Perceived barriers and facilitators of structural reimbursement for remote patient monitoring: an exploratory qualitative study

Rakers, M.M.; Os, H.J.A. van; Recourt, K.; Mosis, G.; Chavannes, N.H.; Struijs, J.N.

Health Policy and Technology 12 (2023) 100718

Contents lists available at ScienceDirect

Health Policy and Technology

journal homepage: www.elsevier.com/locate/hlpt

Original Article/Research

Perceived barriers and facilitators of structural reimbursement for remote patient monitoring, an exploratory qualitative study

Margot M. Rakers [a,*], Hine J.A. van Os [a], Kasper Recourt [a], Georgio Mosis [b], Niels H Chavannes [a], Jeroen N. Struijs [c,d]

[a] Department of Public Health and Primary Care, Leiden University Medical Center, Leiden, The Netherlands
[b] Royal Philips N.V., High Tech Campus, Eindhoven, The Netherlands
[c] Department of Quality of Care and Health Economics, Center for Nutrition, Prevention and Health Services, National Institute of Public Health and the Environment (RIVM), Bilthoven, The Netherlands
[d] Department Public Health and Primary Care, Leiden University Medical Center Campus The Hague, The Hague, The Netherlands

ARTICLE INFO

Keywords:
Remote patient monitoring
Reimbursement
Alternative payments models
eHealth

ABSTRACT

Objective: Structural reimbursement can be an important factor for large-scale implementing and upscaling of remote patient monitoring (RPM). During the COVID-19 pandemic, the Dutch Healthcare Authority expanded regulations, creating novel opportunities to reimburse RPM. Despite these regulations, barriers to the reimbursement of RPM remain. This study aimed to identify the barriers and facilitators of structural reimbursement of RPM in hospital care in the Netherlands and to propose actionable recommendations.

Methods: This is an exploratory qualitative study with relevant stakeholders in the Dutch purchasing market: the Dutch Healthcare Authority, health insurers, and healthcare providers. Semi-structured interviews were held between October and December of 2020. All interviews were conducted using a digital medium, transcribed verbatim, and thematically analyzed.

Results: Multiple perceived barriers were mentioned: wrong pocket problems (i.e. the entity that bears the costs of implementation does not receive the benefits), no uniform quality and outcome indicators, lack of willingness to redesign care pathways by providers, and difficulties implementing cross-sector models. Perceived facilitators included interdisciplinary cooperation and transparency, the use of alternative payment models, increase in the total number of patients per RPM project, and the optional reimbursement scheme.

Conclusion: Our interviews found barriers and facilitators concerning structural reimbursement of RPM in hospital settings in the Netherlands. Our results emphasize that the successful integration of structural reimbursement requires: 1) understanding the improvement potential of RPM by creating business cases, 2) co-creation (redesigning care paths) from the outset of an RPM project, 3) and allocating financial risk by providers and insurers.

Public Interest Summary: The COVID-19 pandemic has demonstrated the strong potential of consultation and monitoring patients at a distance. Remote patient monitoring - the use of information technologies for monitoring patients at a distance - is seen as a potential solution to urgent challenges in the healthcare system. Nevertheless, embedding remote patient monitoring innovations into routine healthcare is often challenging, partly due to difficulties in reimbursing these initiatives. Barriers to reimbursing remote patient monitoring included organizational factors, no uniform quality and outcome indicators, and difficulties using different payment models. Perceived facilitators included an increase in the total number of patients per project, better interdisciplinary cooperation and transparency, and help from the Dutch Healthcare Authority. Introducing these insights into healthcare policy dialogues could support reimbursement of remote patient monitoring and stimulate the collaboration of healthcare stakeholders responsible for implementing and scaling up remote patient monitoring projects.

* Corresponding author.
E-mail address: m.m.rakers@lumc.nl (M.M. Rakers).

https://doi.org/10.1016/j.hlpt.2022.100718

Available online 21 December 2022

Introduction

eHealth is defined as the use of information and communication technologies to improve health, well-being, and healthcare [1]. Within the spectrum of eHealth applications, remote patient monitoring (RPM) presents information technologies for monitoring patients at a distance, through the transmission of clinical information between the patient and a healthcare professional [2]. RPM has been proposed to have the potential to support healthcare systems by, for example, improving health outcomes, facilitating shared decision-making processes, and supporting self-management [3–6]. However, there are still important barriers, e.g. affordability of technology for users, inadequate internet access, and low eHealth literacy, that must be overcome for successful large-scale implementation and upscaling [7].

The COVID-19 pandemic has created an urgent need for coordination of patient care outside the hospitals as patients did not intend to or could not visit the hospital anymore. RPM has been identified as a promising approach to address this challenge [8,9] but in contrast to the many research outcomes demonstrating its value, sustainably embedding RPM innovations into routine healthcare, both in the Netherlands and other countries, is often challenging [10–12]. To improve the adoption and implementation of RPM, several studies have provided insights into the barriers and facilitators of implementing RPM in clinical care [10,13]. Given how implementation challenges have been thoroughly researched, the next steps should revolve around upscaling those initiatives. One important aspect of large-scale adoption is embedding a successful experiment with RPM in routine care and providing structural reimbursement [14]. To date however, most RPM innovations begin as an experiment with temporary funding and experience difficulties in getting successful RPM innovations structurally reimbursed [15–18]. Structural reimbursement is defined as a sustainable solution to finance innovations and conquer a solid place within the current healthcare system [14].

During the beginning of the COVID-pandemic in early 2020 and the subsequent years, the Dutch Health Authority expanded the regulations for reimbursing RPM, which aimed to make it possible to claim expenses for clinical care at home and to give insurers and healthcare providers enough opportunities for reimbursement agreements [19]. These regulations may catalyze the dialogue between healthcare providers and health insurers, leading to the adoption of RPM. However, despite the expansion of regulation for reimbursement of RPM, barriers remain experienced by stakeholders [18]. Therefore, this study aims to explore and identify barriers and facilitators concerning structural reimbursement of RPM. Subsequently, we aim to identify core principles to accomplish ongoing reimbursement of PRM and turn them into actionable recommendations.

