Unlocking the Value of Digital Patient Follow-up

Contents

List of abbreviations

Abbreviation	Meaning
AE(s)	Adverse event(s)
AEM	Adverse event monitoring
AI	Artificial intelligence
CE	Conformité Européenne certification
CAGR	Compound Annual Growth Rate
DHCRC	Digital Health Cooperative Research Centre
DHM	Digital health monitoring
DTC model	Direct-To-Consumer model
DVG	Digitale-Versorgung-Gesetz
EHR(s)	Electronic health record(s)
(e)PRO(s)	(Electronic) patient-Reported Outcome(s)
HCP(s)	Healthcare practitioner(s)
IT	Information technology
mHealth	Mobile health
NIHDI	National Institute for Health and Disability Insurance
P4Q	Pay for Quality
PREMs	Patient-reported experience measures
PRO-CTCAE	Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events
PROMs	Patient-reported outcomes measures
QOC	Quality of care
RCT	Randomized controlled trial
RWE	Real-world evidence
RWD	Real-world data
UK	United Kingdom
US	United States
USD	United States Dollar
WHO	World Health Organization

1. Executive summary

Digital health monitoring refers to a wide class of technologies that **enables patient follow-up outside of conventional care settings.** Digital health, mobile Health (mHealth), wearable devices, and predictive analytics are examples of technologies making digital health monitoring possible[1].

Digital health monitoring **creates value for patients, healthcare practitioners, hospitals, and governments** along the patient pathway, starting from prevention and awareness to diagnosis, treatment, short- and long-term follow-up, and ultimately survival. Digital health monitoring enables patient empowerment, in-depth communication between patient and healthcare practitioner, more timely diagnoses and accurate interventions, and better patient experience and outcomes. Healthcare practitioners build better relationships and trust with patients while reducing physical consultations and hospital readmissions. They experience a reduced administrative burden by using digital health monitoring, potentially diminishing the risk of burn-out. Hospitals can free-up capacity due to reduced (re)admission and length of stay. Finally, governments can better allocate healthcare resources, increasing the value of healthcare services and improving overall population health.

The **global digital patient monitoring devices market** was valued at $62 billion USD in 2020 and is **expected to grow with 28% annually** to $273 billion USD in 2026[2]. Our global scan of digital health monitoring solutions showed that start-ups and tech companies enter the healthcare system and immensely collaborate with international life sciences companies. Governments around the world support digital transformation, for example by developing reimbursement frameworks for digital health monitoring solutions, through funding, research initiatives or favorable legislative framework. In the future, governments are likely to increase their incentives to support the adoption of digital health monitoring solutions in order to improve the overall population health and augment access and equity of care.

The Belgian digital health market is evolving as interest of hospitals to follow-up on patients in a digital way is rising. However, in a sample of 98 **Belgian hospitals,** only **15% are currently applying digital follow-up** of adverse event management for their cancer patients.

MSD and Deloitte are collaborating to improve cancer patients' lives by investigating the impact of digital health monitoring on the different stakeholders and by identifying key success factors and enablers for digitalizing patient follow-up. These insights are bundled in **a playbook to support hospitals in digitalizing remote patient follow-up** and kickstarting their digital implementation by leveraging the specific tools, methodologies and lessons-learned from early adopters. In this way, MSD wants to strengthen its support to hospitals in overcoming the known hurdles to digitalizing remote patient follow-up, refining cancer care delivery and by doing so, improve the live of cancer patients.
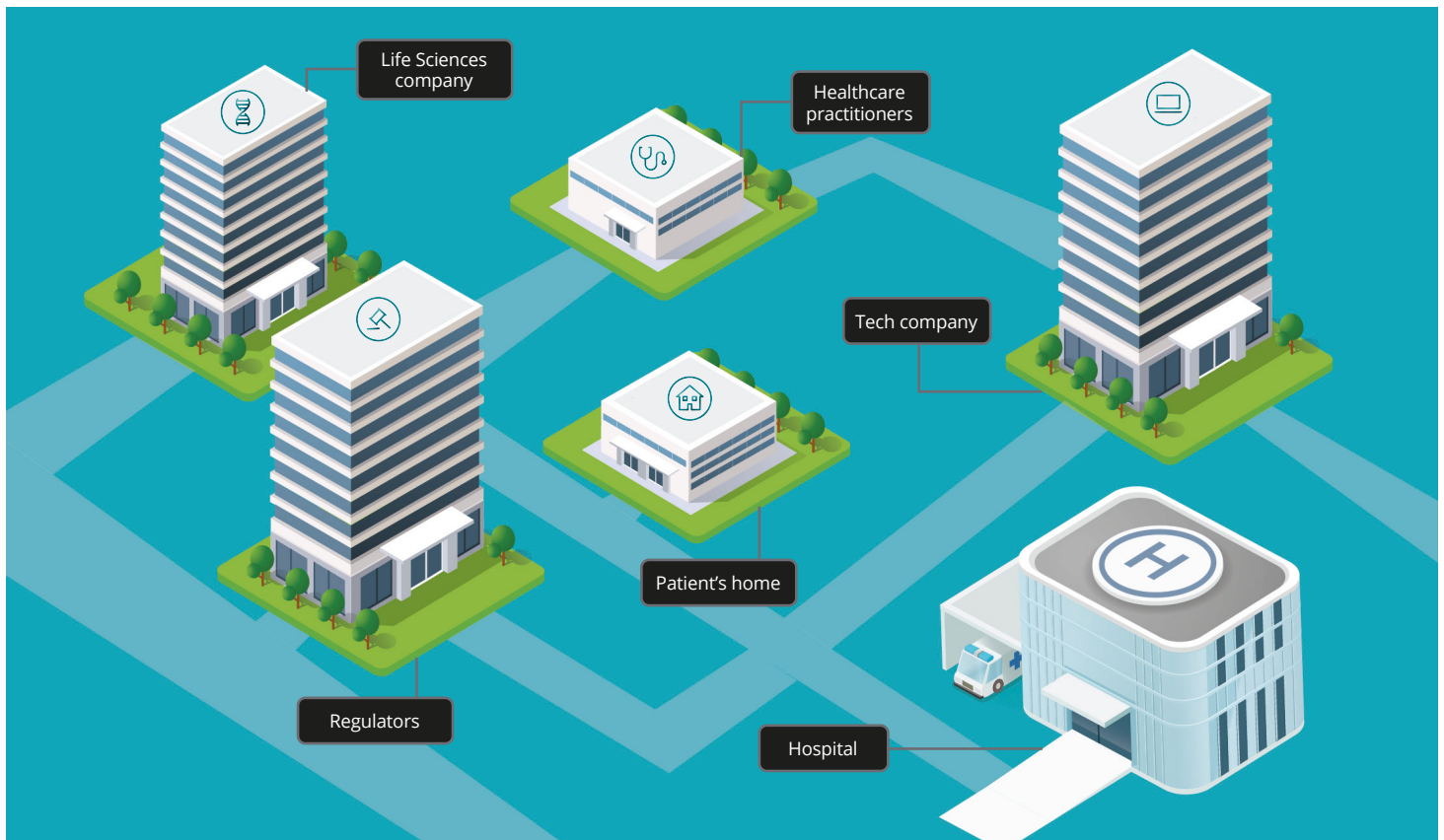
2. Introduction

Digital transformation is shaping the future of healthcare. Radically interoperable data, artificial intelligence (AI), and open, secure platforms will drive much of this change. Digital health monitoring (DHM) plays a vital role in this transformation, allowing easy access to relevant data, improving quality of care and delivering value to patients, healthcare practitioners, hospitals and governments, leading to better population health[3]. Numerous start-ups are active in the DHM market and engage with traditional healthcare players such as insurers and life science companies, accelerating DHM adoption.

The DHM market has been rapidly expanding over the past few years, whereby the global Digital Patient Monitoring Devices market was valued at $62 billion USD in 2020 and is expected to grow 28% annually up to $273 billion USD in 2026[2].

CAGR

28%

$273 billion USD in 2026

$62 billion USD in 2020
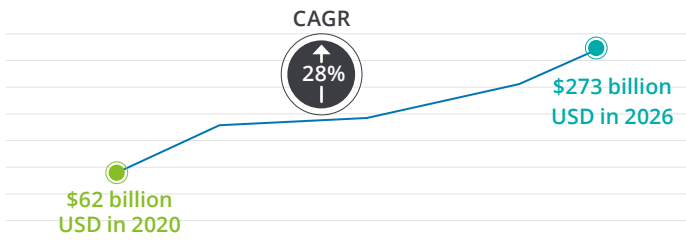
mHealth (technologies that involve mobile devices) is expected to become the largest contributor to the United States DHM market by 2021 due to wide adoption of mobile devices and wearables[4].

