant reference information. An efficient and advanced decision support system would provide both general and person-specific information while filtering and organising valuable data. This can help improve diagnoses, treatment decisions and patient outcomes.

There is significant clinical evidence to demonstrate the value of advanced decision support systems. Studies show that machine learning algorithms can help avoid unnecessary CT scans in children with minor head injuries (Bertsimas et al. 2019); also, advanced decision support in oncological care can increase adherence to guidelines, reduce treatment costs and ease physician workload (Klarenbeek et al. 2020).

Siemens Teamplay Digital Health Platform

Siemens Healthineers has developed a comprehensive decision support solution. The Teamplay digital health platform offers features and applications that support operational decision-making, improved workflow and more informed diagnostic and therapeutic decision-making for optimal outcomes. Teamplay also enables doctors, nurses and patients to connect more easily, thus providing a basis for patient-centred care and shared decision-making (Figure 1).

The Teamplay digital health platform operates system- and vendor-neutral through various interoperability standards. It allows data from existing IT systems within an organisation to be integrated and shared across institutional boundaries such as hospitals, outpatient practices and pharmacies. The core philosophy behind the platform is to support decision-making along the patient pathway by providing a flexible and uniform IT solution. This is done through various individual applications and extensions, which are available via an integrated digital marketplace. Siemens Healthineers' Teamplay solution addresses multiple problems in various clinical fields, including radiology, oncology and cardiology.

Siemens Healthineers also offers the AI-Pathway Companion, a software system for data-driven decision support. The AI-Pathway Companion integrates clinical guidelines, individual risk stratification (CMS 2014) and patient preferences. This helps clinicians make evidence-based and transparent recommendations for different treatment options. It also helps

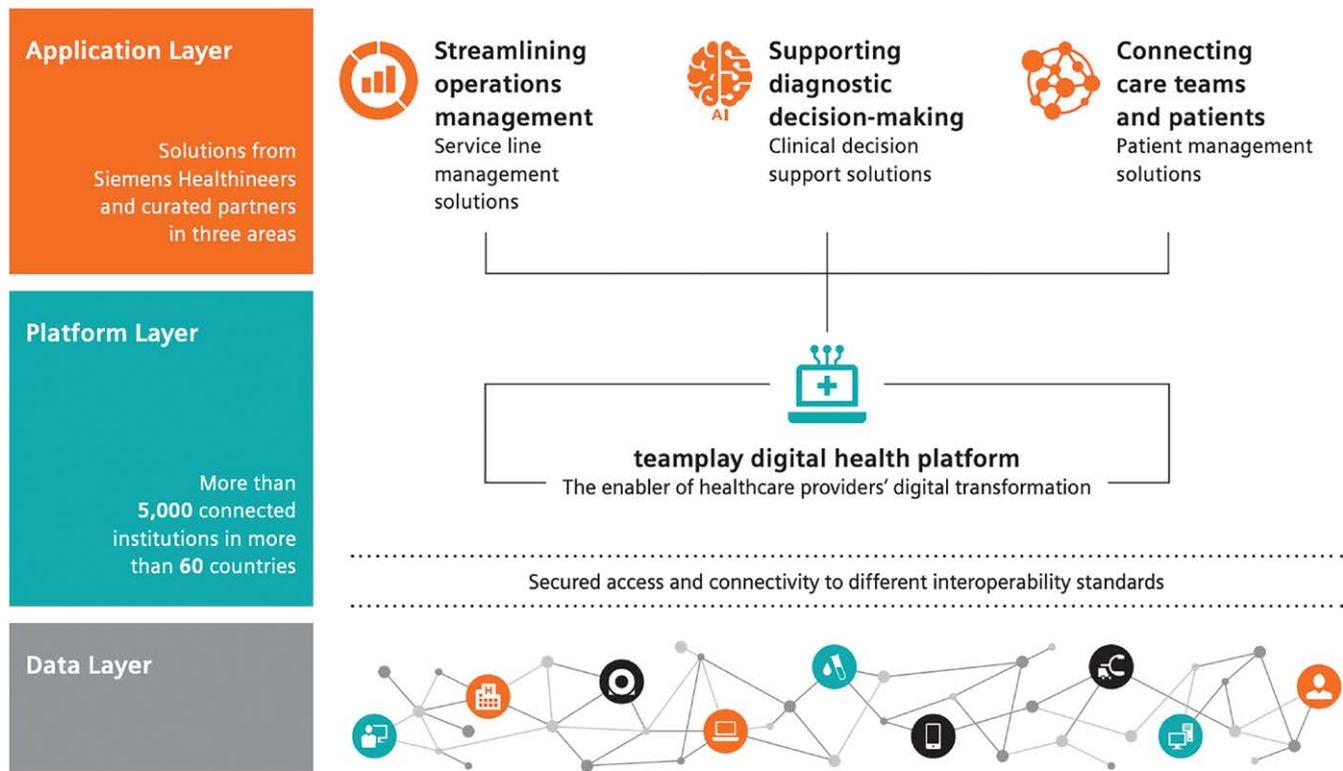


Figure 1: Basic principle of the “teampay digital health platform”