Methods

Study design and setting

A qualitative study using a semi-structured interview format was set up, adhering to the Standards for Reporting Qualitative Research (SRQR) guidelines [20]. All participants were informed about the study purpose, provided verbal informed consent, and agreed to recording the interviews.

This article represents the Dutch healthcare system. In this study, we focus on the health purchasing market. More details and background information on the Dutch healthcare system can be found in Supplemental file 1 and Fig. 1. Furthermore, background information about payment models and regulations referred to in this article are included in Table 1.

Research population

We invited participants responsible for reimbursing several RPM projects and implementing RPM initiatives within a hospital setting. The study population consisted of people working in one of the three stakeholder groups within the healthcare purchasing market (see Supplemental file 1 and Fig. 1): health insurers, Dutch Healthcare Authority, and healthcare providers. Participants were identified using the network of the National eHealth Living Lab (NeLL). Participants with a personal relationship with the researcher were excluded from this study. Participants showing interest were invited to participate via email or telephone to schedule an appointment.

Data collection

This exploratory qualitative study was conducted to gather the information that will help define the barriers and facilitators and suggest practical recommendations [21]. A guiding fundamental within this study was that the data collected should reflect the point of view of the different stakeholders. Therefore, a semi-structured interview design was selected. Due to COVID-19, all semi-structured interviews were conducted using a digital medium. Data collection took place between October and December 2020. Interviews were conducted in Dutch. The topic list was developed in collaboration with a qualitative research expert and pilot-tested with one of the researchers (GM). The topic list can be found in Supplemental file 2. During the interviews, participants were allowed to discuss other topics of importance to them as well. The interviews lasted approximately 60 minutes. All interviews were audiotaped and transcribed verbatim. Names of participants and other identifying data were omitted from the transcript and replaced by a

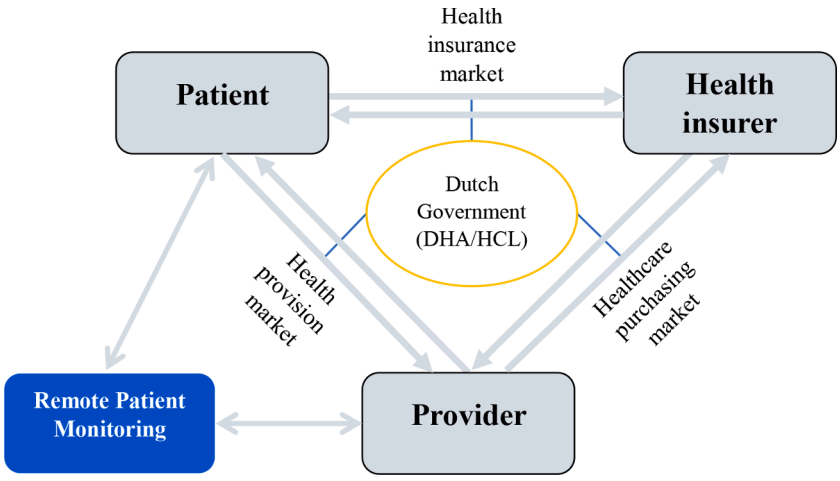

Fig. 1. Main parties in the Dutch healthcare system. DHA: Dutch Healthcare Authority. The Dutch Healthcare Authority (NZa) is an autonomous administrative authority, falling under the Dutch Ministry of Health, Welfare and Sport (VWS).
HCI: National Health Care Institute. The National Health Care Institute (Zorginstituut Nederland) carries out tasks relating to two Dutch statutory health insurance schemes: the Health Insurance Act (Zorgverzekeringswet) and the Long-Term Care Act (Wet langdurige zorg, Wlz). The National Health Care Institute's role in maintaining the quality, accessibility and affordability of health care in the Netherlands involves 4 tasks.

Table 1
additional description of the existing payment models and the policy regulations.

Payment model type	Definition
Shared savings	Shared savings incentivise healthcare providers to reduce healthcare spending for a defined patient population. This will be done by offering a percentage of net savings realized as a result of their effort [30]. The accountable payer can share in gains (*one-sided)* and/or losses (*two-sided)* with the payer [46].
Bundled payments	If a care path, such as maternity care, includes one or more providers and/or organizations, bundled payments can be defined for this specific set of activities within this care path. The provider/organization receives a higher margin when a patient has used less care and bears the financial risk. Here, savings and losses are not shared like shared savings [46].
Policy rules	**Definition**
Expanded regulations	In the Netherlands, the Dutch Healthcare Authority (NZa) determines the product description of all care, from physiotherapy treatments to maternity care, from DTCs in hospitals to care and support at home. In addition, the NZa determines the price tag for some of the care products. The price and the description of the care provided is called *an provision.* Provisions are established with the care providers. Care providers decide themselves what they consider good care and how it should be provided. With the start of the COVID-19 pandemic, the NZa has temporarily removed all restrictions for claiming digital care. This should have created space for healthcare providers to quickly introduce digital application for remote care in clinical practice. This means that remote care can also be charged without a special provision being determined for this [19].
Optional provision	An optional provision makes it possible for healthcare providers and health insurers to get to an agreement about (new) initiatives that are difficult to fund with the existing hospital reimbursement schemes (i.e. Diagnosis Treatment Combination (DTC)). Hospitals register the diagnosis, treatment, and cost in a DTC. These DTCs represent all possible diagnoses, treatments, and costs thereof. Each DTC has its own price [31]. An optional provision should offer more capacity for innovation. The Dutch Health Authority has honoured these optional reimbursement scheme agreements between hospitals and healthcare providers whereby other hospitals can easily arrange the same agreements with health insurer(s) about this form of digital care. This renewal of payment schemes implies a fluid movement of change and improvements, as a new reimbursement payment scheme will be added to this optional reimbursement scheme in 2023. This new scheme allows RPM to be claimed at a maximum rate to reimburse the costs of human resources, accounts of the software, and maintenance [37].

study ID. Participants were interviewed until saturation was reached and no new information was obtained.

