My home

is my hospital

Towards more technology-assisted remote hospital care

Introduction

Preface

People in Europe live longer and European societies are getting older. Ageing populations have to deal with a rise in chronic diseases. As a result, existing hospital capacity is often insufficient to meet the rising demand and healthcare costs are under continuous upward pressure. New medical techniques are an interesting part of the healthcare puzzle: they can improve quality, but often entail high costs. The billion dollar question is: how can they slow down cost growth or increase healthcare capacity and quality at the same cost?

As the largest cost category within healthcare, hospitals are an expensive place to provide care. Regulators therefore encourage the use of technology that enables more care to be provided more outside the hospital.

The corona crisis has clearly spurred things on for technology-assisted remote hospital care, but to what extent? Did the crisis create a 'new way of working' or will things be quickly back to (the old) normal after the pandemic? In this study, we try to shed light on 1. the strengths, weaknesses and potential of remote hospital care and 2. the ways different stakeholders can accelerate its implementation in Europe.

In chapter one, we examine the reasons why hospitals would provide remote care. What are the pros and cons? Chapter two describes the current state and potential of remote hospital care and the factors delaying its adoption. In the final chapter, we examine what different stakeholders can do to take remote hospital care to the next level.

Contents

Executive summary

Technology enables hospital care in or near the patient's home
New medical technologies enable hospitals to deliver care in or near the patient's home. Hospital patients can use apps and connected devices to manage their health and communicate with medical professionals, while doctors and nurses can monitor patients remotely. There are major potential benefits and – as it is a relatively new way of providing care – there are also some potential downsides and risks.

**20% of hospital care could be offered remotely in 2030**
There is increasing evidence that remote hospital care can improve the quality and cost-effectiveness of care. Based on in depth interviews with healthcare experts, we estimate that, given the current state of technology, almost half of the chronic care provision – on average 20% of total hospital revenue – could be offered largely outside the hospital in 2030.

Potential benefits, downsides and risks of remote hospital care

Potential benefits:
- More effective prevention
- More convenience for patients and doctors
- Reduced care demand
- Reduced costs of care delivery
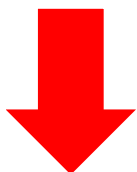
Potential downsides and risks:
- A less controlled environment
- Unpredictable patient behaviour
- Less certain cost outcomes
- Less certain medical outcomes

€3 billion to gain for the Netherlands, €50 billion within the EU
This could reduce total hospital care costs by 10% or almost €3 billion per year for the Netherlands in 2030. Extrapolating these percentages, the cost savings could amount up to €50 billion within the entire EU and up to €10 billion for the UK.

1 to 1.5 million hospital visits fewer per year
Research indicates that remote patient monitoring reduces outpatient hospital visits for chronically ill patients by at least 25% on average. If all chronically ill patients with less complex care needs could be monitored remotely, this would mean an annual reduction of 1 to 1.5 million hospital visits for the Netherlands alone.

But volumes remain small despite a covid-surge
The pandemic has boosted the adoption of remote hospital care across Europe. Nevertheless, the increase is mainly limited to remote consultation. Despite their potential to relieve the pressure on congested hospitals, the deployment of more transformative applications, such as remote patient monitoring, is still limited.

Three hurdles slow down structural adoption
There are three major hurdles that slow down structural adoption of remote hospital care: 1. fragmentation in organisation and interests, patient records and regulation; 2. a lack of financial incentives due to fee-for-service schemes in healthcare; 3. implementation hurdles, such as financial and technical challenges, and difficulties in medical approval.

Regulators, healthcare purchasers, hospitals and medtech providers all play a critical role in the growth of remote hospital care:

Regulators: incentives, data exchange and innovation support
1. Encourage payments based on quality and cost effectiveness
2. Ensure a smooth exchange of patient data
3. Support innovators to develop medical technology faster

Healthcare purchasers: payment models and investments
1. Arrange long-term agreements with the right financial incentives
2. Arrange cross-sectoral bundled healthcare purchasing
3. Participate in scalable projects

Hospitals: payment innovation, collaboration and 'remote first'
1. Agree innovative payment models and prices that cover actual costs
2. Collaborate with other healthcare providers and medtech suppliers
3. Explore, evaluate and scale up to 'remote first'

Medtech suppliers: strategic collaboration and service are key
1. Collaborate strategically
2. Unburden hospitals and integrate technologies
3. Have a sharp eye for stakeholders' interests

The how and why

1.1 Three types of remote hospital care

We distinguish three main types of remote hospital care: 'remote consultation', 'remote diagnostics' and 'remote treatment and monitoring'.

1. **Remote consultation**
   a) Remote consultation for patients: the patient consults a general practitioner or medical specialist by telephone, e-mail or video call.
   b) Remote consultation for doctors: the general practitioner calls in a medical specialist for specific expertise.

2. **Remote diagnostics**
   Diagnostics via portable devices, home care, patient apps and wearables:
   a) Remote diagnostics and ('point-of-care') health testing using portable medical devices by the patient themselves or by a nurse.
   b) Automated recurring health checks by wearable devices that send outcomes to personal health records saved on the patient's smartphone, and in electronic health records at the hospital or in the cloud.
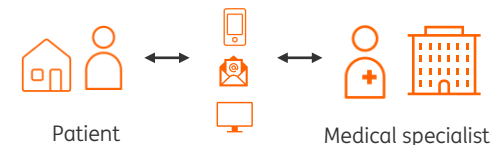
3. **Remote treatment and monitoring**
   a) The patient or a nurse provides medical treatment at home or in a medical centre near home. A nurse or doctor monitors the resulting health data at the hospital and, if needed, coaches the patient in coping with their illness.
   b) Automated recurring health checks by wearable devices that are connected to hospital IT systems create a continuous flow of measurement outcomes. The monitoring of these health data can be done partly by computers that alert nurses and, if necessary, medical specialists, when the measurement data fall outside a predetermined safety range of values.

   Another possibility is the monitoring of patient's vital signs data generated by intensive care units in other hospitals, but in this study we focus on remote hospital care in or near the patient's home.