Data from a wide variety of IT systems can be integrated and then used by individual applications to improve the care process in its various dimensions. Image Credit: Siemens Healthineers

clinicians map out where a patient is in the treatment pathway and facilitates discussion between patient and doctor. Similarly, Siemens Healthineers’ eHealth solutions include various software packages that allow patient-specific data exchange across institutions and better communication between care teams and patients.

Digitalisation - The Future of Healthcare

According to an international survey, three out of four healthcare executives believe digital platforms that connect things and people and foster innovation will enable their organisation’s business strategy (Elliott et al. 2018). Siemens Healthineers offers solutions that can make this possible. Its digital

health platform is a flexible tool that understands the importance of data for healthcare. Siemens Healthineers provides more than 40 apps, a third of which are AI-powered, for six different specialties. These apps enable advanced and customised digitalisation for a wide range of healthcare providers and healthcare situations.

Siemens Healthineers Teampay digital health platform does not require any major investment or restructuring. It is an interoperable system with a vendor-neutral design. It can integrate existing and different IT components and enable a step-by-step approach. It is the ultimate solution to ensure smart data integration, holistic decision making and improved patient outcomes. ■

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The Benefits of Connected Care and Better Utilisation of Patient Data in Healthcare

Xavier Battle | Vice President Marketing and Sales | Siemens Healthineers Digital Health

Connecting care teams and patients can drive patient engagement and help improve treatment processes that can facilitate cooperative care. HealthManagement.org spoke to Xavier Battle, the head of Marketing and Sales for the Digital Health Business Line for Siemens Healthineers, about the importance and benefits of connected care, the use and application of real-time data, Artificial Intelligence and wearable technology, combatting the challenge of chronic disease and improving the utilisation of telemedicine.

The future of healthcare will focus more on connected health and delivering care beyond the hospital walls. Do you think this is an achievable goal? What tools do you think are critical to making this happen?

I think it is a necessity and the current events related to the COVID-19 pandemic demonstrate how needed it is. Once this crisis is behind us, or more likely, when we have gotten used to living with this increased and constant risk, the ability to engage with patients remotely will remain. It is a matter of convenience and efficiency. The tools are, to some extent, there already: very vibrant innovations in personal and mobile devices, a steady trend towards connectedness and miniaturisation, and of course, increasing awareness and familiarity of the public. What is critical to making it happen is our attitude and openness to store, manage, share and exchange data within a growing network of healthcare providers in which patients become active participants.

Do you think improving patient access to their healthcare data is important?

Of course, it is important. First, it would allow physicians to access all the available data, including the patient history, instead of only the data that is available in their IT environment. This is especially important when people move or change providers during their care. Evidently, when patients engage more directly in their care, having access to the data opens the door to much greater communication between physician and patient, leading to a better understanding of the situation and subsequent decisions. Additionally, patients could more easily get second opinions and weigh into the treatment options offered to them. I would, however, like to point out that the close and trusting relationship between a patient and its care team is likely to remain the biggest driver of patient satisfaction – data access will solidify this trust.

What role do you think wearable technology and real-time data can play in improved decision-making and connecting care teams and patients?

It will play an increasingly important role. I observe that wearable technology and real-time data are established, nearly ubiquitous and de facto standard in the 'wellbeing' side of healthcare. Everyone can now know their heart rate, biometrics, track them over time and can even get recommendations on how to improve them. The same happens in some chronic conditions (e.g. cardiac arrhythmias when implanted defibrillators monitor the patient's condition and report to their physicians). I expect this trend to continue. As patients become actors in their care, they will need tools to record and analyse their data, connect to their physicians and receive personalised and continuous care. More than devices that provide direct care, personal devices will be essential vectors of rich and interactive communication between patients and physicians.

What role do you think connected care can play in combatting the continuous increase in the prevalence of chronic disease?