A global horizon scan across therapeutic areas, with a focus on oncology, has identified case studies and scientific evidence on the impact of DHM solutions and their respective value for patients, healthcare practitioners, and governments. The impact of DHM during the COVID-19 pandemic is undeniable, influencing hospital capacity, accessibility of care, and qualitative remote patient follow-up, and will be highlighted throughout this article.

Further, an in-depth investigation on DHM in Belgium in oncology focuses on the current Belgian policy, the digital savviness of hospitals, and key success factors for implementing DHM initiatives.

Lastly, MSD's active role in digitizing healthcare and its initiative to develop a playbook for Belgian hospitals will be tackled. This playbook will allow hospitals to accelerate the implementation of digital solutions for remote patient monitoring in oncology patients by using specific tools, methodologies and lessons-learned from early adopters.

This whitepaper is evidence of the need for all the actors in the healthcare ecosystem to embrace digital transformation in order to realize the impact that matters for patients, healthcare practitioners, hospitals, and Belgian society as a whole.

3. Methodology

Definition of digital health monitoring

Digital health monitoring refers to a wide class of technologies that enables patient follow-up outside of conventional care settings. Digital health, mobile Health (mHealth), wearable devices, and predictive analytics are examples of technologies making digital health monitoring possible[5].

The purpose and use of digital health monitoring vary widely, from providing or sharing information with patients through an app to predicting patient care needs and generating holistic patient views through platforms aggregating interoperable data.

Research approach

This article is the result of a collaboration between MSD, Deloitte, and Harvard CBE undergraduates and summarizes information gathered through:

- A targeted literature search to understand the digital health monitoring market, with a focus on oncology and other selected therapeutic areas, complemented by interviews with MSD executives and Harvard University professors

- A comparative analysis of patient programs via interviews with over 20 key opinion leaders in oncology care from ten Belgian hospitals, Including oncologists, oncology coaches and nurses, and pharmacists to identify best practices and potential pitfalls.

4. Impact of digital health monitoring

Digital health monitoring solutions provide a variety of important benefits across diseases and therapeutic areas, with a positive impact on patients, healthcare practitioners, hospitals, and governments. The value that digital health monitoring delivers for these stakeholders is mapped along the patient journey, from prevention and awareness, diagnosis, treatment, short- and long-term follow-up and finally through to survival. (Figure 1).

Figure 1 Impact and value of digital health monitoring on patients, healthcare practitioners, hospitals, and governments

	Prevention and Awareness	Diagnosis	Treatment	Short- and long-term follow-up	Survival
Value for Patients	• Timely and targeted **exchange of information** • More meaningful **communication** between patient and HCP • Improved **medication adherence** and disease management • More **empowered** and **engaged** patient	• **Earlier diagnosis** • **Better prognosis** • **Less invasive treatment** options at lower cost	• More **timely and accurate intervention** • Increased **efficacy and efficiency of care**	• Enhanced **treatment adherence** • **Early detection of warning signs** • Reduced **hospital (re)admissions** and health-related **costs** • More **equitable** care and an improved patient **experience**	• Enhanced patient **outcomes** • Improved **survivorship**
Value for HCPs	• Building of a personal **relationship** between patient and HCP • Increased **trust**	• **Earlier diagnosis** • More **treatment options**	• Improved **information sharing** • Better understanding of **patients' needs** • More **personalized and data-driven treatment plans** • **More valuable** patient-HCP **interactions**	• Reduced **administrative burden**** • Diminished risk of **burn-out**	• Improved overall **survival**
Value for Hospitals	• Increased hospital **capacity** • Reduction in hospital (re)**admissions** and/or **length of stay**	• Enhanced patient **experience**	• Increased hospital **capacity** • Reduction in hospital (re) **admissions** and/or **length of stay**	• More valuable use of hospital **resources*** and capacity • Reduction in **physical follow-up visits and (re)admissions**	• Improved **patient outcomes** and **experience** • Positive reinforcement of **the hospital's reputation**
Value for Governments	• Better allocation of **healthcare resources** and budgets • Increased **value of healthcare services** offered • Improved overall **population health**				

*: When hospitals are payed through pay-for-quality system;**: When data interpretation is done by thrid-party app administrator and/or data manager;

HCP: Healthcare Practitioners

Value for patients

Digital health monitoring solutions for patients could lead to:

- Increased level of **health information** exchange, **patient engagement and empowerment**
- Improved **medication compliance and disease management**
- **Earlier detection and diagnosis** of diseases
- Improved patient-HCP communication and relationship and over all **patient experience**
- Improved **health outcomes** including improved survival
- Improved **safety and QOC** through prompt, efficient, and effective care interventions
- Improved **accessibility** and **equity** of care

Diagnosis

Digital health monitoring solutions using AI and machine learning can quickly detect important symptoms of diseases, especially due to new imaging software making use of neural networks. The improvement of imaging software is currently used in many clinical settings to timely and accurately diagnose cancer in patients based on CT and MRI scans[6,7].

Treatment

According to the World Health Organization, studies in high-income countries have shown that treating cancer patients, who have been diagnosed early, is two to four times less expensive compared to treating patients with more advanced stages of cancer[8]. Patients and society can therefore benefit economically from digital health monitoring solutions, influencing the accessibility and equity of care.

Follow-up

Digital health monitoring solutions have shown promising results when predicting health outcomes across (palliative) cancer patients as demonstrated in a study that found that emergency visits and unplanned readmissions were strongly correlated with resting heart rate and speed of steps (measured through wearables). Wearables are therefore valuable in cancer patient follow-up[9].

Patient-reported outcomes (PROs) are often included in digital solutions for remote patient monitoring. A study comparing 129,893 matched

Case study: In an observational clinical field testing, study breast cancer patients were asked to complete weekly online symptom reports during four cycles of chemotherapy through the Electronic patient self-Reporting of Adverse events: Patient Information and aDvice tool (eRAPID tool). The clinical staff used the sumbitted patient data in their clinical assessments, in which patients described the eRAPID tool as 'reassuring' and 'comforting', increasing their knowledge and confidence. Patients valued the tailored management advice and were supported in their decision-making and coping strategies. Feedback indicated that eRAPID has the potential to improve patients' self-efficacy, knowledge and confidence through symptom management during treatment[10].

pairs of cancer patients with and without digital health monitoring with PROs, The observed benefit at one year with PRO-symptom monitoring of a 5.5% absolute overall survival benefit exceeds the benefits of many existing cancer drugs, with substantially less 'toxicity'[11].

During the current global pandemic it is difficult to have access to healthcare through traditional means.

Case study: A prospective randomized study collecting PROs with the UroHealth investigated the influence of the digital health monitoring solution on answering long-term follow-up questionnaires after surgical procedures in patients with prostate cancer. The study found the app improved communication between patients and their medical professionals sixfold compared to the traditional printed questionnaires, resulting in more prompt and effective interventions when AEs were reported[12].

Value for healthcare practitioners

Digital health monitoring solutions for HCPs could lead to:

- Increased level of **health information** exchange, **patient engagement and empowerment**
- **Earlier detection and diagnosis** of diseases
- **Optimization of HCPs time** (workflow efficiency) due to reduced no-shows and administrative burden, reducing **HCPs burn-out**
- Improved **informed decision-making** strengthened by longitudinal patient data and a holistic patient view resulting in reduced medical errors and deaths
- More **personalized care delivery** based on real-world data (RWD) and real-world evidence (RWE)

Healthcare practitioners are increasingly using digital solutions to provide care. A survey of 1300 United States HCPs conducted by the American Medical Association found that HCP use of technology for teleconsultations has doubled since 2016, resulting in a 30% adoption rate of digital health technology across HCPs in the United States (even before the COVID-19 pandemic). The most important drivers of adoption, according to HCPs, were patient adherence, convenience, liability coverage, and physician burn-out, as well as patient safety and efficiency[13,14].

Treatment

Further, digital health monitoring improves the communication and relationship between patients and HCPs, allowing for increased patient engagement and empowerment, as well as improved medication adherence. This is critical for ttreatment maintenance and to prevent more dire circumstances from occurring.