Three types of remote hospital care

1) Remote consultation

a) Remote consultation for patients:

Patient — Medical specialist

b) Remote consultation for doctors:

General practitioner — Medical specialist
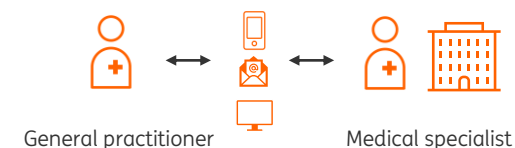
2) Remote diagnostics
Via portable devices, home care and/or patient apps and wearables:

Patient — Health data
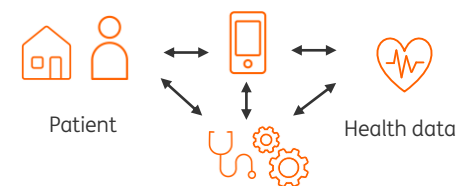
3) Remote treatment and monitoring

a) Remote treatment

Patient — Health data

b) Remote monitoring

Medical specialist — Patient
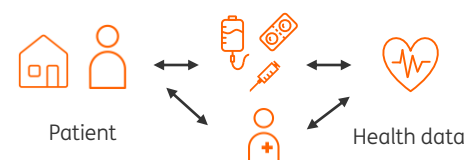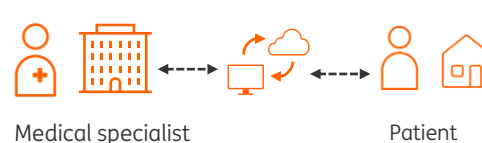
1.2 Technology enables remote hospital care

There are three main types of medical technology. There are two subtypes of connected technology that enable remote hospital care: 'portable devices', and 'digital medicine' or 'ehealth'.

Medical technology comes in three flavours

Medical or healthcare technologies can be split up in three main categories:

- **In vitro diagnostics** consists of non-invasive medical laboratory equipment used for tests on biological samples (for example blood, urine or tissues) to determine the status of someone's health.

- **Medical devices** consist of clinical devices and portable devices. The first are used in hospitals and other clinics for prevention, diagnostics, monitoring, treatment or care. Medical imaging devices such as MRI, CT and X-ray machines account for the largest share of costs in this field. Other examples from a wide range of other devices are surgical robots and life support equipment such as heart-lung machines, incubators and respiratory equipment. portable devices are used by patients and medical staff outside a clinical setting.

- **Healthcare information and communication technology (ICT)** consists of digital health and care or 'eHealth' that use ICT to improve prevention, diagnostics, treatment, monitoring and management of health and lifestyle (1) and other software and ICT applications used by healthcare providers, such as administrative and logistic systems (2).

Connected portable devices and eHealth enable remote hospital care

Remote hospital care is made possible through a combination of wearable devices and smart apps that connect to medical professionals through Internet of Things (IoT) technologies. This enables continuous monitoring and analysis of various medical devices and systems, regardless of the patient's location.

Four types of medical technology enable remote hospital care
The different categories of medical technology and their involvement with remote hospital care
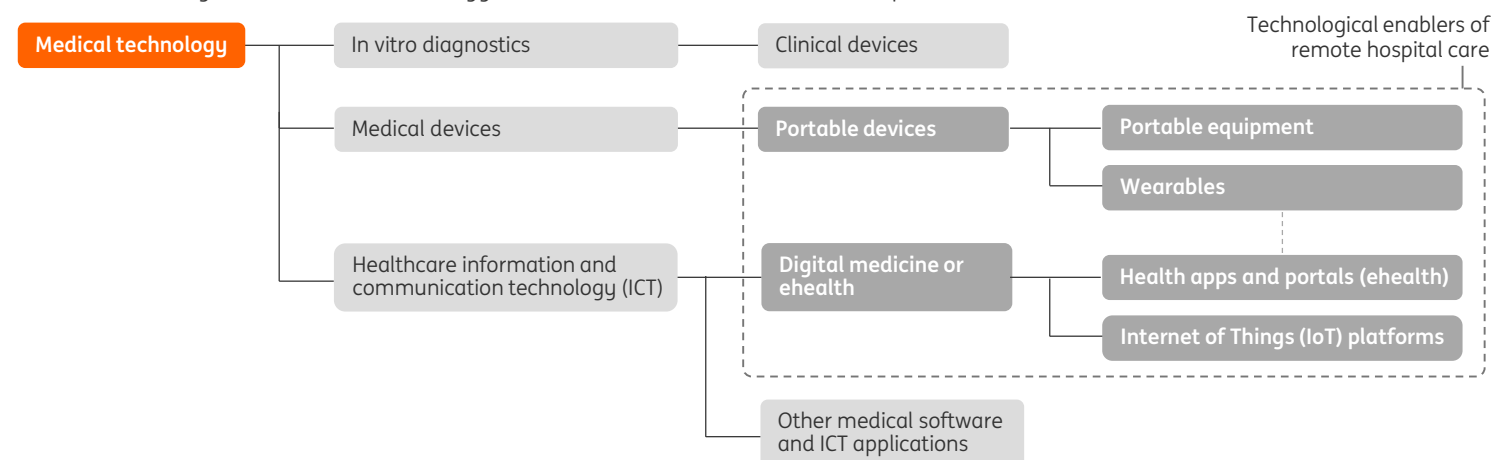
Source: ING Research, based on Medtech Europe, KPMG and NHS - Topol Review

Portable equipment to diagnose and treat
Portable medical equipment makes treatment in or near home possible. Examples of hospital care that can already be provided remotely thanks to purpose-built portable devices are: ultrasound imaging, haemodialysis, light therapy, chemotherapy and respiration.

Wearable devices measure vital signs
Wearable devices enable patients and medical professionals to automatically and continuously measure vital signs such as body temperature, heart rate, respiration rate and blood pressure, or to make an electrocardiogram (ECG). Examples are: fitness trackers, smart watches and smart rings and glasses, self-adhesive bio sensors and a wearable artificial pancreas.