Data analysis

Using the Atlas.ti software program, data derived from the semi-structured interviews were analyzed using a framework approach. An initial framework for the thematic analysis was accomplished based on our objectives and components from the Research and Policy Framework for Telehealth. This framework consists of the following major components: structure (policy context), process (delivery), and outcomes along the continuum of care [22]. To create a primary codebook, interviews were analyzed deductively based on this framework. We supplemented the codebook with additional themes that were identified inductively during analyses. The final coding framework was discussed in the research group consisting of medical doctors (MR, KR, HvO), researchers with experience in alternative payment models (JS), and technical innovations (GM). Each transcript was independently analyzed and coded by MR and KR. The preliminary findings were sent to all participants for feedback to ensure that the results reflected the full range and depth of the data.

Results

Barriers and facilitators identified as relevant for answering the research question were sorted according to the relevant components of the Research and Policy Framework for Telehealth. Seven interviews were conducted with 10 participants (three interviews were conducted with two persons). Data saturation was reached at the seventh interview. The characteristics of the study population are shown in Table 2. Table 3 provides an overview of the inhibiting and facilitating factors. The results are discussed below and will be illustrated by quotes.

Barriers related to structural reimbursement of RPM

Participants identified various barriers which prevented RPM from being structurally reimbursed. Barriers included factors pertaining to (1) wrong pocket problems within healthcare organizations, (2) lack of uniformity of quality and outcome indicators, (3) inertia in redesigning care pathways, and (4) difficulties using cross-sector payment models.

Wrong pocket problems within healthcare organizations

Health insurers and healthcare providers identified barriers to managing hospitals' internal budgets. Most of the funding needed to start a new remote patient monitoring initiative comes from the departmental budget. This contrasts with the fact that financial agreements are made between health insurers and healthcare providers or the hospital board. A healthcare provider mentioned: '*The question is whether the benefits of remote patient monitoring will accrue to the same department where the costs are incurred.' – P05* Medical departments and self-employed specialists may be afraid that the effect of RPM results in a negative business case since the patients are no longer seen physically and therefore provide a lower income per patient. This leads to wrong pocket problems (i.e. entity that bears the costs of implementation does not receive the benefits).

A health insurer stated: '*An insight we have had in the recent months is that we make appointments with the hospital board and not with an independent medical specialist or medical department. We do not influence the agreements the hospital makes with the specialist.' – P04*

Lack of uniformity of quality and outcome indicators

The lack of uniform and widely adopted clinical outcome indicators makes it difficult for insurers to make structural agreements with healthcare providers about the reimbursement of RPM technology [23]. Quality indicators could improve the structural reimbursement of RPM by supporting health insurers and care providers in agreements on structural reimbursement and including RPM in the care path [24]. Currently, Dutch health insurers are creating a multi-layered quality assessment model to evaluate digital healthcare applications. The funnel-like process starts with assessing costs, quality, and accessibility [25]. From there, the insurer determines whether the business case and the proposition could be sustainable in the future. A pilot of this assessment model started at the end of 2021 when 40 apps were reviewed for safety and added value. The results and points for improvement found in this review were given back to the providers and affiliated health insurers. Hereby, health insurers could use these findings to start pilots with successful providers.

A project manager digital health at a health insurer noted: '*Innovations often fail because the stakeholders involved in the payment of RPM do not speak the same language of one another. Therefore, we must create a tool where all stakeholders know what criteria they must meet to have their innovation structurally funded. This will not be a checklist, a golden standard, or a guarantee, but this will provide further steps in getting remote patient monitoring structurally funded.' – P02*

Table 2
Information listed per participant.

Interview	Gender/ age	Participants profession	Role	Type of (healthcare) organization	Experience RPM projects	Years of experience using RPM
P01	P1 Male / 45 years P2 Female / 39 years	Health insurer	P1 Senior project manager Digital Health P2 Innovation expert	Insurer with collaborations with academic, teaching and general hospitals.	Several RPM projects within chronic diseases, as COPD, heart failure and Crohn.	4 years
P02	Male / 47 years	Health insurer	Program manager innovation	Insurer with collaborations with academic, teaching and general hospitals.	Several RPM projects within chronic diseases, as COPD, heart failure and Crohn.	6 years
P03	Male / 48 years	Dutch Healthcare Authority	Project leader digital health	The Healthcare Authority determines the product description of all care (from physiotherapy treatments to maternity care, from hospitals to care and support at home).	The Dutch Healthcare Authority does determine the product description of RPM and have widen this policy rule since the COVID-19 pandemic so that it became more easy to reimburse RPM.	6 years
P04	P1 Female / 31 years P2 Female / 55 years	Health insurer	P1 Innovation manager P2 Innovation manager	Insurer with collaborations with academic, teaching and general hospitals.	Several RPM projects within chronic diseases, as COPD, heart failure and Crohn.	P1 3 years P2 3 years
P05	Female / 57 years	Healthcare institution	Head of Sales	Academic hospital, sales of medical specialist healthcare services, cross-sector care and regional meetings on the organization of healthcare in the region.	Experience with RPM projects within the hospital and in negotiating with health insurers.	6 years
P06	P1 Female / 33 years P2 Male / 49 years	Health insurer	P1 Innovation manager P2 Innovation manager	Insurer with collaborations with academic, teaching and general hospitals.	Several RPM projects within chronic diseases, as COPD, heart failure and Crohn.	P1 4 years P2 2 years
P07	Female / 37 years	Healthcare institution	Senior advisor quality and innovation	General hospital	Several RPM projects within chronic diseases, as COPD, heart failure and Crohn.	3 years