Case study: A systematic review including 154 articles investigated the influence of patient empowerment on medication adherence and disease management. Results showed an 89% relationship between patient empowerment and medication adherence, and an 80% relationship between patient empowerment and disease management. This highlights the importance and influence of patient empowerment on medication adherence and disease management[15].

Follow-up

Physician burn-out and decreased productivity through increased administrative burden are major factors driving the need for change in the medical profession[16]. Healthcare practitioners' time and accessibility can be optimized using digital health monitoring, such as solutions with scheduling technology that can reduce patient no-shows, or apps that can reduce the administrative burden on HCPs. In this way, qualitative, effective, and personalized care delivery is possible. In addition, bundled longitudinal patient information provides a holistic or 360° patient view for HCPs and allow easier access to health records, resulting in better informed treatment decisions and potentially reducing medical errors by HCPs[17,18].

54% of US physicians said they wrote prescriptions or referred patients to specialists due to time constraints, showing a lack of personalized care[19].

74% of US primary care providers cited too much paperwork and bureaucracy as the top cause of burn-out[17].

Digital health monitoring could provide the HCP a 360° view of their patients' health status any time of the day, anywhere[18].

Case study: The multicentre PRO-TECT Trial evaluated the implementation of electronic Patient-Reported Outcomes (ePROs) in adults receiving treatment for advanced/metastatic cancers. Questions derived from the Patient-Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE) were administered weekly by web or automated telephone system, with alerts to nurses for severe or worsening symptoms. Nurses said that ePROs were helpful for clinical documentation (79%), efficiency of patient discussions (84%), and patient care (75%). In addition, 65% of oncologists said they used ePROs when making treatment decisions for their patients. These findings support the clinical utility and value of implementing digital systems for monitoring PROs, including the PRO-CTCAE in routine cancer care[20].

Further, HCPs' informed decision-making could be improved by longitudinal patient data collected through, for example, adverse event monitoring (AEM) apps or other digital health monitoring solutions including PROs, making determining diagnoses and treatments more efficient by receiving patient feedback and frequent updates on symptoms and clinical status[21].

Technology is expected to drastically change the care model and, despite present-day hurdles to HCPs' technology acceptance, the healthcare industry is progressing towards an augmented workforce combining people and technology to be more efficient and effective[16].

Value for hospitals

Digital health monitoring solutions for hospitals could lead to:

- **Earlier detection and diagnosis** of diseases
- Reduced hospital (re)admissions, follow-up visits and improved care effectiveness, leading to **increased hospital capacity and reduced costs**
- Improved **safety and quality of care** leading to improved **accessibility** and **equity** of care, improved **patient outcomes and survival**, resulting in an improved **hospital reputation**

Prevention and Awareness

Digital health monitoring helps to reduce unnecessary hospital visits, emergency visits, and (re)admissions, allowing hospitals to free up capacity, reduce waiting lists and unnecessary costs[22, 23]. This prevention value of digital health monitoring is of increasing importance for hospitals, especially as the strain on hospital capacity is expected to grow due to the increasing prevalence of chronic diseases and unpredictable situations such as pandemics[24].

Case studies:

The KLAS (a healthcare research institution) research report found a 13% increase in medication compliance under digital health monitoring programs. Digital health monitoring also helps to reduce the number of emergency department visits by as much as 25% with a 38% reduction in hospital admissions, corresponding to a 17% decrease in costs[22].

A study at Memorial Sloan Kettering Cancer Center, including patients undergoing routine chemotherapy for metastatic solid tumours, found a 17% decrease in emergency visits and an 8% decrease in hospitalizations over one year when using their patient symptom tracking and reporting tool[25].

Mercy Virtual, a successful all-virtual hospital, has shown a 52% reduction in preventable readmissions of chronically ill patients when implementing m.Care (a digital health monitoring solution), a 20% increase in outpatient service utilization, an 11% increase in clinic office visits, and a 30% decrease in medical spending as a result of timely health care interventions and reduced hospital readmissions. Overall, 98% of the participants were satisfied with the program[26].

69% of HCPs rank remote patient monitoring as the number one way to decrease overall costs[27].

Over the next 25 years, remote patient monitoring is expected to save $200 billion USD in healthcare costs globally by eliminating unnecessary visits, optimizing time spent with patients and improving communication[27].

Treatment – follow-up and survival

Predictive analytics and the large amount of data enabled and built-in to digital health monitoring solutions can enhance (early) diagnosis, treatment and follow-up of patients, while improving providers knowledge by generating RWD and RWE. Therefore, improvements in efficiency, effectiveness and quality of care influence patient outcomes and survival positively, resulting in improved hospital reputation.

Case studies:

A randomized controlled trial (RCT) of lung cancer patients in France found that relapses were detected an average of five weeks earlier when monitored at home[28].

A multicenter RCT including 121 patients investigated the detection of lung cancer relapse using self-reported symptoms transmitted via an Internet Web-application. The two-year survival rate between patients using remote patient monitoring (22.5 months) and those not (14.9 months) differed significantly[1].

A RCT in the Memorial Sloan Kettering Cancer Center, including 766 patients undergoing routine chemotherapy for metastatic solid tumours found a 20% increase in overall survival of cancer patients who reported their symptoms through the Patient Symptom Reporting and Tracking Tool compared to the usual care or control group[25].

Improved patient outcomes are important value indicators for hospitals that can benefit financially from improved care when Pay for Quality (P4Q) is embedded in the hospital funding system.

Value for governments

Digital health monitoring solutions for governments could lead to:

- **Earlier detection and diagnosis** of diseases, reducing costs

- Reduced hospital (re)admissions, follow-up visits and improved care effectiveness, leading to **increased hospital capacity, quality of care and reduced costs**

- Improved **hospital evaluation and ranking**

- Improved **population health** by better **allocation of health resources**

Diagnosis

Early detection can alleviate the economic burden of disease on the healthcare system and by extension on the society as well. For oncology patients, early detection and diagnosis can cut costs significantly and help decision-makers manage cost predictions more accurately. From 1995 to 2014, the direct cost of treatment of all types of cancer across Europe rose from €35.7 billion to €83.2 billion, corresponding to an increase of 133%[29]. It is evident that the cost difference between early

and late stage is largely driven by cost of treatment, in that later stage cancers require the most intensive and expensive treatments. Thus, early detection of symptoms enabled by digital health monitoring can reduce costs significantly.

In Belgium, the average per-patient cost during a 6-year period for treating stage I breast cancer is nearly half of the cost of stage IV disease[30].

Treatment– follow-up and survival

Digital health monitoring drives innovation and builds interoperability such that institutions can facilitate integration of data across clinical and commercial sectors. Standardization of data flow mandated by the government can maximize use of information, such as through the use of electronic health records (EHRs). This method of information sharing has been critical for patient care and data collection.

Case studies:

In the US, the HITECH Act incentivized the adoption of EHRs in hospitals and thus brought HCP use of EHRs from 10%, prior to the Act in 2009, up to 86% in 2017[31], impacting patient safety and QOC[32].

- In Germany, the Digital Health Care Act (Digitale-Versorgung-Gesetz,DVG) was passed in late 2019 to catalyse the digital transformation of the nation's healthcare system. The DVG formalized "prescription applications", which include technology such as standard software, mobile and browser apps which can be used for disease management such as AEM and treatment of conditions like obesity, agoraphobia, and insomnia. These apps have been added to a registry that will be reimbursed by all of Germany's statutory health insurance, allowing for implementation and stimulation of the collection of scientific evidence through digital solutions[33].

In Belgium, in the context of the COVID-19 pandemic, various payment codes have been created for telephone services, initially for physicians in the triage of covid-19 patients and for advice on continuity of care for known patients. Later, new payment codes were created for other HCPs allowing them to follow-up on their patients through teleconsultation. Finally, a telemonitoring pilot project was initiated for monitoring COVID-19 patients at home, allowing hospitals to free up capacity while following-up on patients' medical status remotely[34, 35].

By facilitating knowledge-sharing across sectors, governments can help reduce inefficiency and better allocate resources. A system of easy capture of reliable data, tools to analyse the data, and seamless feedback of knowledge to the system can drive institutional health surveillance efforts. Moreover, data structure, classification, and storage are important in repurposing data collected for different studies.