From a practical standpoint, chronic diseases pose the challenge of trying to live a nearly normal life despite a health condition that requires continuous attention. This would be, of course, incompatible with repeated stays in the hospital and too lengthy periods away from the active life. Following the tremendous treatment progresses, many people with transplanted kidneys, insulin pumps or pacemakers live a (nearly) normal life. The way to monitor and care for such conditions is also progressing to allow patients to stay out of the hospital for most of their routine care, be it for checkups or minor health conditions. Connected care is also a formidable way to level socioeconomic disparities in the access to care and allow patients in need to benefit from the best care, nearly independent of their location or access points. Last but not least, connected care, in the way it engages patients directly,



on a daily basis, can help improve their compliance with their care plan (e.g. medication) which ultimately will improve the overall outcomes.

The COVID-19 pandemic highlighted the benefits of telemedicine. Which tools do you think are essential to improve its efficiency and effectiveness?

As I pointed earlier, the tools and fundamental technologies are, to some extent, already there. Nearly everyone carries a powerful sensor and/or connection hub in the form of our familiar mobile phones. Wireless communication is ubiquitous, and bandwidth progresses rapidly to support full-duplex HD communication in most places. The obstacles to the wide adoption of telemedicine are more legal and regulatory than technological. In many countries, regulations will need to be adjusted to account for what technology can enable, be it for remote operations such as remote scanning or remote surgery or for much higher levels of data exchanges and sharing across jurisdictions or borders.

Do you think Artificial Intelligence is underutilised in healthcare?

I don't know if it is underutilised. It is for sure holding great promises in the goal of assisting physicians in dealing with exponentially growing amounts of data and complexity. Yet, the adoption of these novel methods is driven by the same criteria held for the adoption of any technology in medicine: it needs to improve patient outcomes, reduce costs, and overall provide better care and/or a better workflow. As such, I believe AI will be first adopted when assisting physicians with highly repetitive and routine workflows for which these methods are proving their strength. Then and beyond these necessary proof points for AI lies a more ambitious goal for our industry. When combining, in a so-called digital twin of the patient, the access to the longitudinal personal patient data (from historical records to current tests) with the ever-increasing computing abilities, we can foresee the ability to not only diagnose but also prognose the course of the disease, factoring in, for example, preexisting conditions and treatment options.

In your opinion, why has digitalisation of healthcare been so slow compared to other industries?

At least in the last 18 months, healthcare has demonstrated that it can be fast in adopting digital technologies to enable better and faster care. No one would have imagined entire hospital departments functioning largely remotely for such a long period. You are, however, right that compared to other industries, healthcare has been relatively slow to adopt digital technologies. This may be due to the combination of several factors. First, process complexity driven by the inherent complexity of medicine and the complexity of the associated economics (payers, guidelines, reimbursement policies...). Second, the inability to stop and "start new" with often a large and complex legacy to accommodate. Third, the heterogeneous IT environment where homegrown legacy solutions coexist with a whole array of products from multiple vendors and the corresponding lack of standardisation and interfaces.

Healthcare generates a massive amount of data. What challenges do you see in terms of managing and analysing this data, and what clinical decision support tools can improve data utilisation?

