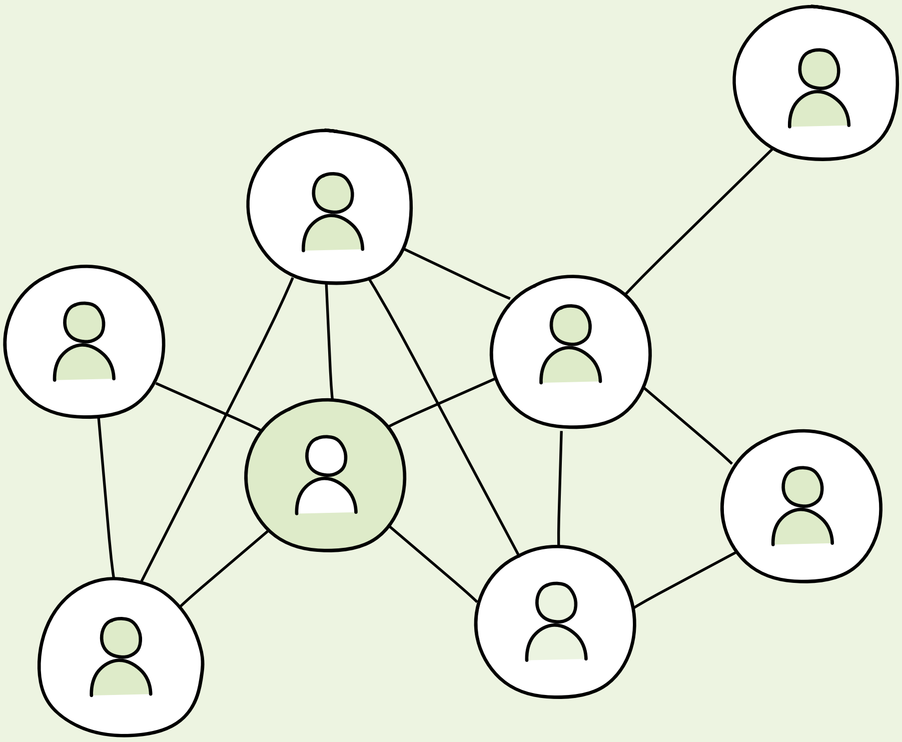
A patient-centred healthcare network for orthopaedic hand and wrist care



Violet van Tilburg

Master thesis
MSc. Strategic Product Design, TU Delft
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Preface

Dear reader,

Hereby I present my graduation project for the Master's programme in Strategic Product Design at the Delft University of Technology. Before I introduce my project, I would like to express my gratitude to the people who have helped make this possible.

First of all, to all the people willing to participate in my project: the people undergoing treatment for their hand and wrist who wanted to share their experience in this care system, and all the healthcare providers from different hospitals and care institutions who were willing to give their time and input. Their contributions have been an essential and valuable part of my project.

I would also like to thank the RHOC for providing me with this opportunity. In particular, I would like to address Mirek Karel and Gerald Kraan, who have guided me with their expertise and knowledge, but especially their infinite enthusiasm. Their belief and passion for this project were contagious and gave me the extra energy to bring this project to a successful result.

Furthermore, my supervisors Marijke Melles and Hilbrand Bodewes steered me during this design process and assisted me whenever I needed it.

Last but not least, Hannah and Marije, who were with me during the rollercoaster of graduation, pulled me through and supported me during the many coffee and study breaks in the sun.

The subject of my thesis is complex and still at the beginning of its development. This brought challenges in finding a focus and caused me to get lost at times. However, after five months I can say that I have completed my graduation project, and I proudly present my project on patient-centred network health care.

Enjoy!