Digital health monitoring provides economic, infrastructural and technological benefits to governments and other institutions that can be realized for both immediate and long-term effects throughout the patient journey. Government benefits mainly lie in connectivity and the cumulative benefits gained by patients, HCPs, and hospitals for a more effective healthcare system.

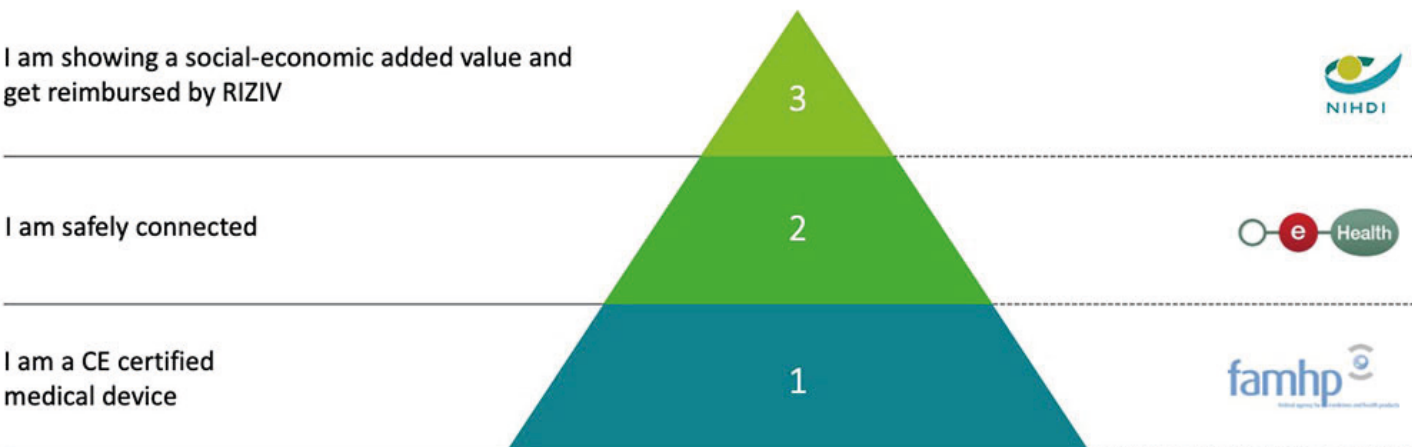# 5. Global scan of digital health monitoring solutions

The true value of digital health monitoring solutions can only be materialized when successfully implemented. Therefore, a global scan with a particular interest in oncology was performed to evaluate several digital health monitoring solutions and how these solutions are supported and funded across different regions.

In Europe, numerous digital health solutions are currently on the market and are mostly offered by start-ups and tech companies entering the healthcare sector, rather than by traditional healthcare companies. There is an increasing trend of life science companies collaborating with tech companies in order to bring digital health monitoring solutions to the market and expanding their focus on patients by evolving their portfolio towards 'beyond-the-pill' services.

Reimbursement frameworks for digital health monitoring develop at different speeds in Europe[36]. The recent German DVG and mHealthBELGIUM policies show the importance of governments supporting digital transformation in healthcare[33,37], while the COVID-19 pandemic expanded the pre-existing frameworks for reimbursement[34,35]. An example to showcase the above is the mHealthBELGIUM platform in Belgium, that centralizes all relevant and required information on mobile apps for patients, HCPs and institutions, which is related to CE-marking, data protection, communication security, interoperability with other information technology systems and the way in which the app is financed[37]. On January 20th 2021, the three-level validation pyramid (see figure below) was finalized, authorizing reimbursement of health apps by the National Institute for Health and Disability Insurance (NIHDI)[38]. Besides the governmental funding of digital health monitoring solutions, several health insurers incentivize the usage of technology by providing financial support in Belgium, such as Onafhankelijk Ziekenfonds and Partena[39, 40]. Table 1 provides illustrative examples of digital health monitoring solutions in oncology in Europe.

Three-level validation pyramid

I am showing a social-economic added value and get reimbursed by RIZIV — 3 — NIHDI

I am safely connected — 2 — e-Health

I am a CE certified medical device — 1 — famhp

Source: mHealthBELGIUM (2020). Validation pyramid. https://mhealthbelgium.be/validation-pyramid

Table 1 Illustrative examples of digital health monitoring solutions in oncology in Europe

Country	DHM solution	Description	Information/Outcomes
Belgium	Awell Health[41]	Awell is a software platform with the ability to design, build, execute and optimize care pathways, and enables increasing standardization across care processes, the collection of PROMs and PREMs, and patient engagement	• Awell provides standardized care pathways in its library, which can be tailored to the needs of an organization, specific disease or evolution • Shared care pathways in the library enable benchmarking between physicians, hospitals, and networks • Active in multiple disease areas such as lung cancer, breast cancer, trauma, irritable bowel disease, pediatric allergy, pre-admission screening, stroke, and COVID-19. • Possible to integrate in electronic health record
	RemeCare[42]	The RemeCare oncology app is a CE-certified medical device that enables remote monitoring of patients and teleconsultation	• Through the RemeCare app, patients can monitor and report on disease symptoms, vital parameters, AEs, etc. and healthcare providers can consult on the data through the RemeCare platform, which can be integrated in the electronic health record • CE-certified medical device class IIA
Finland	Noona[43, 44]	Noona is a smart cloud-based mobile service designed to capture PROMs in oncology, personalize treatment, automate interventions, and perform outcome analysis. Noona´s smart algorithms are helping care teams to identify and predict acute symptoms and focus on patients in need of immediate care based on patient-reported data.	• Product of Varian, a global leader in developing and delivering multidisciplinary cancer care solutions, designed with direct input from patients • Average age of use is 64, and the application has a 90% response rate • Patients spend less time in the emergency room and are less hospitalized • Nurses spend up to 60 minutes less per day on the phone with patients usingNoona • Structured symptom data helps to inform patient care and predict future outcomes improving clinical decision-making • Structured symptom data helps to inform patient care and predict future outcomes improving clinical decision-making • Noona is free of charge for end-users, and has a subscription based model for caregivers • CE-certified medical device in Europe and has ONC-certification in the US
	KaikuHealth[45]	KaikuHealth is a Finnish platform for digital health interventions	• provides PROMs and PREMs, as well as intelligent symptom tracking with an algorithm prioritizing patients' symptoms for HCPs • Allows HCPs to prioritize their daily tasks and enables better collaboration across lines of care, follow-up and early interventions • 25% of the cancer patients using Kaiku are +70 years old; patient compliance across modules >90% • Currently available and used in seven countries, including Finland, Norway, Sweden, Germany, the Netherlands, Italy and Switzerland • Currently used in 40 European hospitals and by thousands of cancer patients in over 25 different cancer types • CE-certified medical device class IIA
France	Cureety[46]	Cureety is a French start-up that supports patients, doctors, and researchers in chronic diseases (oncology patients included)	• Patients can share health information with city and hospital caregivers while accessing digital supportive care services • The digital health monitoring solution is currently used by over 3000 patients, in 28 healthcare facilities, in 135 treatments and protocols, and in 4 clinical studies • Possible to integrate in electronic health record • Cureety brings value to patients by improving their QOL, facilitating communication, decreasing sense of isolation, and improving access to supportive care services • Cureety brings value to HCPs by saving time, monitoring patients in real-time, managing AEs, and adjusting medication dosage and generating a synthetic report to optimize consultations • Cureety brings value for healthcare facilities by decreasing the number of emergency visits, optimizing hospital service organization and scheduling, and participating in real-life study projects on innovative treatments • CE-Certified medical device class I

AEs: Adverse events; CE: Conformité Européenne certification; DHM: Digital health monitoring; HCPs: Healthcare practitioners; PREMs: Patient-reported experience measures; PROMs: Patient-reported outcomes measures

In Australia, in particular,, the government actively supports digital health monitoring solutions through funding. Two important government funded digital health players include My Health Record and the Digital Health Cooperative Research Centre (DHCRC). In 2018, the Australian government invested $43 million USD in the DHCRC and plans to invest over $155 million USD in the future[47]. Occasionally, there are some private sector players, such as ANDHealth, which has commercially supported more than 300 high potential growth companies and reached more than 70,000 new patients[48]. Other than major government initiatives such as My Health Record, the adoption of digital solutions is limited by additional government funding and legislation[49, 50]. As such, in Australia, the role of the federal government in driving digital health monitoring development and innovation is crucial.