Inertia in redesigning care pathways

Two health insurers and healthcare providers agreed that too little research has been done into the underlying internal cost structure to support redesigning care paths. Participants emphasized that the hospital they are working for or the hospitals they make agreements with do not redesign the underlying cost structure of their care paths when they start using RPM. *'Funds for transformation are meant for implementing remote patient monitoring initiatives but do not provide ongoing change and payment models. You ultimately want a "business process redesign" to be introduced in the care path, so the care path is redesigned cost-effectively.'* – P04 (innovation manager) Moreover, an important barrier that prevents RPM initiatives from being reimbursed is the way healthcare professionals provide RPM as care that is used 'on top of' the current care. A health insurer noted: '*We think the greatest barrier does not lie within the payment models, but in the transformation of the healthcare provider and his intrinsic motivation to adopt remote patient monitoring in his routine care.'– P02 Healthcare professionals and hospitals are inclined to maintain the old process. They start to run a pilot and subsequently developed a new process using remote patient monitoring. They forget to let go of the old process and strengthen the new process.' – P04* This inertia of redesigning may be due to lack of time, wrong pocket problems and the implementation challenges they must overcome [26].

Difficulties using cross-sector payment models

Nowadays, reimbursement payment models are made per healthcare sector and might not interfere with each other due to two Dutch laws: the Dutch health insurance law (Zvw) and the Social Support Act (WMO) [27]. One participant (head of sales in-hospital care) mentioned: '*We have once tried to use cross-sector bundled payments. Using these, you agree on one bundled payment price, and you will have to divide this price between the different healthcare organizations across sectors. Then the problem starts; there are financial stakes for everyone involved, and all organizations are considering if they get the same amount as before. This is where you should come to an agreement and where everyone should shoulder the economic risks together.' – P05* This allocation of risks might halt the implementation of new cross-sector payment models due to inherent design flaws [28].

Facilitators to improve structural reimbursement of remote patient monitoring

Participants identified various facilitators enabling a successful experiment with RPM to be structurally embedded in routine care and structurally reimbursed. Facilitators included factors pertaining to (1) interdisciplinary cooperation and transparency, (2) the use of alternative payment models, (3) an increase in the total number of patients per RPM-project, rather than a niche population, and (4) the optional reimbursement scheme.

Interdisciplinary cooperation and transparency

A participant from within the Dutch Healthcare Authority noticed that the cooperation between hospitals and the conversations about the use of RPM are much better than one year ago. *'Several alliance networks (hospitals) accelerate the transformation to use RPM. As soon as it shows demonstrable results, we elaborate those results into infographics/workshops and we scale these initiatives as much as possible to a national level by involving our healthcare buyers in discussions at other hospitals.' – P06* (health insurer) Most health providers and health insurers agreed that involvement early in the innovation project with periodic consultations and interim evaluations between the stakeholders is necessary.

The use of alternative payment models

Alternative payment models are a form of payment reform that gives added incentive to providers to provide cost-efficient and high-quality care [29]. All stakeholders have mentioned shared savings and bundled payments as a facilitator to improve reimbursement of RPM. '*Shared savings could be a solution when the remote patient monitoring-innovation leads to lower revenues. If we want to give hospitals an incentive to use or implement remote patient monitoring, even though their revenues fall, shared savings could be appropriate.' – P05* Shared savings offer an incentive for healthcare providers to reduce healthcare spending for a defined patient population. This will be done by providing a percentage of net savings realized as a result of their effort [30]. These shared savings agreements are in general multi-year

Table 3
Barriers and facilitators emerging from the analysis.

Barriers		Brief summary
Wrong pocket problems within healthcare organizations	The entity that bears the costs of implementation does not receive the benefits.	
Lack of uniform language	The lack of uniform and widely adopted clinical patient outcome indicators makes it difficult for insurers to make structural agreements.	
Lack of willingness to redesign care pathways	The need to redesign the care paths using remote patient monitoring technology and therefore to make the innovation a replacement for a redesign of (part of) the current care.	
Difficulties using cross-sector payment models	Reimbursement payment titles are made per healthcare sector and cannot interfere with each other.	
Facilitators		**Brief summary**
Interdisciplinary cooperation and transparency	Involvement early in the innovation project with periodic consultations and interim evaluations between the stakeholders is necessary.	
The use of alternative payment models	Shared savings and bundled payments have been mentioned as a facilitator to improve reimbursement of remote patient monitoring.	
Increase in the total number of patients per project, rather than a niche population	The need for large volumes of patients per project if the innovation wants to be profitable.	
Optional provision	An optional provision makes it possible for health care providers and health insurers to get to an agreement about (new) initiatives that are difficult to fund with the regular Diagnosis Treatment Combination (DTC).	

contracts (e.g. three to five years).

Increase in the total number of patients per RPM-project, rather than a niche population

Most health insurers emphasized the need for large volumes of patients per project if they want the innovation to be profitable. Thus, insurers indicated urgency to increase the total number of patients (preferably across departments within and between hospitals) applying RPM to obtain more insights into the cost structures of the changes in the care process and the ability to scale. One participant (health insurer) stated: '*We prefer to consider reimbursement of a project that can serve large volumes of patients rather than having a niche group of patients. Check whether the scale within your organization is large enough to make your project profitable. Seek for collaboration within your organization when necessary.' – P04* Health insurers indicated that large volumes are necessary to cover the cost of RPM and to get RPM reimbursed by health insurers. One healthcare insurer noted: '*We are now at the point where we require hospitals to have a minimum inclusion of 50% of all patients within the concerned disease (mostly chronic diseases). Otherwise, we will not consider reimbursing remote patient monitoring.' – P02* Most pilots do test their innovation on a small number of patients, whereas the RPM initiatives that are already being reimbursed are the ones that a have a large number of patients in their pilots.