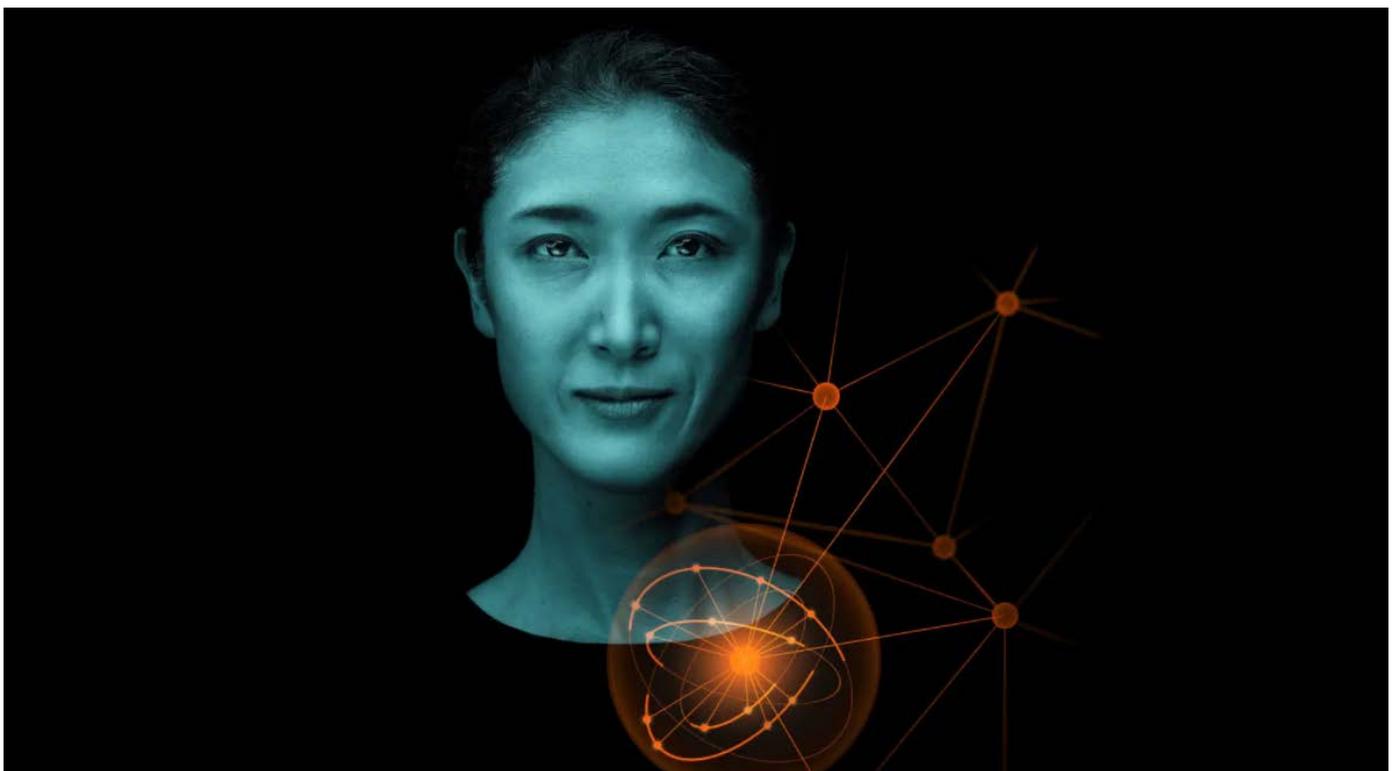
It is true than in an aggregate view, the healthcare industry produces very large quantities of data, yet I do not believe it is correct to look at it "all at once". Data are created by a multitude of equipment and devices. Data are held by healthcare providers for which they have access for the purpose of patient care. Subsequent access to the data must be given by the individual patients themselves and can be revoked at will. Even the notion of anonymisation is complex, and its definition varies. It is, in practice, not easy to access large quantities of data to conduct the sort of analysis that could support the development of novel methods. I believe that the industry as a whole (patients, payers, providers and Med Tech) and the regulators need to come together to define a mechanism for data exchange that would, of course, protect the patients but also enable access to large quantities of population longitudinal data – the precondition to developing methods that will enable true precision medicine. ■

Telehealth Platforms: The Foundation for Digital Transformation

An overview of the role of digital transformation in the healthcare space, particularly the adoption of telehealth solutions during the pandemic and an outlook of the future of telehealth solutions and the momentum of digitalisation in healthcare.

Key Points

- During the COVID-19 pandemic, digital transformation efforts in healthcare have accelerated, especially in the telehealth sphere.
- Remote patient monitoring is here to stay, and the idea of keeping tabs on patients at home is an important transition in healthcare.
- Digital transformation is also the path to improving the flow of information, increasing patient adherence, reducing the cost of care and improving productivity.
- The next evolution would be to build algorithms around artificial intelligence and deliver that information to augment clinicians to achieve better diagnosis and identify best practices and pathways.
- Healthcare is now better positioned to harness technology to deliver better, quicker, less expensive care.



Digital Transformation in the Healthcare Space

The primary goal of digital transformation in healthcare is to facilitate the adoption of a patient-focused approach where healthcare providers streamline their operations, better understand patient needs and build loyalty and trust to offer a better healthcare experience.

The digital transformation of healthcare is a logical transition. Today, the use of video and audio to connect with patients and connect patients to specialists is a reality. Also, workforce and staffing challenges, whether nurses or doctors, continue to be an issue in healthcare. There is a huge need for additional manpower. Utilising technology to be in more places simul-

technology within these regulations, help regulators understand what technology is capable of doing and implementing that technology responsibly. It is also about developing the right kind of partnerships with technology providers who offer telehealth solutions. In other words, technology partners, clinicians and regulatory authorities have to work together to pave the way for digital transformation in healthcare.