In the US, funding for digital health monitoring technologies comes primarily from hospitals themselves. Most digital health monitoring solutions are developed by private companies that sell these solutions to hospital systems or consumers. These solutions are often supported with outside sources of funding such as venture capital, with little evidence of the government developing their own digital health monitoring systems or financing the development of private solutions. On the buyer side, hospital systems generally pay directly for these technologies. Other health monitoring solutions are more targeted towards patients rather than the hospital systems. In that case, often the payer is the purchaser of the digital health monitoring solution (rather than a Direct-To-Consumer model). Overall, there is little evidence of any subsidization for hospitals by the government, other than their general tax-exempt status. However, the US government does provide indirect incentives to hospitals through Medicare coverage for telehealth and remote patient monitoring solutions[51].

China has efforts to collect population data through population-wide cohort studies. Japan has policy areas that have prioritized digital healthcare in the recent decade. In addition, Japans' patent laws allow people to file for intellectual property more easily compared to the US, stimulating innovation in the private sector (Table 2).

Further, immense collaboration between international life science companies and smaller digital startups in different sectors can be observed.

While digital health monitoring solutions are increasingly used and adopted globally because of the value they bring, questions regarding data security, data privacy, and digital ethics are rising[54, 55]. Furthermore, digital and health literacy, access to high speed internet and (smart) digital devices are some of the experienced hurdles by patients, potentially limiting access and adoption towards digital health monitoring solutions.

The WHO for example, highlights the importance of digitalization in healthcare, publishing guidelines and recommendations on digital interventions for health system strengthening[56].

In order to overcome these hurdles, governments would need to provide clear legal frameworks, assuring data privacy and security for patients while providing ethical context. It is important that digital health monitoring solution developers co-create digital health monitoring solutions with patients to provide relevant and user-friendly interfaces to maximize patient adoption.

Hospitals and HCPs also need to be aware and convinced of the value digital health monitoring brings to patients, HCPs, hospital and the broader society. An open mind for digitalization, and good internal adoption of digital health monitoring, specifically, will therefore have an accelerating effect towards patients as well.

Lastly, in order to achieve a successful patient adoption of the digital health monitoring solution, patients need to be well educated and guided through the digital health monitoring solution when they start using it. Patient adoption is critical to maximize the potential that digital health monitoring solution can bring for all involved stakeholders.

Table 2 Illustrative examples of collaborations across therapeutic areas in Japan

Country	Collaboration	Description	Information/Outcomes
Japan	Docomo and Omron Healthcare[52]	Japanese telecom NTT Docomo teamed up with medical equipment manufacturer Omron Healthcare to launch a new wireless and mobile healthcare venture (Docomo Healthcare)	• By combining Docomo's i-Bodymo health and wellness platform with Omron's WellnessLINK, the company aims to advance healthcare communication through seamless integration of health-related data • Wireless links to various Omron devices, including blood-pressure cuffs, sleep monitors and body composition scales allow the uploading of personal data to the cloud via smartphones
	Japan Post Group, IBM and Apple[53]	Collaboration to deliver iPads and custom apps to connect the elderly in Japan to services, family and community	• Connect millions of seniors to services, healthcare, community and their families • The initiative includes custom-built apps specifically for the elderly providing reminders and alerts about medications, exercise and diet, along with direct access to community activities and supporting services such as grocery shopping and job matching

6. Digital health monitoring in Belgium

The benefits of digital health monitoring solutions have been elaborated from an international perspective. The following chapters will emphasize digital health monitoring in Belgium, more specifically digital remote patient follow-up in oncology patients, and how this fits within the broader Belgian healthcare system.

Current Belgian policy and health authority view

The Belgian Federal government agreed upon several points to improve the Belgian healthcare system during the current legislature. Generally, four major goals are considered regarding the healthcare system:

Accessibility of care
Aiming to reduce the health gap between people with the highest and lowest number of expected healthy life years by at least 25% by 2030

Quality of care
Aiming to reduce the number of avoidable deaths by 15% by 2030

Improved HCPs' experience and working conditions
Delivering qualitative and coordinated care with emphasis on prevention rather than curative care

Reduction of overconsumption:
Aiming to improve quality and efficiency in care to obtain accountability

These goals are clearly linked to the Quadruple aim model, targeting better patient experience and outcomes (including population health), and improving healthcare team wellbeing while reducing costs[57].

In order to obtain these four goals, several enablers are highlighted in the coalition agreement[58]:

- **Integrated care delivery:** the role of primary care will be strengthened towards a well-structured, strong and performing primary health care system playing the role of guardian and coach

- **Digitalization:** the e-Health plan 2019-2021 will be continued, with its seven clusters focusing on the importance of digitalization in healthcare for HCPs, care institutions, and sick funds, while positioning the patient as co-pilot in this process[59]

- **Prevention:** the importance of prevention is highlighted to obtain better population health

- **Hospital funding:** the reform of the hospital landscape and financing model will continue, including adjustments in financing of day hospitalization, while stimulating alternatives to traditional hospitalization. More bundled payments to emphasize the importance of quality care and improve transparency will be utilized.

Digital health monitoring allows for more effective care delivery, influencing every step of the patient journey (from prevention and awareness to survival) and facilitating integrated care delivery. Therefore, digital health monitoring can facilitate the achievement of previously stated goals: accessibility, quality of care, HCPs experience, and reduce overconsumption.
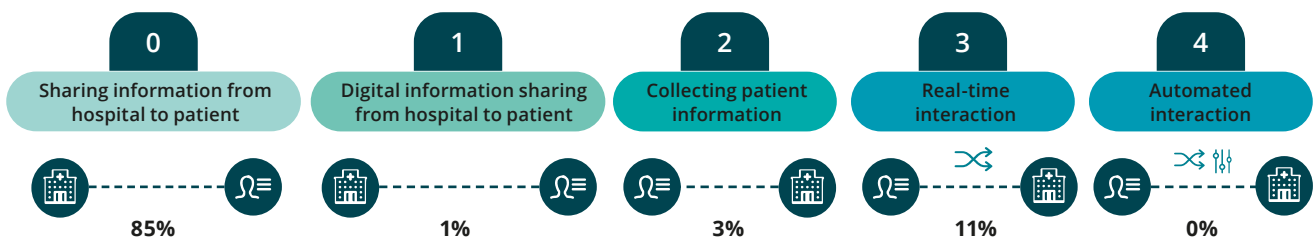
Digital savviness of Belgian hospitals in remote patient follow-up

Digital remote patient follow-up in terms of cancer care, and more specifically digital AE management, is gaining interest within the Belgian hospital landscape. However, based on a sample of 98 Belgian hospitals investigating the implementation and application of digital patient follow-up in oncology, the conclusion is that there is still much untapped potential in this domain. Only 15% of the scanned hospitals are currently applying digital follow-up of AE management for their cancer patients.

Different maturity stages regarding digital AE management can be defined for cancer care. Figure 3 gives an overview of these stages, from non-digital information sharing, to fully automated digital interactions through predictive algorithms.

Figure 3: Stages of remote adverse event management and distribution in 98 Belgian hospitals based on a high-level sample

0	1	2	3	4
Sharing information from hospital to patient	Digital information sharing from hospital to patient	Collecting patient information	Real-time interaction	Automated interaction
85%	1%	3%	11%	0%

- **Stage 0:** Hospitals sharing information with patients in a non-digital manner (e.g. hospital-specific brochure)

- **Stage 1:** Hospitals pushing information towards the patient in a digital manner (e.g. information brochures, tips to deal with AEs)

- **Stage 2:** Patients registering information (PREMs and PROMs) via digital applications by means of an electronic survey. Physicians use reports during a consultation based on the patient input

- **Stage 3:** Health care practitioners actively following-up on PREMs and PROMs and contacting patients and physicians if needed. Severe outcomes result in alerts or pop-ups to patient and hospital

- **Stage 4:** Integration with wearables and automatic receipt of feedback and tips based on reported outcomes. Predicting outcomes and suggested pro-active prevention measures

The majority of the hospitals included in the sample above (85%) still use non-digital materials such as brochures inform and to communicate with patients on care. One third of these hospitals use customized brochures or diaries specifically designed for cancer patients, while two thirds still use widely available standard brochures on AEs (Figure 4).