The possibility of new hospital payment regulations (i.e. the so-called 'Optional reimbursement scheme' (in Dutch: Facultatieve Prestatie)

Another mentioned facilitator to improve structural reimbursement of RPM is the optional reimbursement scheme. An optional reimbursement scheme makes it possible for healthcare providers and health insurers to get to an agreement about (new) initiatives that are difficult to fund with the existing hospital reimbursement schemes (i.e. Diagnosis Treatment Combination (DTC)). Hospitals register the diagnosis, treatment, and cost in a DTC. These DTCs represent all possible diagnoses, treatments, and associated costs. Each DTC has its price [31]. This optional reimbursement scheme is different from and on top of the expanded regulations of the Dutch Healthcare Authority mentioned in the introduction (see Table 1). The Dutch Healthcare Authority mentioned: '*Since the beginning of 2021, we will provide an additional option for the payment models of remote patient monitoring or other innovations that are difficult to fund with the regular DTC-care path. A healthcare insurer and provider can apply the request immediately. (…) An advantage of using this scheme is that it is not necessary to arrange this at a national level (which is usually the case) but on a regional/local level between one healthcare insurer and one healthcare provider. Moreover, suppose that one healthcare insurer and one healthcare provider develop a new care path through the optional reimbursement scheme. Other hospitals and insurers can take over this new care path. It is open-source.' – P03*

Discussion

In this study, we aimed to provide an exploratary overview of the experienced barriers and facilitators of structural reimbursement of RPM in the Netherlands by interviewing health insurers, healthcare providers, and the Dutch Health Authority. From the semi-structured interviews, it was observed that wrong-pocket problems (i.e. the entity that bears the costs of implementation does not receive the benefits) stand in the way of distributing costs and benefits. That health insurers emphasize the need to increase the willingness for healthcare providers to redesign the care paths using RPM technology and that there is a need for healthcare providers and health insurers to create insights into the uniformity of (quality) indicators based on patient outcomes to make reimbursement agreements. In addition, several facilitating factors have been mentioned regarding the increase in interdisciplinary cooperation and transparency between hospitals and health insurers, the increased research and adaptation of alternative payment models, and the facilitation of a sizeable total number of patients per project rather than a niche population. Furthermore, the optional reimbursement scheme was mentioned as an opportunity to obtain an agreement between the health insurer and provider about (new) initiatives that are difficult to fund within the existing reimbursement schemes.

Our results corroborate findings from US studies that showed the challenges of change management and the requirement of governmental stewardship (i.e. supporting knowledge development and long term vision) with stable leadership to reform the payment structure of the public health system as market conditions and stakeholder engagement shift over time. [32]. This study found similar barriers as wrong pocket problems, limited participation of patients and uniformity of quality, outcomes and cost performance measures. However, this study's focus was on implementing value-based payment reform projects and not on RPM projects. Moreover, our study reveals that stakeholders agreed that too little research had been done into the underlying internal cost structure towards redesigning care paths and cross-sector payment models. For instance, our interviewees expressed the need for "business process redesign" of care paths when using RPM and allocating financial risk between payer and provider, as was also mentioned in earlier research [28]. Lastly, our findings are in line with a scoping review that found a lack of studies evaluating trends in RPM reimbursement policies [33]. This review emphasized the restrictions in these policies by either type of provider (e.g. limited reimbursement to only certain providers) and service, facility, and health conditions (e.g. limited reimbursement

to type or purpose of the visit).

Digital remote patient monitoring applications are typically produced by small and medium-sized enterprises (SMEs), but users and payers often struggle to gain acceptance in the public health system. Kelley et al., [34] describe that this is caused by the current physician reimbursement system which encourages face-to-face visits, which in turn runs counter to the goals of many digital health solutions that aim to reduce visits to clinics and hospitals. This disparity between the economic incentives that drive clinical behavior and the adoption of digital health technologies is in congruence with our findings. In addition, SMEs experience additional difficulty in integration due to the need for more access to evaluation resources and opportunities, which is essential for a business case that supports reimbursement [34]. Here, applications developed in the hospital might have a step ahead.

In the Netherlands, governmental stewardship might further stimulate the road to payment models of RPM. The government has a role in defining the conditions within the system of regulated competition [35]. Our study showed that the optional reimbursement scheme, initiated by the Dutch Healthcare Authority, might be an option to provide more guidance or assistance. As we have already outlined in the result section, this new reimbursement scheme is thought to be a more manageable and efficient method through which healthcare insurers and -providers can submit a request jointly. Few RPM innovations have made use of this new possibility yet [36]. The Dutch Health Authority has honoured these optional reimbursement scheme agreements between hospitals and healthcare providers whereby other hospitals can easily arrange the same agreements with health insurer(s) about this form of digital care. This renewal of payment schemes implies a fluid movement of change and improvements, as a new reimbursement payment scheme will be added to this optional reimbursement scheme from 2023. This new scheme allows RPM to be claimed at a maximum rate to reimburse the costs of human resources, accounts of the software, and maintenance [37].

Recommendations

Structural reimbursement of RPM may contribute to the large-scale adoption of RPM initiatives, though the current study suggests that several actions are needed to overcome the barriers that are currently experienced regarding reimbursement of RPM. In addition to the facilitators mentioned by the stakeholders, preliminary recommendations are proposed that could contribute to the improvement of structural reimbursement of RPM. These recommendations are supported by the present findings as well as relevant literature [17,38-48] within the field of RPM (Table 4). Further research may be needed to determine the effectiveness of those recommendations in improving the ongoing payments models of RPM and should be repeated in other settings and countries where these core principles could contribute to the reimbursement of RPM.

Although our study uses data from within the Dutch healthcare setting to identify barriers and facilitators, it is important to evaluate the transportability of these findings to an international context, as this will help understand the problems faced worldwide. Healthcare systems in other countries and financing health systems are context-specific. However, core principles such as 1) understanding the improvement potential of RPM by creating business cases containing health, costs and experience of healthcare professionals and patients, 2) co-creation (redesigning care paths) from the outset of the implementation/pilot phase of a RPM project with all stakeholders involved, 3) and allocating financial risk by providers and insurers are relevant in a global context.