The pandemic has clearly shown the benefits of telehealth. [Remote patient monitoring](#) is here to stay, and the idea of keeping tabs on patients at home, not only from a visit but also devices that will give vital information back to the caregiver, is an important transition in healthcare. [Digital transformation](#) is

Utilising technology to be in more places simultaneously is one of the biggest benefits of digital transformation

taneously is one of the biggest benefits of digital transformation. In particular, during the last 18 months, as the world struggled with the COVID-19 pandemic, digital transformation efforts in healthcare have accelerated, especially in the [telehealth](#) sphere.

COVID-19 put a spotlight on [telehealth technologies](#) and remote patient monitoring. The need to reduce potential virus exposure in patients and healthcare providers alike pushed clinicians to adopt this method. The use of video and two-way video/two-way audio into the patient bed spaces allowed the reduction of personal protective equipment (PPE). Therefore, nurses or doctors didn't need to don PPE to go in and have a quick conversation with the patient. Instead, they could do it remotely from a monitoring station or phone. That gave a whole level of comfort and a lot less anxiety or stress about entering into a patient's bed space who may be suffering from coronavirus. In addition, there was an increase in both provider willingness and consumer willingness to use telehealth. Finally, the regulatory changes that came into play were adapted very quickly to accommodate the telemedicine/telehealth situation.

The Benefits and Challenges of Digital Transformation in Healthcare

Digital transformation has accelerated everywhere during the pandemic, although the healthcare sector has had some specific constraints that make this transformation different from other industries. First, the level of regulation regarding technology and how it is utilised within the patient setting differs in healthcare. Video is a powerful tool, but with privacy concerns, there is strict guidance that healthcare providers need to follow. Therefore, the challenge in healthcare is to apply

also the path to improving the flow of information, increasing patient adherence, reducing the cost of care and improving productivity. All this can be achieved while the patient is at home.

An important element of digital transformation is the use of healthcare data. The data generated while using technology to provide care is a valuable asset for clinicians. The goal is to collect data acquired through healthcare organisations and bring it back into a central database, thus allowing clinicians to use this data to their advantage. With the increase in the use of remote patient monitoring devices, the challenge is to take data, aggregate it into a patient-centric record, and serve it up to clinicians so that it gives them better insights into how to treat that patient in the best possible way.

The next evolution would be to build algorithms around artificial intelligence and become a partner to clinicians as they diagnose and treat patients in real-time. Building algorithms around AI and delivering that information will augment what the clinician is trying to achieve, not only in the diagnosis, but in the treatment of patients and in identifying best practices and pathways. This will require technology providers to partner with clinicians to help them make more informed, better decisions. Today, there is inexpensive technology that can allow the collection of a large amount of data. Healthcare organisations can use this data to provide a better patient experience. This will allow the realisation of a more patient-focused approach where it's not just about the outcomes, although those are very important, but also about the quality of care and the patient experience.

There has been a quick evolution of space and innovation beyond the virtual urgent care convenience in recent months. These innovations around virtual longitudinal care and enabling

care at the home and remote patient monitoring, and investment in this digital front are all coming to be adopted and accepted by the medical community, not only from the physician but from the patient. This acceptance will continue to grow. It will help clinicians and providers, as they stretch their resources, to become more attentive and be able to do more with less.

When the world is out of the pandemic, the ability to decide which patients will be seen first based on the remote monitoring solutions data that has been acquired can be a huge benefit. Clinicians would be able to build their rounds based on the data. This can be beneficial, both to the caregivers, because they will know exactly what they're going into and why, and also for the patients. There's the obvious benefit that people who need to be seen sooner will be seen sooner. As we move forward, these innovations will continue to be of great value, especially because the world continues to be an uncertain place. Having these systems in place will be extremely valuable, no matter what comes next.

The world is also seeing the utilisation of 5G in the private networking space in connecting very rural, very remote locations. There has been a tremendous amount of success there in improving quality and equity of care. Even if it is a rural area or a rural setting, patients can receive the same level of care utilising new technologies.

The pandemic has driven mass production and a huge increase in different organisations building sensors, for example. There's now a wide range of sensors on the market that it's driving the price down of hardware, allowing the solutions to be accessible to a lot more people. This is the ultimate goal – to be able to offer advanced solutions to as many people as possible that can benefit from them and to have better patient outcomes, better patient experiences, and better experiences for the workers themselves. Healthcare is now better positioned to harness technology to deliver better, quicker, less expensive care. ■

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Unlocking Digital Tools to Expand Access to Healthcare

An overview of the emergence of digital front doors, their potential and key points to bear in mind during the technological transition.