Ehealth can inform, coach, diagnose, treat or facilitate safe communication
Health apps on their smartphone or tablet help people monitor activity, vital signs or medical data themselves. Connected via Internet of Things platforms they facilitate communication (video consultations), diagnostics (such as skin cancer detection), treatment (such as medical coaching), and data exchange for monitoring by medical professionals.

1.3 Large potential benefits

Potential benefits of remote hospital care are better care outcomes through more effective prevention and convenience for doctors and patients, and more cost-effective and accessible care.

1. Better care through more prevention and convenience

Remote hospital care can potentially improve the quality of care in several ways:

Better prevention:

- **Early detection** of patient deterioration by continuously instead of periodically monitoring health outcomes. This enables earlier intervention which could reduce the number of hospital visits, hospitalisations, duration of hospital stays and mortality.

- **Better adherence to therapy** is possible through ehealth-applications such as a coaching app that supports chronically ill patients in dealing with their condition on a 24/7 basis and gives them a digital consultation option for any medical questions that may arise.

- **Lower risk of infection** than in the hospital. The European Centre for Disease Control estimated that 3.8 million people acquire a healthcare-associated infection each year in acute care hospitals in the EU.

More convenience for patients and doctors:

- **For doctors: easier sharing** and co-viewing of computer files with images, results and treatment options using e-consultations.

- **For patients: a greater sense of self-reliance and safety** in dealing with a condition that is remotely monitored. A poll among Dutch ING customers shows that almost 60% prefer to receive periodic hospital care in or near their home if they have to go to the hospital regularly.

- **For patients: more comfort** receiving care in or near home. The number of periodical trips to the hospital could be reduced which saves time and money for patients and doctors. Based on recent evaluations (see page 10 and 18) it seems safe to say that patient monitoring programs could reduce outpatient hospital visits of chronically ill patients (with less complex care needs) by at least 25% on average. Extrapolating this figure to all patients with chronical conditions, this would mean a yearly reduction of 1 to 1.5 million hospital visits for the Netherlands alone.

Almost 60% prefers to receive periodic hospital care in or near their home
Share of respondents to the question: 'If I have to go to hospital regularly, I would rather receive this care...'

At home: 27%
Close to home: 31%
In the hospital: 42%
58%
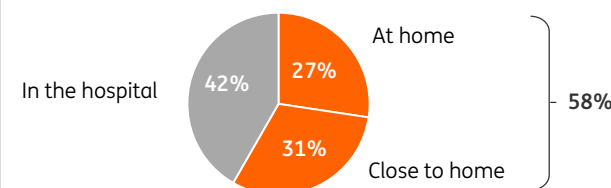
Source: ING 'Vraag van Vandaag', 1 December, 2020, 14.000 NL respondents

2. More cost-effective and accessible care

Furthermore, demand for traditional hospital services could diminish, while cost-effectiveness and accessibility could improve by:

Reducing care demand

- **Better predicting of alarming health situations** reduces the need for expensive acute care and hospitalisation. For example, early detection of upcoming heart failure by remote monitoring reduces unexpected emergencies and thereby the need for acute care significantly.

- **More self-management** when the patient takes over part of the treatment themselves by using ehealth-applications and/or wearable devices.

Reducing the costs of care delivery

- **Reducing the human factor in care,** made possible by applying technology in a cost-effective way. When the technology input costs less than the labour costs of human input, the costs per treatment go down. Like in most other industries, technology could become a driver of efficiency rather than a driver of rising costs.

- **More care in less expensive settings;** hospitals have much higher overhead costs than for example primary care practices. Every medical action that keeps a patient out of the hospital can potentially save a lot of money.

- **Lower out-of-pocket expenses** when patients need to pay towards hospital costs and travel costs themselves.

1.4 Benefits come at a cost

Potential downsides of remote hospital care are a less controlled care environment and unpredictable patient behaviour, whereas risks of remote hospital care are the less certain costs and medical outcomes.

There are downsides and risks as well

Like any innovation, remote hospital care comes with potential downsides and risks too.

Downsides:

- **A less controlled environment** like a living space makes it harder to rule out any influencing elements compared to a clinical environment. Errors due to failing internet connections, misuse of devices or changing household circumstances are more common in such settings.

- **Unpredictable patient behaviour** makes broad acceptance and application less certain. Some people like to go to the hospital to see doctors physically. People with low levels of literacy are on average more chronically ill, while they probably also have more difficulty using the necessary apps and devices.

Risks:

- **Less certain cost outcomes** arise when remote care comes on top of traditional care. The required investments can be substantial. Furthermore, the collectively paid healthcare systems such as in Europe often contain incentives to fill declining volumes with alternative (insured) care, unless there is sufficient countervailing power from insurers.

- **Less certain medical outcomes** arise due to less scientific evidence and less experience with this kind of process innovation. Major medical innovations are usually product innovations which take years of scientific preparation. Evidence is growing, but the wide variation in techniques and applications associated with remote hospital care makes this a lengthy process.

Potential benefits, downsides and risks of remote hospital care

Potential benefits:
- Better prevention
- More convenience for patients and doctors
- Reduced care demand
- Reduced costs of care delivery

Potential downsides and risks:
- A less controlled environment
- Unpredictable patient behaviour
- Less certain medical outcomes
- Less certain cost outcomes

Potential and obstacles

2.1 Proven benefits and more technological possibilities

Evidence that remote hospital care results in better outcomes is growing, while technological possibilities are increasing.

Growing evidence for benefits of remote hospital care…
There is growing evidence that remote hospital care can contribute to the 'triple aim' of improving the patient experience of care (including quality and satisfaction) and population health, while reducing costs per capita.