Strengths and limitations

To interpret our results, several methodological challenges have to be taken into account. First, there is some drawback in this study approach, given the sampling of the participants was restricted to those with expertise in the field and experience with payment model mechanisms for RPM in operational sites. With this tight selection, we may have excluded the point of view of other key decision-makers in the ecosystem, but they were selected in line with our analytical approach. Furthermore, as some interviews included multiple interviewees, this might have limited the interviewees from speaking freely. Nevertheless, all the interviewees self-intended to do the interviews together and had the same positions (see Table 2) in their organization, allowing them to

Table 4
Recommendations for improvement of structural reimbursement of RPM.

Recommendations	
Development of business cases	An RPM innovation may sustain itself without short-lived subsidies. These subsidies are an impetus to implement innovation but are not a long-term solution. A health insurer mostly supports the innovation by paying one-off implementation costs, or the innovation is paid with a subsidy. As soon as the innovation becomes more integrated into regular care, the one-off costs should decrease, and the business case should prove that the care given can be provided at the same price or cheaper. This business case may contain not only an economic evaluation but also the quality of care, experience of healthcare professionals and patients (i.e. Quadruple Aim) [39]. The Quadruple Aim considers care, health, costs, and the meaning of work [40,47]. Therefore, RPM does not necessarily have to be substantially cheaper, but if the quality of care and the perceived safety improves with the same price, it is also beneficial enough for a healthcare insurer to collaborate with the developer and healthcare professional. It is, therefore, important to make a business case with all stakeholders from the outset of the pilot phase [41]. Moreover, the internal budgets and cost benefits within the hospital should be properly agreed upon and considered within the business case. A clear vision, objectives, strategies, and business models are needed for healthcare providers to provide the incentives to use RPM in their day-to-day practice and to create explicit agreements with health insurers.
Beyond getting the incentives right	Studies have shown that alternative payment models, such as bundled payments and shared savings models, include provider incentives to enhance the coordination of health services and collaboration among providers and have the potential to contribute to the financial sustainability of digital health [42–44]. One of the most difficult aspects of purchaser-provider contracting has been the development, negotiation, and implementation of appropriate payment models that effectively allocate financial risk. Theory suggests that, in order to incentivize value creation and minimize undesirable behaviors, purchasers should not transfer all of the financial risk to providers, but rather implement some form of risk-sharing that protects providers from random and systematic variations in health spending that are beyond their control [48]. This would imply the use of payment mechanisms that carefully balance the allocation of financial risk between purchasers and providers. In the Netherlands, several collaborating health insurers and healthcare institutes are experimenting with these alternative payment models to reimburse RPM. However, evaluations of nine Dutch population health management initiatives have shown that alternative payment models are complex and most of them are not (yet) implemented [44,45]. Therefore, a study suggested that more guidance and assistance from the government in reforming these payment models may be of value, especially clearly defining key design elements, including risk mitigation strategies, rather than only facilitating the reformation of payment models without those elements [48]. This governmental stewardship may improve the hesitance in moving towards the adoption of alternative payment models [44].

complement each other. Thus, we do not believe that it affected our results. Moreover, we have focused on the two actors (provider and insurer) within the healthcare purchasing market and have placed the patient out of scope. This does not imply the patient is forgotten. We attempt to create more value in the healthcare system through payment models so that the patient benefits from it. A further limitation is that all the participants in this study contributed voluntarily. Therefore, the results could be biased towards the participants having a greater knowledge of the topic of this study. We have also not included professionals from the primary care domain, where RPM also plays an important role. This omission may be an indication of a fragmented view of care delivery. It is unclear how these insights translate into the primary care health system and its challenges in introducing RPM solutions. Future qualitative studies may be needed to examine primary care healthcare professionals' views further.

A strength of our work is that we identified a wide variety of barriers and challenges stakeholders face in getting structural reimbursement for RPM. There are reasons to believe that the approach and some of the findings are generalizable, given that many healthcare systems outside the Netherlands may have a similar ecosystem with stakeholders that are required to align to enable RPM solutions to be structurally funded. Moreover, an important advantage of using a qualitative method in data collection is that it allows for open-ended responses from participants leading to more in-depth information acquisition through follow-up discussion on the insights.

Conclusion

In this study, we performed an explorative study to identify barriers and facilitators concerning structural reimbursement of RPM. Subsequently, we aim to identify core principles to accomplish ongoing reimbursement of PRM and turn them into actionable recommendations and core principles. Our results demonstrated that wrong pocket problems, no uniform quality and outcome indicators, lack of willingness to redesign care pathways, and difficulties using cross-sector models were perceived as barriers by all stakeholders. Facilitators are the use of alternative payment models, increased total number of patients per RPM-project, interdisciplinary cooperation and transparency, and the optional reimbursement scheme. This explorative study shows that integrating structural reimbursement goes beyond getting the financial incentives right in paying for RPM. In addition to the possibilities for reimbursement initiated by the government, clear agreements about the content of reimbursement between healthcare insurers and providers are needed to promote the large-scale adoption of RPM in hospital care. Therefore, as healthcare organizations in multiple countries are experiencing a sense of urgency for implementing payment reform, learnings from successes and failures will be critical.

Ethical approval

The ethics committee Leiden-Den Haag-Delft (METC-LDD) approved this project.

Role of the Funder

The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Patient consent

Not required.

Funding

This project was supported by grants KVW-00252 from the Kansen voor West II.

Declaration of Competing Interest

Non declared.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at 10.1016/j.hlpt.2022.100718.