Key Points

- For decades, basic healthcare interaction has been a human one. However, the limitations of this system are now becoming more and more apparent.
- Patients today are demanding fast, convenient, easy and affordable service.
- Primary care physicians are no longer the first option for finding and navigating care.
- Patients are seeking alternative front doors to obtain care. These digital doors can take many forms, including a website, an online portal, a mobile app or a technological interface.
- Digital front doors can serve as an alternative to a conventional doorway leading to a brick-and-mortar facility.



Introduction

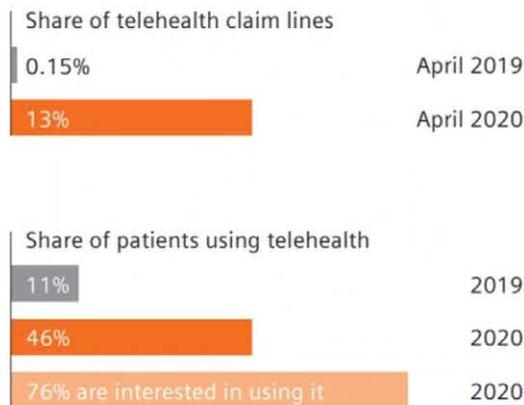
Traditionally, patient access to healthcare has been a one-on-one interaction where patients visit their healthcare providers. The adoption of digitalisation in healthcare has been quite slow. However, the COVID-19 pandemic has changed this and has accelerated the pace of digitalisation throughout the

leverage different virtual health solutions to create a digital ecosystem for patients. This can help transform care delivery, improve access to care, optimise clinical operations, better manage population health and increase workforce productivity.

Specifically, digital front doors can enhance four different areas of provider-patient interaction (Meinhardt and Staehr 2021). . These include:



The usage of telehealth has increased dramatically in the U.S.



Source: Bestsenny et al. 2020; FAIRHEALTH 2020.

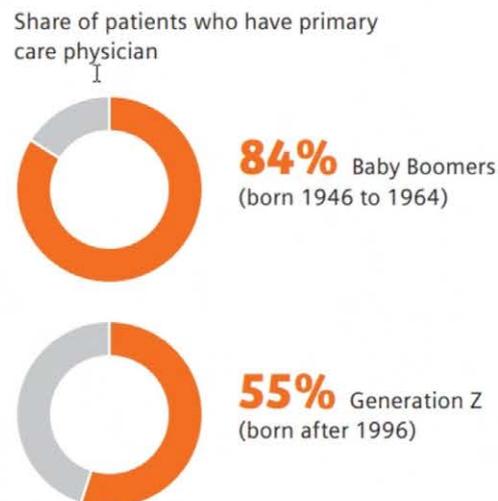
healthcare system. Due to this rapid acceleration, the point of access to care has now shifted. In 2019, only 11% of patients in the U.S. used telehealth solutions. Today, that number has increased to nearly 50%. 76% of patients are now interested in using virtual health solutions such as telehealth (Bestsenny et al. 2020). According to an Accenture survey, nearly 60% of patients who used virtual tools during the pandemic said they wanted to use the technology more for communicating with healthcare providers. 90% of patients who tried new devices or apps to manage their medical conditions liked them (Accenture Patient Survey 2020).

Possibilities for Digital Front Doors

Digital front doors allow healthcare providers to engage with patients throughout their healthcare journey. A strong digital front door strategy is not limited to a single solution but should



Younger people are less likely to have a primary care physician



Source: Accenture 2019.

Directing patients: Patients often need to be directed to the proper provider or source of care. Digital front doors can function as navigation signposts, triaging and directing patients to the appropriate level or type of care.

Engaging with patients virtually: A successful digital front door strategy would allow care teams to engage with patients virtually. This would mean patients could reach out to care teams any time, from anywhere, and healthcare providers would be able to respond with the click of a keyboard.

Monitoring patients remotely: Telehealth and tele-visits would allow patients to easily make appointments and reduce waiting times while delivering quality care to patients. Over 60% of patients and 59% of clinicians report no differences in the overall quality between virtual and office visits (Donelan et al. 2019).

Managing population health: Digital front doors also offer the opportunity for health systems to better manage overall population health, identify and respond to trends and establish new care delivery models. Healthcare providers would be able to analyse and operationalise digital data to identify vulnerable cohorts and pave the way for proactive and targeted engagement.

How to Unlock the Digital Front Door?