As stated, only 15% of the hospitals included in the sample engage with cancer patients in a digital way regarding AE management. Most of these hospitals are situated in stage 3 where there is real-time interaction between patient and HCP enabled by digital platforms and tools.

None of the Belgian hospitals included in the sample have reached stage 4 where all digital interaction is automated and predictive and preventive algorithms are used to improve the healthcare towards cancer patients.

Key success factors

Based on more than 20 interviews with various stakeholders from 10 leading Belgian hospitals, we identified four factors that are critical to the success of digitalizing patient follow-up for cancer care:

- **Full integration** of the proposed digital solution with the existing EHR of hospitals

- Digital solution should be **tailored** to the specifics of the hospital needs and existing care pathway

- **Easy-to-use solution** with simple interface for patients, and insightful dashboards for HCPs

- **Scalability** of the digital solution to other disease areas across the hospital (e.g. heart failure, other chronic diseases)

Enablers for successful implementation of digital remote monitoring

In order to overcome experienced hurdles for HCPs and hospitals, critical factors were identified through these interviews to enable the successful implementation of digital remote monitoring:

Change management and resources – Convincing people across the organization regarding the need for change (culture) and the added value of remote patient follow-up is key. Creating a strong value- and business case, is important for convincing stakeholders and for the allocation of both sufficient financial and non-financial resources by project sponsors

Structured approach – A structured approach to manage digital projects for the involvement of different stakeholders, and the ability to make a bridge between the needs of patients, HCPs and IT functionalities

Digital and IT capabilities – Advanced digital and IT capabilities are needed, whether these are inhouse or by consulting external partners. Skills to develop and maintain digital solutions are required. Thus, choosing and collaborating with the right external partners is critical for success

Internal and external adoption – For both patients and HCPs, adoption of digital solutions is extremely important. Implementing user-friendly, interactive and "sticky" tools for patients, and ensuring convenient follow-up without increasing the workload for HCPs, are essential

Regulatory framework – Hospitals experience difficulties with understanding the full regulatory framework. Since the functionalities of the digital solution and its intended use define compliance and regulatory requirements, understanding the applicable regulations and the impact on the hospital is critical

7. MSD as a true partner in cancer care

Globally, MSD has developed the KeyCare® Patient Support Program dedicated to providing Keytruda® patients and their caregivers with information and digital tools that are important for the monitoring and success of their treatment. Consisting of a patient website and a mobile diary application, KeyCare supports the patient with treatment information, health and lifestyle tips, stress management techniques and a digital diary encouraging the regular exchange of information with their healthcare team. It is currently available in multiple markets across Asia Pacific, United Kingdom, Europe, Canada, and Africa. Beyond KeyCare, MSD is also piloting and studying the use of advanced predictive remote monitoring technologies, which will enable more proactive and personalized care for cancer patients.

In Belgium, MSD has been playing an active role in several projects over the past years to enhance cancer patients' outcomes through digital health monitoring, improved care pathways, and AE management. As some of the projects have experienced mutual hurdles and had the potential to be scaled and implemented across multiple hospitals, MSD is evaluating and optimizing its offerings in this area for patients, HCPs, and hospitals.

A playbook to support hospitals in digitalizing remote patient follow-up

MSD and Deloitte developed a playbook with the purpose of supporting hospitals in digitalizing remote patient follow-up, and kick-starting their digital implementation by leveraging the specific tools, methodologies and lessons-learned by early adopters.
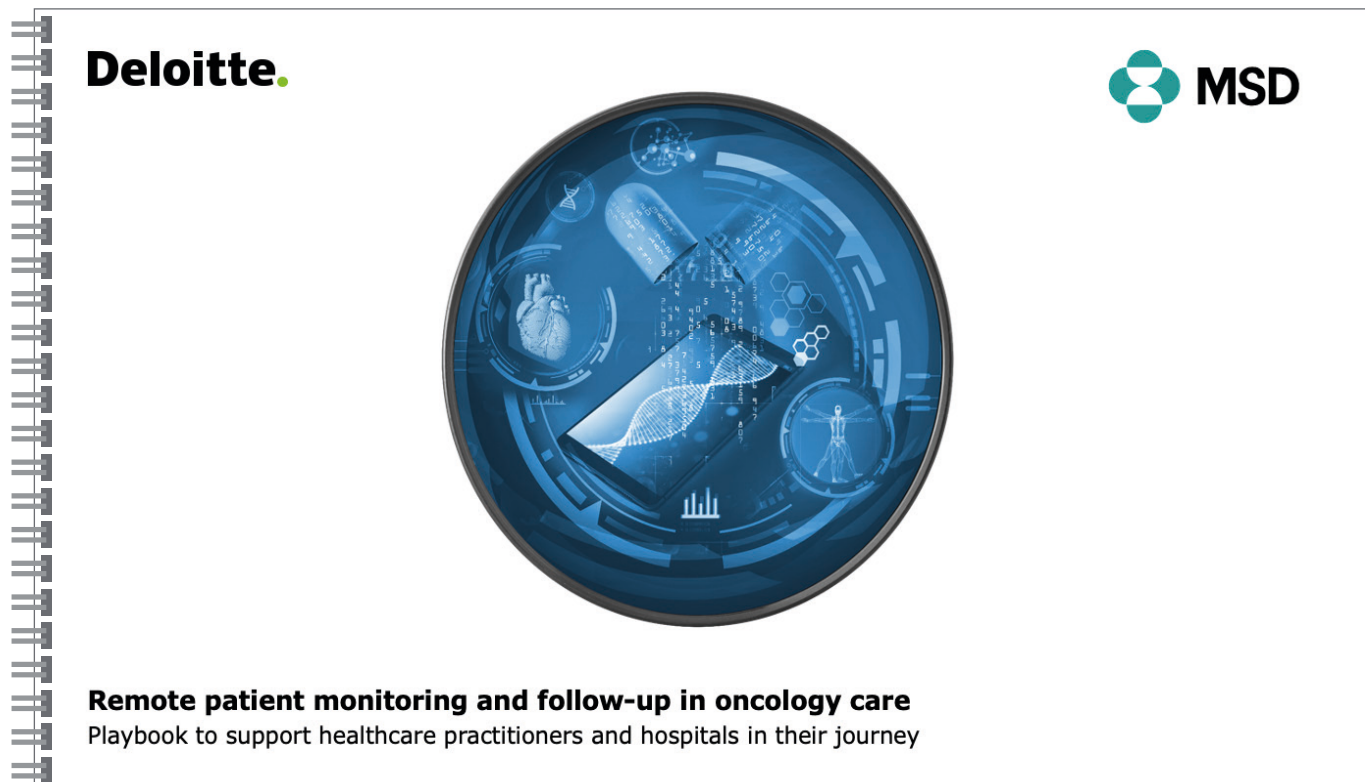
By developing this playbook, MSD and Deloitte want to support hospitals in overcoming the known hurdles linked to digitalizing remote patient follow-up, refining their cancer care delivery and by doing so, improve the lives of cancer patients. MSD is a partner in care by going beyond-the-pill to support patients, HCPs, and hospitals to bring the Belgian healthcare system one step closer to being a data-driven and value-based healthcare system. By empowering these stakeholders and adding value to the Belgian healthcare ecosystem, MSD strives to fulfil its ultimate mission in delivering breakthrough innovations that save and improve lives[60].

The playbook is designed to provide flexible guiding frameworks with relevant content that can be tailored to the specific needs of each hospital, and is applicable for both inexperienced and more advanced hospitals regarding digital remote patient follow-up.

The playbook contains the following elements;

- Describing the concrete value of digital patient follow-up for patients, HCPs, hospitals and society

- Providing methodologies that can be leveraged to tackle the general identified hurdles in digitalizing remote patient follow-up

- Suggesting specific tools for digital AE management, taking into account patients and HCPs' needs, by leveraging existing content and lessons learned (e.g., frequently used questionnaires and standard sets of outcomes)

- Providing concrete Belgian case studies showcasing the different steps these hospitals went through to digitalize remote patient follow-up and elaborating on the value created for patients, HCPs, and the hospital itself

Remote patient monitoring and follow-up in oncology care
Playbook to support healthcare practitioners and hospitals in their journey

8. Conclusion

The **future of health** will be driven by **digital transformation** enabled by radically interoperable data[61]. Digital health monitoring feeds **real-world data and real-world evidence,** leading to valuable insights for HCPs, hospitals, governments, and life science companies, while influencing positively the **cancer patients' journey** on a clinical, financial, and operational level. Therefore, it is meaningful to invest time and money to embrace and facilitate digital health monitoring solutions and projects.