…such as cost savings and better patient outcomes
A 2017 UK study concluded that technology enabling remote hospital care proved cost-effective while improving patient outcomes and experience in several projects. These included remote monitoring, self-care for people with certain long-term conditions and improved access for GPs to specialist expertise. In 2017, Dutch research showed that remote monitoring and coaching halved the number of hospital admissions, almost halved outpatient visits and improved therapy adherence in patients with chronic IBD*. A recent study finds a strong long-term decline in the overall cost of care for patients with heart failure and COPD** due to the adoption of remote patient monitoring by the Dutch Slingeland Hospital.

* Inflammatory bowel disease, the collective name for ulcerative colitis and Crohn's disease.
** Chronic obstructive pulmonary disease, the collective name for chronic bronchitis and emphysema.

Cardiovascular diseases most often remotely monitored
Heart failure is one of many cardiovascular diseases, a group of conditions for which remote hospital care is most often used. Pacemakers and implantable cardioverter defibrillators (ICD) for the remote treatment of cardiac arrhythmias are among the earliest examples and are still the most widely used portable or implantable devices. Today, these can come with wireless data transmission to healthcare providers.
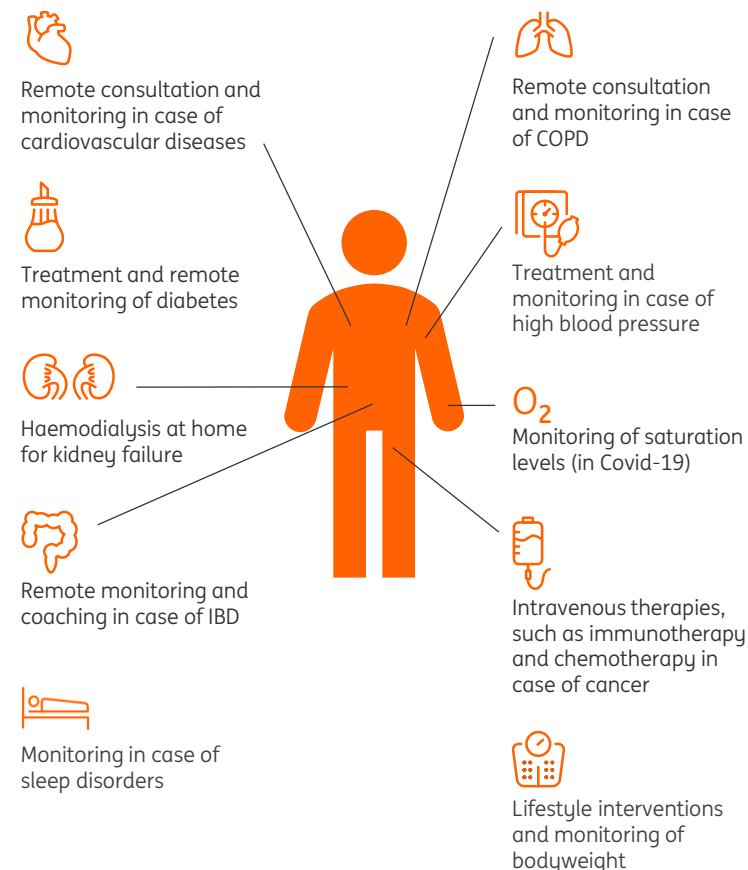
Remote hospital care most widely adopted for chronic diseases
Due to its repetitive nature and the great influence that patients themselves can exert on the care treatment, care for patients with chronic diseases is very well suited for remote hospital care. Besides cardiovascular diseases, it is most commonly used in diabetes, COPD, high blood pressure, sleep disorders and weight management.

More home therapies available through new technologies
New apps, wearable and portable devices extend the possibilities of remote hospital care to more than the most common chronic diseases. More and more care can be provided outside the hospital. Consider intravenous therapies such as immunotherapy and chemotherapy, at-home haemodialysis for kidney failure, and monitoring of saturation levels for Covid-19 and other rehabilitation care due to infections. Pre- and post-operative care can often take place partly outside the hospital by means of rehabilitation care, home care or ehealth. This means fewer nursing days are needed, allowing patients to recover in their own environment.

Examples of remote hospital care applications

Remote consultation and monitoring in case of cardiovascular diseases

Treatment and remote monitoring of diabetes

Haemodialysis at home for kidney failure

Remote monitoring and coaching in case of IBD

Monitoring in case of sleep disorders

Remote consultation and monitoring in case of COPD

Treatment and monitoring in case of high blood pressure

Monitoring of saturation levels (in Covid-19)

Intravenous therapies, such as immunotherapy and chemotherapy in case of cancer

Lifestyle interventions and monitoring of bodyweight

* Based on Dutch expenditure on hospital care in 2019.

2.2 International examples: paths to follow

Recent real-life examples show what can be achieved in practice with remote hospital care.

NHS 'At Home' roll out: home monitoring and a 'virtual ward' service
NHS England has ramped up its 'At Home' rollout scheme which will see thousands of respiratory patients benefitting from home monitoring devices – including those with cystic fibrosis and those recovering from Covid-19. The patients will be given home monitoring devices and apps which healthcare professionals can use to monitor the patient's conditions remotely.
The NHS is trialling oximeters – devices that can identify dips in the blood oxygen levels of Covid-19 patients while they recover at home rather than in hospital. These devices will be combined with appointments through telephone apps to aid recovery and identify readmission cases.
'The feedback we are getting from patients is that the remote monitoring with clinical oversight is really reassuring to them, and they are grateful to be at home while they recover, rather than in a hospital bed. The clinical team is finding it helps give them very rapid feedback on their patients and they are able to keep an eye on a number of people at a glance, which is working much better for them than the previous system which relied on phone calls.'
A 'virtual ward' service has also been rolled out in west London which allows clinicians to monitor a patient's vitals in real time, with plans for implementation in other areas of the country. If this is successful it could pave the way for a national rollout later this year.