Successful utilisation and adaptation of digital front doors can be achieved by focusing on five key areas (Meinhardt and Staehr 2021):

Enabling patients

In order to make the transition to digital care successful, patient buy-in is essential. Real-time monitoring and easier access to physicians can have a positive impact on unplanned readmissions, patient quality of life and mortality. However, older patients, many of whom suffer from chronic diseases, are not always comfortable with new technology. They may require education and stronger engagement compared to younger patients. In any case, enabling patients to adopt digital care avenues would require offering them different options and different providers. More virtual care portals are likely to emerge to help patients navigate the marketplace. Digital marketing efforts would also have to increase, such as brand management, search-engine optimised marketing, social media engagement, and platforms for patient reviews to convince patients to choose digital front doors.

Empowering the workforce

In order to unlock digital front doors, existing workforces would have to be trained to work with new technology. They will have to be more aware of how new digital options can make their workplace more flexible. This will require incentives and motivation and the hiring of digital experts to make the transition smooth.

Upgrading infrastructure

Digital front doors will need to be integrated into existing infrastructure. This will require investment in new hardware and software as well as improvement in wireless capabilities for better connectivity. A shift to cloud-based storage may also be needed. These technology upgrades could prove to be a barrier, but this can be managed through flexible funding alternatives or partnership models.

Optimising workflows

In order to utilise the true potential of digital front doors, there will be a need to reorient parts of a provider's work and revenue streams. Workflows will change, and infrastructure, data, workforce and patients will have to be incorporated within this process.

Protecting data

Medical data is particularly sensitive. Healthcare systems must ensure patients are confident that their digital data is being treated securely. Internal data security governance capabilities will be essential, and a thorough understanding of data management will be required to anticipate any security vulnerabilities.

Conclusion

Digital access points to healthcare are not new and were not created as a response to COVID-19. However, the pandemic has provided a strong incentive for patients and providers to look at alternative models of care that have been underutilised. While face-to-face contact has its advantages in healthcare, digital alternatives can help fill this need if such contact becomes unavailable or too risky.

During the pandemic, patients have seen that alternative access platforms are safer, convenient and effective. The increased use of digital front doors has also reduced pressure on hospital emergency departments and has allowed a more efficient allocation of healthcare resources. The most important benefit has been improved patient outcomes, which is the ultimate goal of health services.

Healthcare systems worldwide have now seen how care can be proactive and how healthcare data can be better utilised to improve decision-making, better identify those at risk of certain illnesses or conditions, and develop a greater understanding of different therapies and treatments.

Digital front doors can provide a safe, convenient and effective access platform to healthcare services. Adoption was already underway before the pandemic, but it has gained further momentum and is likely to accelerate further in the years to come.

For more insight on this topic, please read [Herbert Staehr's exclusive interview here](#).

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Teamplay Digital Health Platform for Performance Management in Radiology

An overview of teamplay applications for performance management in radiology and how they offer a clear overview of performance data and facilitate radiology directors or clinical administrators to make fast and well-informed decisions.



Key Points

- The teamplay digital health platform enables digital transformation by facilitating easy access to solutions for operational, clinical and shared decision support.
- The teamplay performance management applications allow radiology directors to access, monitor and compare their institution's key performance indicators in a single dashboard accessible from anywhere, anytime.
- The teamplay digital health platform combines two different deployment models - cloud and on-edge deployment to enable integrated solutions according to specific use cases and requirements.
- With the teamplay digital health platform, radiology operations can be optimised by accessing and analysing data more effectively, understanding the workflow, optimising operations by taking direct measures and creating a culture of continuous improvement.

The healthcare environment for radiology directors can be extremely challenging. Not only do they have to stay compliant with nationally defined reference levels for applied radiation, but they are also expected to increase efficiency, produce results and provide a data privacy-compliant way to share and manage medical images. In addition, protocol management can be a time and resource-consuming effort. In simple words, radiology teams have to achieve better outcomes and results with less investment and resources. One way to overcome this change is through digitalisation. Siemens Healthineers' teamplay performance management applications allow radiologists to better utilise patient data, improve workflow and optimise daily operations.

Benefits of Teamplay Applications

With teamplay performance management applications, clinicians can access objective data insights to make well-informed and prompt decisions and improve radiology operations. Streamlining operations in a radiology department is not limited to scanning more patients. It is also important to optimise processes and deliver high-quality care while complying with national regulations.