References

[1] Eysenbach G. What is e-health? J Med Internet Res 2001;3(2):1–5. https://doi.org/10.2196/jmir.3.2.e20. Journal of Medical Internet Research.
[2] Pare G, Jaana M, Sicotte C. Systematic review of home telemonitoring for chronic diseases: the evidence base. J Am Med Inform Assoc 2007;14(3):269–77. https://doi.org/10.1197/jamia.M2270.
[3] McManus RJ, et al. Efficacy of self-monitored blood pressure, with or without telemonitoring, for titration of antihypertensive medication (TASMINH4): an unmasked randomised controlled trial. Lancet (London, England) 2018;391(10124):949–59. https://doi.org/10.1016/S0140-6736(18)30309-X.
[4] Hanlon P, Daines L, Campbell C, Mckinstry B, Weller D, Pinnock H. Telehealth interventions to support self-management of long-term conditions: a systematic metareview of diabetes, heart failure, asthma, chronic obstructive pulmonary disease, and cancer. J Med Internet Res 2017;19(5). https://doi.org/10.2196/JMIR.6688.
[5] Hartasanchez SA, et al. Remote shared decision making through telemedicine: a systematic review of the literature. Patient Educ Couns 2022;105(2):356–65. https://doi.org/10.1016/J.PEC.2021.06.012.
[6] Noah B, et al. Impact of remote patient monitoring on clinical outcomes: an updated meta-analysis of randomized controlled trials. NPJ Digit Med 2018;1(1). https://doi.org/10.1038/S41746-017-0002-4.
[7] Houlding E, et al. Barriers to use of remote monitoring technologies used to support patients with COVID-19: rapid review. JMIR mHealth uHealth 2021;9(4):e24743. https://doi.org/10.2196/24743. 2021;9(4)e24743, https://mhealth.jmir.org/2021/4/e24743.
[8] Car J, Koh GCH, Foong PS, Wang CJ. Video consultations in primary and specialist care during the covid-19 pandemic and beyond. BMJ 2020;371. https://doi.org/10.1136/bmj.m3945.
[9] Dirikgil E, et al. Home-monitoring reduced short stay admissions in suspected COVID-19 patients: COVID-box project. Eur Respir J 2021:2100636. https://doi.org/10.1183/13993003.00636-2021.
[10] Schreiweis B, Pobiruchin M, Strotbaum V, Suleder J, Wiesner M, Bergh B. Barriers and facilitators to the implementation of eHealth services: systematic literature analysis. J Med Internet Res 2019;21(11). https://doi.org/10.2196/14197.
[11] Ross J, Stevenson F, Lau R, Murray E. Exploring the challenges of implementing e-health: a protocol for an update of a systematic review of reviews. BMJ Open 2015;5(4). https://doi.org/10.1136/bmjopen-2014-006773. BMJ Publishing Group.
[12] Granja C, Janssen W, Johansen MA. Factors determining the success and failure of eHealth interventions: systematic review of the literature. J Med Internet Res 2018;20(5):e10235. https://doi.org/10.2196/10235. Journal of Medical Internet Research.
[13] J R, F S, R L, E M. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update. Implement Sci 2016;11(1). https://doi.org/10.1186/S13012-016-0510-7.
[14] S L, et al. Barriers and facilitators when implementing web-based disease monitoring and management as a substitution for regular outpatient care in pediatric asthma: qualitative survey study. J Med Internet Res 2018;20(10):e9245. https://doi.org/10.2196/JMIR.9245. 2018;20(10)e284.
[15] F. A. Wilson, S. Rampa, K. E. Trout, and J. P. Stimpson, "Reimbursements for telehealth services are likely to be lower than non-telehealth services in the United States:," https://doi.org/10.1177/1357633X16652288, vol. 23, no. 4, pp. 497–500, Jun. 2016, doi: 10.1177/1357633X16652288.
[16] Mairesse GH, Braunschweig F, Klersy K, Cowie MR, Leyva F. Implementation and reimbursement of remote monitoring for cardiac implantable electronic devices in Europe: a survey from the health economics committee of the European Heart Rhythm Association. EP Eur 2015;17(5):814–8. https://doi.org/10.1093/EUROPACE/EUU390.
[17] Joseph V, West RM, Shickle D, Keen J, Clamp S. Key challenges in the development and implementation of telehealth projects. J Telemed Telecare 2011;17(2):71–7. https://doi.org/10.1258/jtt.2010.100315.
[18] A. M. Lopez, K. Lam, and R. Thota, "Barriers and facilitators to telemedicine: can you hear me now?," https://doi.org/10.1200/EDBK_320827, no. 41, pp. 25–36, May 2021, doi: 10.1200/EDBK_320827.
[19] NZa, "Wegwijzer bekostiging digitale zorg 2020 - Nederlandse Zorgautoriteit," 2020. https://puc.overheid.nl/nza/doc/PUC_280639_22/1/(accessed Sep. 14, 2020).