Scientific evidence shows the **positive effects** of digital remote patient monitoring on **patient outcomes**, such as improved survival, detecting (recurrent) symptoms earlier, and reduced hospital (re) admissions and emergency visits[1,2]. Digital remote patient follow-up, including **monitoring of both clinical** and PROMs, provides an example of how hospitals can implement **value-based solutions** into their daily practice, derive clinically relevant insights, and generate real-world evidence and thereby **improve patient care**.

Governments are increasingly adapting and facilitating digital transformation in healthcare and therefore face new **challenges** including data security, data privacy, and digital ethics. In order to obtain increasingly value-based and value-driven healthcare systems, governments need to play an **active role** in creating a guiding framework for the healthcare sector and digital developers to overcome these challenges and support change in the ecosystem, bringing value to both patients and the broader society.

To support the ongoing digital transformation of the **Belgian healthcare ecosystem**, MSD and Deloitte have developed a playbook to help hospitals in digitalizing remote patient follow-up. This **playbook** will allow hospitals to kick-start and/or sustain their digital implementation by leveraging **specific tools**, **methodologies** and **lessons learned**.

We strongly believe that creating a **supportive framework** for hospitals in their journey towards digital health monitoring will make a positive impact on patients, HCPs, hospitals, and the Belgian society as a whole.

> We strongly believe that creating a supportive framework for hospitals in their journey towards digital health monitoring will make a positive impact on patients, HCPs, hospitals, and the Belgian society as a whole

9. Appendix

1. Steinhubl, R. (2016, February 10). The emerging field of mobile health. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4748838/

2. Grand Valley Research. (2019, July). Digital Patient Monitoring Devices MarketSize, Industry Report, 2026. https://www.grandviewresearch.com/industryanalysis/digital-patient-monitoring-devices-market

3. Kawecki, A. (2019). *2020 global health care outlook, Laying a foundation for the future*. Deloitte. *https://www2.deloitte.com/content/dam/Deloitte/za/Documents/life-sciences-health-care/za-2020-global-health-care-outlook.pdf*

4. Stewart, C. (2018, November 02). *Digital health market size by technology U.S. 2014-2024 forecast*. Statista. *https://www.statista.com/statistics/938594/digital-health-market-size-forecast-united-states-by-technology/*

5. Steinhubl, R. (2016, February 10). *The emerging field of mobile health. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4748838/*

6. Cancer Center (2021). *Our mission – supporting cancer diagnosis by AI (machine and deep learning).* https://cancercenter.ai/

7. Oren, O. (2020, September 1). *Artificial intelligence in medical imaging: switching from radiographic pathological data to clinically meaningful endpoints. https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30160-6/fulltext*

8. World Health Organization. (2017, February 3). *Early cancer diagnosis saves lives, cuts treatment costs. https://www.who.int/news/item/03-02-2017-early-cancer-diagnosis-saves-lives-cuts-treatment-costs*

9. Pavic, M., Klaas, V., Theile, G., Kraft, J., Tröster, G., Blum, D., and Guckenberger, M. (2020). *Mobile Health Technologies for Continuous Monitoring of Cancer Patients in Palliate Care Aiming to Predict Health Status Deterioration: A Feasibility Study. Journal of Palliative Medicine, 23(5). https://doi.org/10.1089/jpm.2019.0342*

10. Warrington L, Absolom K, Holch P, et al. *Online tool for monitoring adverse events in patients with cancer during treatment (eRAPID): field testing in a clinical settingBMJ Open 2019;9:e025185. doi: 10.1136/bmjopen-2018-025185. https://bmjopen.bmj.com/content/bmjopen/9/1/e025185.full.pdf*

11. Basch, Ethan, Charlot, Marjory, and Dueck, Amylou C. (2020). *Population-level evidence of survival benefits of patient-reported outcome symptom monitoring software systems in routine cancer care. Cancer Medicine (Malden, MA), 9(21), 7797-7799. https://pubmed.ncbi.nlm.nih.gov/33029950/*

12. Faria LF, Reis ST, Leite KR, da Cruz JAS, Pimenta R, Viana NI, Amaral GQ, Santos GAGD, Ilias D, Fakhouri F, Xavier G, Srougi M, Passerotti CC. *Digital application developed to evaluate functional results following robot-assisted radical prostatectomy: App for prostate cancer. Comput Methods Programs Biomed. 2020 Dec;197:105683. doi: 10.1016/j.cmpb.2020.105683. Epub 2020 Aug 3. PMID:32777664. https://pubmed.ncbi.nlm.nih.gov/32777664/*

13. O'Reilly, K. (2020, February). *Why physicians' use of digital health is on the rise. https://www.ama-assn.org/practice-management/digital/why-physicians-use-digital-health-rise*

14. Mills, R. (2020, February). *Digital health tools gain momentum among physicians. https://www.ama-assn.org/press-center/press-releases/digital-health-tools-gain-momentum-among-physicians*

15. Náfrádi, L., Nakamoto, K., and Schulz, P.J. (2017). *Is patient empowerment the key to promote adherence? A systematic review of the relationship between self-efficacy, health locus of control and medication adherence. PLoS One, 12(10). https://doi.org/10.1371/journal.pone.0186458*

16. Gordon, R.L., Bang, A., Lewis, S., and Randin, J. (2019). *Shaping the physician of the future.* Deloitte. *https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/physician-of-the-future.html*

17. CISION PR Newswire. (2017, September 20). *Strained Healthcare System Hurts Doctors and Affects Patient Care. https://www.prnewswire.com/news-releases/strained-healthcare-system-hurts-doctors-and-affects-patient-care-300522622.html*

18. Digital Health (2021). *Careology launches remote monitoring platform for cancer patients. https://www.digitalhealth.net/2020/08/careology-launches-remote-monitoring-platform-for-cancer-patients/#:~:text=A%20new%20remote%20monitoring%20platform,day%2C%20wherever%20they%20may%20be.*

19. MDVIP. (2017, September 20). *Strained Healthcare System Hurts Doctors and Affects Patient Care. https://directprimarycare.com/2017/10/16/mdvip-strained-healthcare-system-hurts-doctors-and-affects-patient-care/*

20. Basch. E., Stover, A.M., Schrag, D., Chung, A., Jansen, J., Henson, S., Carr, P., Ginos, B., Deal, A., Spears, P.A., Jonsson, M., Bennett, A.V., Mody, G., Thanarajasingam, G., Rogak, L.J., Reeve, B.B., Snyder, C., Kottschade, L.A., Charlot, M., Weiss, A., Bruner, D., and Dueck, A.C. (2020). *Clinical Utility and User Perception of a Digital System for Electronic Patient-Reported Symptom Monitoring During Routine Cancer Care: Findings From the PRO-TECT Trial. JCO Clinical Cancer Informatics 4 947-957. https://doi.org/10.1200/CCI.20.00081*

21. Healthcare Weekly Staff. (2018, May 18). *Reduce Administrative Burden With Healthcare Technology. Healthcare Weekly. https://healthcareweekly.com/reduce-administrative-burden-with-healthcare-technology/*

22. Cohen, J. K., (2018, October 03). *KLAS: Remote patient monitoring reduces admissions, readmissions, ER visits. Becker's Hospital Review. https://www.beckershospitalreview.com/telehealth/klas-remote-patient-monitoring-reduces-admissions-readmissions-er-visits.html*

23. Siwicki, B. (2018, October 12). *Remote Patient Monitoring via Smartphone Cuts one-week Post-partum Visits by 57%.* HealthcareITNews. *https://www.healthcareitnews.com/news/remote-patient-monitoring-smartphone-cuts-one-week-post-partum-visits-57#:~:text=Clinical-,Remote%20patient%20monitoring%20via%20smartphone%20cuts%20one%2Dweek%20post%2Dpartum,to%20a%20remote%20monitoring%20portal.*

24. Transparency Market Research. (2020, October 07). *Increasing Prevalence of Chronic diseases Set to Propel Growth in Remote Patient Monitoring Devices Market.* PR Newswire. *https://www.prnewswire.com/news-releases/increasing-prevalence-of-chronic-diseases-set-to-propel-growth-in-remote-patient-monitoring-devices-market-tmr-301147579.html*