Source: healtheuropa.eu

Home monitoring reduces costs of heart failure and prevents unnecessary covid-19 admissions
Home monitoring of heart patients works just as well as traditional outpatient visits. This is the conclusion of researchers at the Heart Lung Centre Leiden in the first randomised clinical trial with home monitoring package 'the box'. The box contains four devices to monitor the health of patients with heart failure at home: a blood pressure monitor, a scale, a heart rate monitor and a pedometer. All devices are connected to the electronic health record via the patient's smartphone. Moreover, according to Douwe Atsma, cardiologist at the LUMC and co-inventor of the application, the total healthcare costs for these patients appear to decrease without this being at the expense of the hospital.
'We want to do at least 10,000 remote consultations in three years. We can scale things up together with two hospitals in our region.'
Soon after the outbreak of Covid-19, the Covid box was developed at the LUMC. People with (suspected) corona measure their vital parameters at home every day with the box. Researchers working together within the NeLL (National eHealth Living Lab) concluded in a recent JMIR-article: 'Telemonitoring offers the opportunity to carefully monitor patients with a confirmed or suspected case of Covid-19 from home and allows for the timely identification of worsening symptoms . Additionally, it may decrease the number of hospital visits and admissions, thereby reducing the use of scarce resources, optimising healthcare capacity, and minimising the risk of viral transmission '.

Pictures of the box for heart failure patients (above) and the box for Covid-19 patients (below):
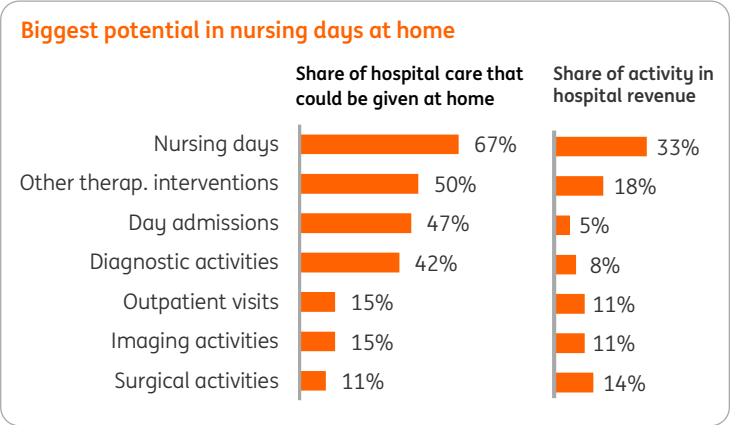

Source: ICT&Health and interview

2.3 Cost savings could amount to €50 billion EU-wide by 2030

By 2030, 20% of hospital care could be delivered remotely, potentially saving up to €50 billion per year in the EU.
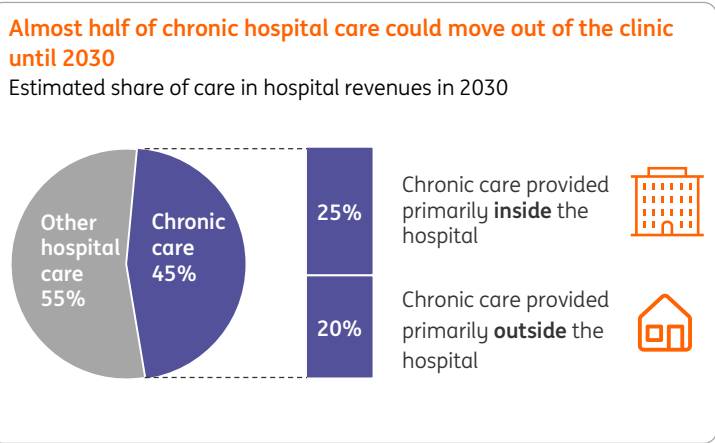
Theoretically, almost 50% of hospital care could be provided at home
In April 2017, the Economist wrote that high-speed internet, remote-monitoring technology and the crunching of vast amounts of data were about to change the way we receive hospital care. A year earlier, a Dutch consultancy estimated that due to technological advancements such as remote monitoring and data analysis roughly 46% of all hospital care activities could safely be moved from a clinical setting to the patient's home within 10 years. They argue that there is especially great care-at-home potential in terms of nursing days, specific therapeutic interventions, day admissions and diagnostic activities. However, this does not mean that it's always financially feasible to do so.

Biggest potential in nursing days at home

	Share of hospital care that could be given at home	Share of activity in hospital revenue
Nursing days	67%	33%
Other therap. interventions	50%	18%
Day admissions	47%	5%
Diagnostic activities	42%	8%
Outpatient visits	15%	11%
Imaging activities	15%	11%
Surgical activities	11%	14%

Source: No place like home, Gupta Strategists

Realistically, 20% of hospital care could be delivered remotely in 2030
The number of people with one or more chronic diseases is increasing rapidly within Europe's ageing population. On average, 40% to 50% of hospital revenue consists of chronic care. Based on in depth interviews with healthcare experts, we estimate that with the current state of technology almost half of this care (20% of the total) could be offered outside the hospital in ten years. This mainly concerns patients who can cope with their disease reasonably well with the right devices and apps and that ccan manage with relatively little additional support – people with less severe forms of diabetes and IBD, for example.

Almost half of chronic hospital care could move out of the clinic until 2030
Estimated share of care in hospital revenues in 2030

Other hospital care 55%

Chronic care 45%

25% Chronic care provided primarily **inside** the hospital

20% Chronic care provided primarily **outside** the hospital

Source: ING Research, based on expert interviews

Cost savings between 50% and 90% are possible
According to the recent long-term evaluation we mentioned on the previous page, total costs decreased by almost 90% due to remote monitoring in heart failure. In COPD, the costs decreased by more than 50%. Through learning effects and technological advancements, new initiatives could increase future cost-saving rates. However, it can also become more difficult to find equally successful remote monitoring applications for other chronic diseases, because the low-hanging fruit has already been picked.

Up to €3 billion to gain for the Netherlands, €50 billion within the EU
Suppose that 20% of current hospital revenue in 2030 will mainly be delivered outside the hospital. If all future remote monitoring initiatives would result in a 50% reduction in total costs, this means that remote monitoring could reduce total hospital care costs by 10% per year. This results in potential cost savings for the Netherlands of up to €3 billion per year in 2030*. An estimation based on a 2019 questioning of Dutch hospital board members points in the same direction. On average they predict savings of 12% on curative care expenditure in 2030 through digitally enabled innovations in hospital care. Extrapolating these percentages, the cost savings would amount up to €50 billion within the entire EU and up to €10 billion for the UK.