[20] O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med 2014;89(9): 1245–51. https://doi.org/10.1097/ACM.0000000000000388.
[21] Austin Z, Sutton J. Qualitative research: getting started. Can J Hosp Pharm 2014;67 (6):436. https://doi.org/10.4212/CJHP.V67I6.1406.
[22] Edmunds M, et al. An emergent research and policy framework for telehealth. eGEMs 2017;5(2):1. https://doi.org/10.13063/2327-9214.1303.
[23] J.-P. Heida, R. Miedema, B. Peltenburg, and M. Rijnen, "Meta-inventarisatie uitkomstgericht contracteren en organiseren | Rapport | uitkomstgerichtezorg," 2020. Accessed: Nov. 24, 2020. [Online]. Available: https://www.uitkomstgerichtezorg.nl/documenten/rapporten/2020/07/07/sirm-rapport.
[24] Vlaanderen FP, et al. Design and effects of outcome-based payment models in healthcare: a systematic review. Eur J Health Econ 2019;20(2):217–32. https://doi.org/10.1007/s10198-018-0989-8.
[25] "Zorgverzekeraars Nederland - Document." https://zn.nl/publicaties/document?documentregistrationid=6010568713 (accessed May 20, 2021).
[26] Mantena S, Keshavjee S. Strengthening healthcare delivery with remote patient monitoring in the time of COVID-19. BMJ Health Care Inform 2021;28(1):100302. https://doi.org/10.1136/BMJHCI-2020-100302.
[27] Schäfer W, et al. The Netherlands: health system review. Health Syst Transit 2010; 12(1).
[28] "Ensuring the Adoption of the Health Care Warranty: a Well-defined Model to Resolve Issues with Risk and Uncertainty | Catalyst non-issue content." https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0344 (accessed Oct. 01, 2021).
[29] M Z, H H, DR H, J X, C W-W, S P. Telehealth: advances in alternative payment models. Telemed J eHealth Dec. 2020;26(12):1492–9. https://doi.org/10.1089/TMJ.2019.0294.
[30] M. Bailit, C. Hughes, M. B. A. Bailit, and H. Purchasing, "Issue Brief Key Design Elements of Shared-Savings Payment Arrangements," 2011.
[31] NZa, "Facultatieve prestatie msz aanvragen | Medisch-specialistische zorg | Nederlandse Zorgautoriteit," 2020. https://www.nza.nl/zorgsectoren/medisch-specialistische-zorg/registreren-en-declareren-van-behandelingen/facultatieve-prestatie-medisch-specialitische-zorg (accessed Feb. 03, 2021).
[32] Conrad DA, Grembowski D, Hernandez SE, Lau B, Marcus-Smith M. Emerging lessons from regional and state innovation in value-based payment reform: balancing collaboration and disruptive innovation. Milbank Q 2014;92(3): 568–623. https://doi.org/10.1111/1468-0009.12078.
[33] C. J. Hayes et al., "Utilization of Remote Patient Monitoring Within the United States Health Care System: a Scoping Review," https://home.liebertpub.com/tmj, Jul. 2022, doi: 10.1089/TMJ.2022.0111.
[34] Kelley LT, Fujioka J, Liang K, Cooper M, Jamieson T, Desveaux L. Barriers to creating scalable business models for digital health innovation in public systems: qualitative case study. JMIR Public Health Surveill 2020;6(4). https://doi.org/10.2196/20579.
[35] Van de Ven WPMM, et al. Preconditions for efficiency and affordability in competitive healthcare markets: are they fulfilled in Belgium, Germany, Israel, the Netherlands and Switzerland? Health Policy 2013;109(3):226–45. https://doi.org/10.1016/j.healthpol.2013.01.002.
[36] "NZa biedt ruimte voor meer monitoring op afstand | Nieuwsbericht | Nederlandse Zorgautoriteit." https://www.nza.nl/actueel/nieuws/2021/10/07/nza-biedt-ruimte-voor-meer-monitoring-op-afstand (accessed Mar. 18, 2022).
[37] "Wegwijzer bekostiging digitale zorg 2023 - Nederlandse Zorgautoriteit." https://puc.overheid.nl/nza/doc/PUC_655318_22/1/(accessed Nov. 28, 2022).
[38] H. Jimison et al., "Barriers and drivers of health information technology use for the elderly, chronically ill, and underserved.," Evidence report/technology assessment, no. 175. Agency for Healthcare Research and Quality (US), pp. 1–1422, Nov. 2008. Accessed: Apr. 07, 2021. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK38653/.
[39] Achelrod D, Schreyögg J, Stargardt T. Health-economic evaluation of home telemonitoring for COPD in Germany: evidence from a large population-based cohort. Eur J Health Econ 2017;18(7):869–82. https://doi.org/10.1007/s10198-016-0834-x.
[40] Sikka R, Morath JM, Leape L. The quadruple aim: care, health, cost and meaning in work. BMJ Qual Safety 2015;24(10):608–10. https://doi.org/10.1136/bmjqs-2015-004160. BMJ Publishing Group.
[41] Paone S, Shevchik G. Making a business case for eHealth and teleservices. Health Inform 2013:297–309. https://doi.org/10.1007/978-1-4471-4198-3_20.
[42] Hayen AP, Van Den Berg MJ, Meijboom BR, Struijs JN, Westert GP. Incorporating shared savings programs into primary care: from theory to practice. BMC Health Serv Res 2015;15(1):580. https://doi.org/10.1186/s12913-015-1250-0.
[43] Alders P, Schut FT. The 2015 long-term care reform in the Netherlands: getting the financial incentives right? Health Policy (New. York) 2019;123(3):312–6. https://doi.org/10.1016/j.healthpol.2018.10.010.
[44] de Vries EF, Drewes HW, Struijs JN, Heijink R, Baan CA. Barriers to payment reform: experiences from nine Dutch population health management sites. Health Policy (New. York) 2019;123(11):1100–7. https://doi.org/10.1016/j.healthpol.2019.09.006.
[45] van Vooren NJE, Steenkamer BM, Baan CA, Drewes HW. Transforming towards sustainable health and wellbeing systems: eight guiding principles based on the experiences of nine Dutch Population Health Management initiatives. Health Policy (New. York) 2020;124(1):37–43. https://doi.org/10.1016/j.healthpol.2019.11.003.
[46] de Vries EF, Scheefhals ZTM, de Bruin-Kooistra M, Baan CA, Struijs JN. A scoping review of alternative payment models in maternity care: insights in key design elements and effects on health and spending. Int J Integr Care 2021;21(2). https://doi.org/10.5334/IJIC.5535.
[47] Porter ME. What is value in health care? N Engl J Med 2010;363(26):2477–81. https://doi.org/10.1056/NEJMp1011024.
[48] Gajadien CS, Dohmen PJG, Eijkenaar F, Schut FT, van Raaij EM, Heijink R. Financial risk allocation and provider incentives in hospital–insurer contracts in The Netherlands. Eur J Health Econ 2022;1:1–14. https://doi.org/10.1007/S10198-022-01459-5/TABLES/4.