25. *Improve cancer patient survival and cut costs? There's a remote symptom monitoring platform for that.* (2019, March 15). The Advisory Board. *https://www.advisory.com/blog/2019/07/symptom-monitoring*

26. *Mercy Virtual Quick Facts.* (n.d.). Mercy Virtual. *https://m.care/customers/%20mercy-virtual/*

27. Backhouse, E. (2018, December 06). *How Remote Patient Monitoring Can Reduce Healthcare Costs. Skedulo. https://www.skedulo.com/blog/benefit-rpm-reduced-healthcare-costs/#:~:text=But%20one%20of%20the%20major,1%20reducer%20of%20overall%20costs*

28. Denis, F., Viger, L., Charron, A., Voog, E., Dupuis, O., Pointreau, Y., and Letellier, C. (2014). *Detection of lung cancer relapse using self-reported symptoms transmitted via an Internet Web-application: Pilot study of the sentinel follow-up.* Supportive Care in Cancer, 22(6), 1467-1473. *doi:10.1007/s00520-013-2111-1*

29. Jönsson, B., Hofmarcher, T., Lindgren, P., and Wilking, N. (2016). The cost and burden of cancer in the European Union 1995-2014. *Eur J Cancer. 66 162-70.*

https://doi.org/10.1016/j.ejca.2016.06.022

30. *Transforming Breast Cancer Together. https://www.europadonna.org/wp-content/uploads/TransformingBreastCancerTogether_White_Paper_FIN.pdf*

31. ChartSwap. (n.d). *What is the HITECH Act? https://www.chartswap.com/what-is-the-hitech-act/*

32. Win, Z. (31 January 2018). *Is The HITECH Act Working? A Summary of its Effect on Healthcare. https://www.campussafetymagazine.com/hospital/hitech-act-summary-healthcare-compliance/*

33. Stern, A.D., Matthies, H., Hagen, J., Brönneke, J.B., and Debatin, J.F. (2020, Dec 2). *Want to See the Future of Digital Health Tools? Look to Germany.* Harvard Business Review. *https://hbr.org/2020/12/want-to-see-the-future-of-digital-health-tools-look-to-germany*

34. RIZIV. (2021, January 12). *Zorg op afstand: COVID-19-patiënten thuis opvolgen via telemonitoring. https://www.inami.fgov.be/nl/covid19/Paginas/zorg-afstand-covid1-patienten-thuis-telemonitoring.aspx#Wat_houdt_dit_pilootproject_telemonitoring_voor_covid-19-pati%C3%ABnten_in?*

35. RIZIV. (2020, December 22). *Telegeneeskunde en mHealth-toepassingen. https://www.inami.fgov.be/nl/themas/kost-terugbetaling/door-ziekenfonds/Paginas/telegeneeskunde-mhealth-toepassingen.aspx#Teleconsultaties_in_stroomversnelling_door_Covid-19*

36. Interreg North-West Europe eMen. (2020, October 15). *Reimbursement for digital health solutions. https://www.nweurope.eu/projects/project-search/e-mental-health-innovation-and-transnational-implementation-platform-north-west-europe-emen/news-blogs/reimbursement-for-digital-health-solutions/*

37. Agoria vzw/asbl and beMedTech vzw/asbl. (2020). *mHealthBELGIUM is the Belgian platform for mobile applications that are CE-marked as a medical device. https://mhealthbelgium.be/*

38. MHealthBELGIUM. (2021, January, 20). *Medische apps vanaf nu terugbetaalbaar door lancering niveau 3. https://mhealthbelgium.be/nl/nieuws/medische-apps-vanaf-nu-terugbetaalbaar*

39. Onafhankelijk Ziekenfonds. (2020). *Medische apps. https://www.oz.be/gezondheid/oz-voordelenpakket/gezondheid/medische-apps*

40. Partena Ziekenfonds. (2021). *Medische apps. https://www.partena-ziekenfonds.be/nl/ziekenfonds-en-voordelen/voordelen-en-terugbetalingen/medische-apps*

41. Awell health. (2021). *The faster path to great care. https://awellhealth.com/*

42. Remedus. (2020). *Build the next-generation oncology department. https://www.remecare.eu/oncology*

43. Varian Medical Systems, Inc. (2021). *Noona. https://www.varian.com/products/software/care-management/noona*

44. Noona Healthcare. (2021). *Patient-reported outcomes, the missing link in oncology. http://www.noona.com/*

45. Kaiku Health (2021). *Kaiku Health was founded to improve the quality of life for cancer patients. https://kaikuhealth.com/*

46. Cureety. (2021). *Supporting patients, doctors and researchers in their fight against cancer.* https://www.cureety.com/

47. Digital Health CRC. (n.d.). *Introducing the Digital Health CRC. https://www.digitalhealthcrc.com/introducing-the-digital-health-crc/*

48. AndHealth. (2019). *ANDHealth Australia's National Digital Health Initiative. https://andhealth.com.au*

49. Australian Government Productivity Commission. (2005, Aug 31). *Impacts of Advances in Medical Technology in Australia: Productivity Commission Research Report. https://www.pc.gov.au/inquiries/completed/medical-technology/report/medicaltechnology.pdf*

50. My Health Record. (n.d). *My Health Record. https://www.myhealthrecord.gov.au*

51. Lagasse, J. (2019, March 19). *Getting paid for remote and virtual care services: CPT codes to know and understand.* Healthcare Finance. *https://www.healthcarefinancenews.com/news/getting-paid-remote-and-virtual-care-services-cpt-codes-know-and-understand*

52. Versel, N. (2012, July 5). *Docomo, Omron Healthcare launch connected health venture in Japan. https://www.mobihealthnews.com/17827/docomo-omron-healthcare-launch-connected-health-venture-in-japan*

53. James, R. (2020, December 04). *Japan Post Group, IBM and Apple Deliver iPads and Custom Apps to Connect Elderly in Japan to Services, Family and Community.* Retrieved 2020, from *https://www.apple.com/newsroom/2015/04/30Japan-Post-Group-IBM-and-Apple-Deliver-iPads-and-Custom-Apps-to-Connect-Elderly-in-Japan-to-Services-Family-and-Community/*

54. De Broglie, C. (2016). *We need to talk about digital ethics. https://www.oecd.org/digital/we-need-to-talk-about-digital-ethics.htm*

55. Martinez-Perez, B., Torre-Diez, I., Lopez-Coronado, M. (2014, October). *Privacy and Security in Mobile Health Apps: A Review and Recommendations. https://www.researchgate.net/publication/269289798_Privacy_and_Security_in_Mobile_Health_Apps_A_Review_and_Recommendations*

56. WHO. (2019). *WHO guideline recommendations on digital interventions for health system strengthening. https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf?ua=1*

57. Sikka R, Morath JM, Leape L. *The Quadruple Aim: care, health, cost and meaning in work.* BMJ Qual Saf. 2015 Oct;24(10):608-10. doi: 10.1136/bmjqs-2015-004160. Epub 2015 Jun 2. PMID: 26038586. *https://pubmed.ncbi.nlm.nih.gov/26038586/*

58. Vlaams Artsensyndicaat vzw. (2020, October 1). *Regeerakkoord De Croo: een overzicht. https://www.vlaamsartsensyndicaat.be/nieuwsbericht/regeerakkoord-de-croo-een-overzicht*

59. eGezondheid. (2021). *Roadmap 3.0. https://www.ehealth.fgov.be/nl/egezondheid/roadmap-30*

60. MSD. (2021). *Oncology, We're working to invent a world where cancer isn't just treated, but cured. https://www.msd.com/research/oncology/*

61. Garia, N. (2019). *Forces of change.* Deloitte. *https://www2.deloitte.com/za/en/pages/life-sciences-and-healthcare/articles/the-future-of-health.html*

Contacts

Deloitte contacts

Anne Massij

Partner Monitor Deloitte
Health Care Leader Belgium
amassij@deloitte.com

Tessa Van Montfort

Senior Manager Monitor Deloitte
LSHC Strategy
tvanmontfort@deloitte.com

MSD contacts

Olivier Fouret

Executive Business Unit Director
Oncology - Belgium & Luxembourg
olivier.fouret@merck.com

Lauren Van Ghyseghem

Commercial Operations Lead
Oncology - Belgium & Luxembourg
lauren.van.ghyseghem@merck.com

Deloitte.