* Based on Dutch expenditure on hospital care in 2019.

2.4 Volumes remain small despite the recent surge

The corona crisis has boosted the adoption of remote hospital care across Europe. The increase is mainly limited to remote consultation, the deployment of more fundamentally transformative applications is still lagging behind.

Rapid increase in remote hospital care due to corona crisis

The corona crisis has boosted the adoption of remote care across Europe. In a recent Deloitte survey among 1,800 clinicians across Europe, nearly 64% of respondents answered that their organisation had increased the use of digital technologies to provide care. Remote care delivery has become more important as it allows for social distancing as well as for rapid diagnostics of health problems.

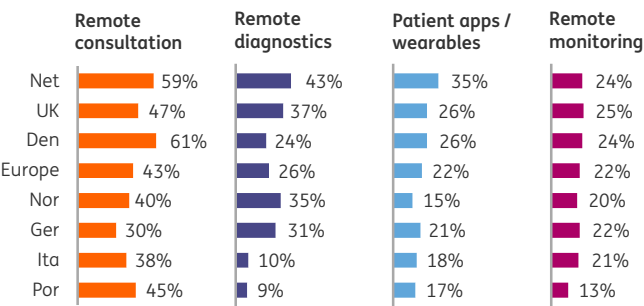### Deployment of more fundamental remote care transformations still lags behind

In particular, an increase is visible in remote consultation. While the technology for remote hospital care has been available for years, the deployment of more fundamentally transformative applications – such as remote diagnostics (medical testing outside a laboratory), patient apps, wearables and remote monitoring – is still lagging behind.

Only 1 in 5 clinicians use remote care technologies, with limited reach

Just over 20% of clinicians in Europe use remote monitoring systems such as patient apps, wearables and remote vital signs monitoring, according to Deloitte's research. This figure is slightly higher for the Netherlands. Nevertheless, in depth interviews with Dutch healthcare providers suggest that only 2%-3% of Dutch patients receive a substantial portion of hospital care in or near home. A 2018 Bertelsmann survey also found that remote monitoring and online consultation across Europe were mostly limited to local or regional initiatives.

Large country differences, remote consultation most widely used
Clinician-reported use of digital technologies to support care delivery

|	Remote consultation	Remote diagnostics	Patient apps / wearables	Remote monitoring
Net	59%	43%	35%	24%
UK	47%	37%	26%	25%
Den	61%	24%	26%	24%
Europe	43%	26%	22%	22%
Nor	40%	35%	15%	20%
Ger	30%	31%	21%	22%
Ita	38%	10%	18%	21%
Por	45%	9%	17%	13%

Source: Deloitte

Device market is growing rapidly, but remains quite small

While the adoption of remote patient monitoring has been slow until now, market forecasters expect high growth for wearable medical devices that enable remote hospital care. On average, a yearly growth of around 20% is expected, ranging from 18.5% per year to 28.5% per year until 2025. The share of wearable medical devices in the total European market for medical devices (of about €40 billion) is still quite small, though, reaching an estimated 4.3% in 2019.

Wearable devices small portion of total medtech market
Estimated size of the European market for medical technology, 2019

Medical technology:
€122 billion

Medical devices:
€40 billion
(33% of total medical technology)

Wearable medical devices:
€1,7 billion
(4.3% of total medical devices)
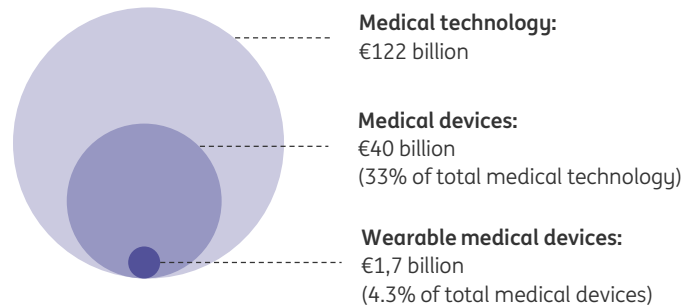
Source: ING research, based on Medtech Europe, Markets and markets, Market data forecast

2.5 Three hurdles slow down structural adoption

Fragmentation, lack of financial incentives and implementation hurdles are the main causes of the slow adoption of remote hospital care.

High hurdles must be overcome to accelerate remote hospital care

Although expectations of forecasters are high, the hurdles to be overcome in most European countries are high as well. This will slow things down significantly, making these projections likely to be quite optimistic. The vast majority of medtech suppliers active in the remote hospital care market are niche players that offer a limited number of devices or solutions. Many of these smaller parties have great difficulty in introducing their products to the medical market. Larger, globally active suppliers do not always see sufficient growth opportunities either.

There are three major hurdles to consider when scaling up remote hospital care.

1. Fragmentation

- **In organisation and interests:** In addition to scepticism within hospitals to adopt new ways of working, hospitals are often confronted with the divergent interests of many of the smaller healthcare providers that are needed to bring care closer to the patient's home.

- **In patient records:** Differences in the way healthcare data are administered and a lack of open ICT platforms with which data can be exchanged, makes it difficult to share patient data in a way that the collaborating parties have access to the right information at all times.

- **In regulation:** Each European country and many regions within countries have very different regulatory frameworks in place for the healthcare sector. The wide variety in reimbursements and medical requirements slow down any scaling up of innovation in healthcare delivery.

2. Lack of financial incentives

- **Fee-for-service schemes:** European hospital care funding systems are mainly based on the fee-for-service principal. This stimulates overproduction instead of efficiency and quality improvement; there are few efficiency incentives. Initiatives that reduce hospital care might result in a lower budget for specific hospitals when no additional funding arrangements are made.

- **High fixed costs:** Roughly two-thirds of a hospital's operating costs are fixed costs because of the large buildings (and expensive equipment) with corresponding financial obligations. When revenue falls as a result of relocating care from the hospital, financial health can be jeopardised.