Some of the key benefits of teamplay applications for radiology directors include:

- Ability to monitor quantities like imaging throughput, dose levels, utilisation of staff, rooms, and department resources down to each device and procedure.
- Simplify reporting and gain insights into where workflows need adjustments.
- Link with other teamplay users and their data for comparable benchmarks and effortlessly exchange images and reports.
- Easily connect with other healthcare professionals, hospitals, and institutions through teamplay's rich cloud-based network.
- Access metrics from your own imaging fleet and a shared pool of imaging data.
- Connect and collaborate in a trusted environment with high data privacy and security standards to improve patient outcomes and quality of care.

Teamplay Performance Management Applications

The teamplay performance management applications allow radiology directors to access, monitor and compare their institution's key performance indicators in a single dashboard accessible from anywhere, anytime. Some of these indicators include:

teamplay Dose – Simplify radiation dose management

The application helps identify areas of improvement and administer best-practice exams. All insights in teamplay Dose are based on data extracted from the radiation data

of scanners.

teamplay Usage – Increase efficiency and expedite imaging fleet utilisation

Explore workflow-specific data on patients and exams and/or focus on the efficiency and performance of individual devices, identifying optimisation potential to do more with less.

teamplay Images – Share and discuss images in a secure environment

With teamplay Images, images can be shared in a secure environment and additional collaboration features help engage with other peers.

teamplay Protocols – Speed up protocol management by remote access

Speed up protocol management by editing protocols remotely and distributing these protocols to the image fleet.

Teamplay Digital Health Platform – Enabling Your Digital Transformation

The teamplay digital health platform is an enabler for digital transformation in radiology. 6500 institutions in more than 75 countries are already benefitting from this platform by using a broad range of applications developed by Siemens Healthineers and third parties. The teamplay digital health platform enables digital transformation by facilitating easy access to solutions for operational, clinical and shared decision support:

Powerful marketplace

Access to innovations and solutions in digital health and AI from Siemens Healthineers and curated partners. These solutions can help radiology departments transform a complex multisite, multivendor imaging environment into an integrated imaging service line with a patient-centric focus throughout the entire workflow.

Digitally enabled collaboration

Sharing and collaborating with peers and patients via standardised interfaces between institutions and care settings.

Scalable deployment models

Innovative and flexible software deployment combining cloud and on-edge to serve your individual needs with a broad portfolio of transformative and AI-powered applications. The deployment models are based on the client's infrastructural demand and preferences and offer flexibility and scalability with future-readiness. The applications can be accessed easily via the digital marketplace that provides state-of-the-art SaaS (software-as-a-service) business models and scalable computing power.

Seamless interoperability

One vendor-, system-, device-neutral digital health platform for cross-departmental and cross-institutional interoperability in a secure and regulatory-compliant environment. It allows easy connection of devices and systems, aggregates data from various sources and provides advanced analytics that results in actionable insights. With the teamplay healthcare digital platform, big data can be converted into smart data and can be used to increase the effectiveness of clinical routines through improved patient outcomes and reduced cost.

Strong platform partner

Secured environment to consume, deploy or operate digital solutions globally by leveraging Siemens Healthineers' ever-expanding infrastructure and services with over 32,000 connected systems, 6500 institutions in 75 countries and more than 30 million patient records accessible cross institutionally through seven major data centres worldwide.

Data Where It Needs To Be

Digital solutions require an innovative and flexible software deployment. Siemens Healthineers' teamplay digital health platform offers this flexibility by combining two different deployment models - cloud and on-edge deployment to enable integrated solutions according to specific use cases and requirements. Leveraging the benefits of both deployment models is called hybrid computing which is enabled by edge technology. With hybrid computing, you can:

- Manage local and global data as per preferences and regulatory requirements and ensure continuous operations.

- Benefit from instant data processing and storage on the local edge device and aggregate and balance load in the cloud when needed.
- Benefit from fully managed operations remotely from cloud: up-to-date software and algorithms, state-of-the-art security and high availability of apps.

Conclusion

Overall, Siemens Healthineers' teamplay digital health platform enables radiology departments to connect different imaging modalities and generate, collect, analyse and access patient data through a range of powerful applications. The teamplay performance management applications provide greater transparency in the workflow and help radiologists increase their productivity and better balance their department's resources. With centralised protocol management, clinicians can deliver a higher quality of care and ensure standardisation. With better data analysis, clinicians can perform in-depth analytics with intuitive dashboards. In addition, the teamplay performance management applications help radiology teams understand cost inefficiencies within their workflow and can implement changes accordingly to optimise operations. In other words, radiology operations can be optimised by accessing and analysing data more effectively, understanding the workflow, optimising operations by taking direct measures and creating a culture of continuous improvement. ■



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