- **Cross subsidies:** A remote care concept is very suitable for chronic care, but the operational margin on this care is usually relatively high for hospitals. Reducing and providing this care remotely is therefore expensive as long as the profit margins on complex care remain relatively low.

3. Implementation hurdles

- **Financial challenges:** Small operating margins limit the possibilities of hospitals to invest in large-scale changes to healthcare processes. Apart from the required adjustments in ICT and equipment, it also costs time and money to phase out old structures.

- **Technical challenges:** Although the required technology is often available, integrating technological applications into existing IT systems in particular proves to be a cumbersome process.

- **Medical approvement:** The European Medical Devices Regulation (EU-MDR) will ensure a more coordinated assessment of safety and efficacy from May 2021. However, the medical effectiveness of devices remains difficult to prove when they entail new technologies that are used for treatments that are new for most medical professionals, such as the monitoring of a patient's vital signs at home.

Ways to expand remote hospital care

3.1 Three ways policy makers can facilitate remote hospital care

Three steps that policymakers can take to set the preconditions for scaling up remote hospital care are about incentives, data flows and innovation support

Each healthcare system has it's innovation flaws
There is not one European healthcare system that is superior in reaching the triple aim goals. Both insurance-based and tax-based healthcare systems struggle to implement innovative solutions. A key challenge is to stimulate integral solutions when multiple providers are involved in caring for patients.

Three steps to take for regulators
Three steps that regulators can take to facilitate remote hospital care are:

1. Encourage payments based on quality and cost effectiveness
Regulators can create the preconditions that enable purchasing parties (such as insurers) to make more outcome-based rather than volume-based payments to healthcare providers. For example, by setting requirements for quality registrations and increase the regional purchasing power of healthcare purchasing organisations. Outside Europe, Israel is a success story when it comes to outcome-oriented healthcare. The Israeli HMOs* have a relatively large positive impact on healthcare quality and costs due to their large size and the combined role of health insurer and healthcare provider. This kind of vertical integration is often not allowed in Europe. Moreover, purchasing power is often limited due to the limited possibilities for the healthcare purchaser to refer insured patients to preferred providers.

2. Ensure a smooth exchange of patient data
Another important enabler of remote and patient-centred hospital care is the smooth exchange of patient records between healthcare providers (subject to patient approval). Remote hospital care often requires collaboration between parties, such as the hospital, the general practitioner and home care. The efficient exchange of patient data using digital platforms on which the various parties can exchange via open standards facilitates such collaboration. After all, every care provider involved must have sufficient insight into a patient's health situation to be able to treat them properly. Due to the existing fragmentation within health care, regulators should establish such uniform standards for recording and exchanging patient data. This means that the data generated remotely by mobile and portable medical devices can also be brought together in one place with data from other sources. An additional advantage is that medical data can be made more accessible for scientific research in this way.

3. Support innovators to develop medical technology faster
In addition to a technical inspection, healthcare providers demand medical evidence about the effectiveness of a device before they purchase it. This is often an insurmountable hurdle for smaller medtech suppliers. An intermediary who brings medtech innovators into contact with healthcare organisations makes it possible to involve the product requirements from end users at an early stage in the development of medical technologies. Health Innovation Netherlands, for example, helps medtech suppliers to speed up their product development by organising guidance from various stakeholders. This provides a better insight into the needs of patients, physicians, insurers and health authorities with regard to new technologies.

A platform that enables uniform storage and exchange of data
Platform where anonymised data are collected to be exchanged with different stakeholders to improve health care

Orange arrows represent data flows
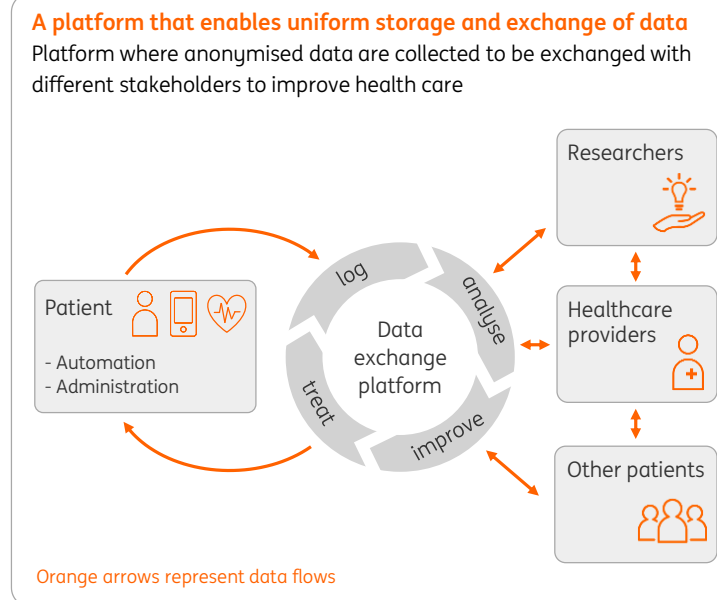
Source: ING Research, based on Brighter.se

* Health maintenance organisations

3.2 Healthcare purchasers and hospitals have to step up as well

Healthcare purchasing organisations such as insurers as well as hospitals themselves should step up in three ways to accelerate remote hospital care. They involve payment models, collaboration and making choices.

Three steps forward for healthcare purchasers such as insurers:

1. Healthcare payments (a): Arrange long-term agreements with the right financial incentives
The challenge for healthcare insurers and other healthcare purchasing organisations is to increase the quality and efficiency of healthcare provision while providing hospitals with sufficient financial security. Long-term purchasing contracts with the right performance-based incentives make this possible, for example by agreeing on annual lump sum payments. Together with clear quality indicators this leaves the hospital with more freedom to organise its own healthcare provision in a patient-oriented and cost effective way, while there is no risk of an unexpected decline in hospital revenue.

2. Healthcare payments (b): Arrange cross-sectoral bundled healthcare purchasing
Insurers often follow a sector-based approach to healthcare procurement. This increases the fragmentation of funding. Bundled payments for cross-sectoral care treatments could facilitate collaboration. Payments based on healthcare outcomes or population health also provide incentives that allow for collaboration to offer care in the best and least expensive place. These models encourage prevention by allowing cost savings to be shared among collaborating healthcare providers ('shared savings').

3. Participate in scalable projects
Insurers and other healthcare purchasers would do well to actively participate in scalable projects. They can do this by identifying and investing in promising business cases together with selected healthcare parties and medtech suppliers. The focus should be on redesigning care processes, making clear arrangements on the replacement of clinical care by remote care. Eventually, this should lead to a decline in the total costs per targeted patient, including the allocated overhead of the hospital.

Three steps forward for hospitals:

1. Agree innovative payment models and prices that cover actual costs
Hospitals would do well to actively promote bundled payments and payments based on healthcare outcomes. These models give hospitals more freedom in organising care as effectively and efficiently as possible. In addition, hospitals should agree prices based on realistic internal cost estimates for chronic, plannable and acute care as well as complex care. This way, they can prevent the loss of cross-subsidies if more profitable care is moved or outsourced.

2. Collaborate with healthcare providers and medtech suppliers
Collaboration is key to more effective healthcare. Organising remote hospital care together with primary and elderly care providers and selected medtech suppliers and service providers paves the way for a smoother exchange of patient information, which in turn can improve healthcare outcomes.

3. Explore, evaluate and scale up to "remote first"
Explore the added value of remote hospital care for different patient groups through pilots. Evaluate and scale up to 'remote first' patient journeys for defined groups in case of positive results. This is necessary to maintain as few duplicate care programmes as possible and to avoid additional workload and costs. Innovations are only successful if they have been incorporated into care processes and work protocols.

3.3 Medtech suppliers have to intensify relationships with hospitals

Succesful medtech suppliers don't focus solely on their technological capabilities, they intensify relationships with hospitals and other stakeholders to make remote hospital care work.

Medtech suppliers such as providers of wearables, portable equipment, health apps and portals and internet of Things (IoT) platforms, should pay special attention to the following three things if they want to make remote hospital care work.

1. Collaborate strategically

a) Health care and medtech are two quite distinctive worlds. Medtech suppliers often develop new products from a technical perspective. They should research the needs of healthcare providers and patients and develop solutions that meet those needs. Therefore, co-creation at an earlier stage is often necessary to obtain sufficient medical evidence and to shorten the time-to-market of new products.

b) Medtech suppliers should focus on leading providers and doctors. Hospitals with a strategic vision on digitisation and remote hospital care are more open to technological innovations and can scale up faster.

c) Size matters: medtech suppliers need a certain size in order to become an attractive strategic partner for hospitals. This can be a problem for niche players. Furthermore, smaller suppliers will have greater difficulty in meeting the additional costs required for approval of new medical technology under the new European Medical Devices Regulation (from May 2021).

2. Unburden hospitals and integrate technologies

a) It's not just about creating new medical technology, it's about creating value for patients, hospitals and society. Medtech suppliers can stimulate remote hospital care if they unburden hospitals, for example by providing them with intensive support in dealing with technological challenges. This way, the use of technology can be supported.

b) More training and coaching on the use of technology and the maintenance and improvement of devices and systems are also part of unburdening hospitals.

c) Devices should be able to communicate smoothly with various IT systems through the use of open standards. Integrating devices and systems from different suppliers on to a single network or platform offers new opportunities for medtech players.

3. Have a sharp eye for stakeholders' interests and demonstrate added value

a) Healthcare purchasers such as health insurers have a great interest in introducing new cost-saving technologies. For them it is important that investments in a different organisation of care are accompanied by better patient outcomes and real cost savings.

b) Healthcare professionals and patients must be convinced of the advantages of technology-assisted remote hospital care. For them, tailor-made solutions are crucial. Problems with the implementation of new technology in the existing organisation and the tendency to undervalue external solutions ('not invented here syndrome') often hinder the success of standardised solutions.

c) Healthcare adjustments often entail new medical and financial risks for the parties involved. That's why it's essential for stakeholders that the safety and medical outcomes of the use of new technology are proven and that potential cost savings are quantified in a solid business case.

With thanks to

Douwe Atsma	Leiden University Medical Centre
Erwin Bomers	Slingeland Hospital
Niels de Bruin	CLB
Roel Goffin	Zuyderland Medical Centre
Rogier van der Hooft	CbusineZ
Menno Jansen	CZ
Arjan Karens	Philips VitalHealth
Volker Lang	Biotronik
Arjen Linders	Mediq
Luc Winters	Mediq
Serge Rink	Tunstall
Kees Smaling	Siemens Healthineers
Jan Tebbens	Menzis
Murk Westerterp	Philips Connected Care

Special thanks to

Iris van Bemmel	FME (Dutch employers' organisation for the technology industry)
Edwin Dekker	FME

Would you like to know more?

Sector Banker Healthcare (NL)
Jan Willem Spijkman
+31 (0)6 30 34 36 80
Jan.Willem.Spijkman@ing.com

Sector Banker Industry (NL)
Gert Jan Braam
+31 (0)6 12 29 84 15
Gert.Jan.Braam@ing.com

Sector Banker Healthcare (EMEA)
Carin Eijgenberger
+31 (0)6 19 27 50 00
Carin.Eijgenberger@ing.com

Sector Banker Healthcare (EMEA)
Maarten van den Broek
+31 (0)6 30 11 47 37
Maarten.Van.Den.Broek@ing.com

Author
Edse Dantuma
Healthcare Sector Economist
ING Economics Department
+31 (0)6 83 64 83 06
Edse.Dantuma@ING.com

Editors
Katinka Jongkind   ING Economics Department
Gerben Hieminga   ING Economics Department

Special thanks to
Guy Walraven   ING Wholesale Banking

Or visit ING THINK
(NL: ing.nl/kennis and Twitter)