Violet

Executive Summary

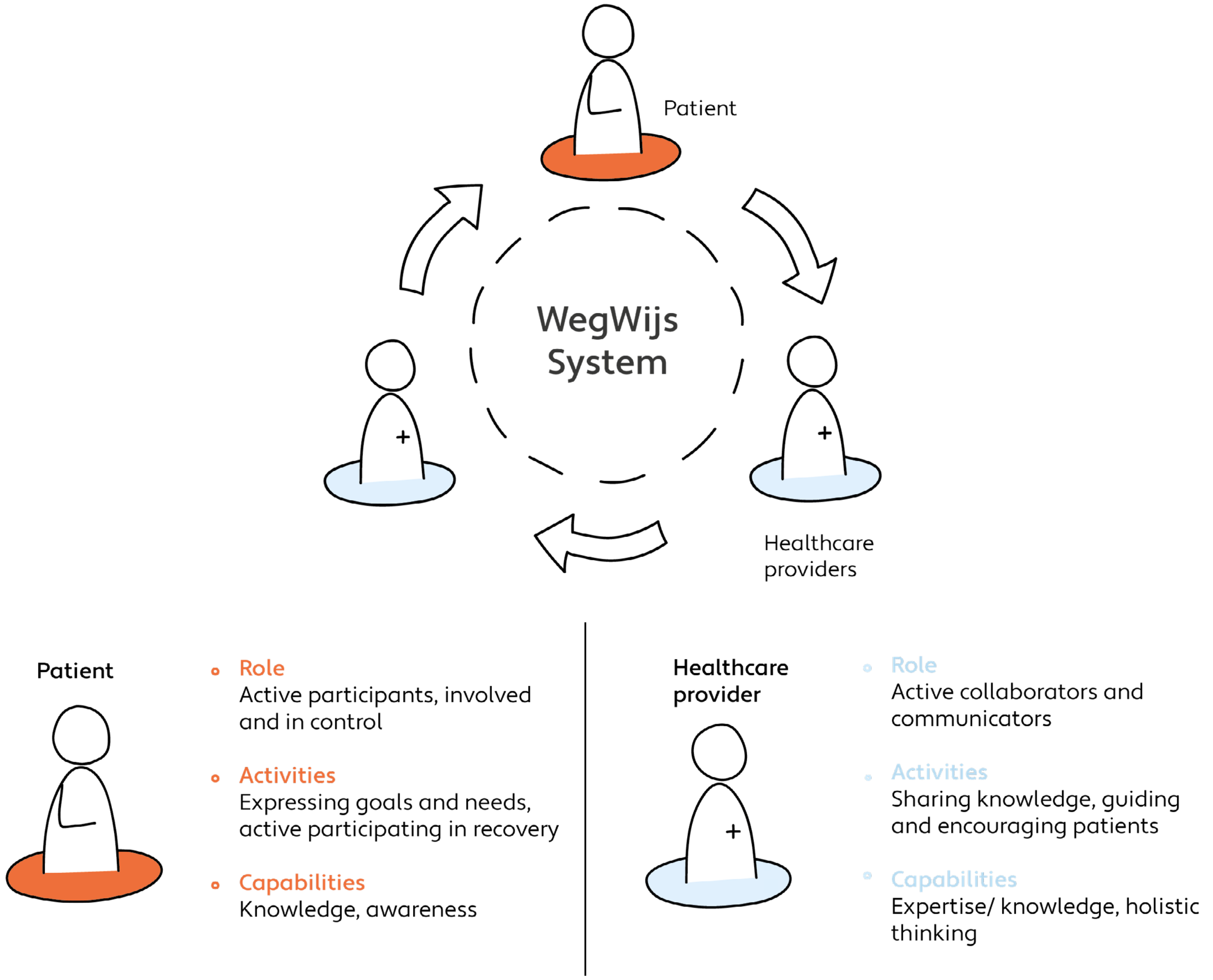
This thesis is initiated by the Reinier Haga Orthopaedic Centre (RHOC) and shows the creation of a patient-centred healthcare network for orthopaedic hand and wrist care. A healthcare network can be defined as a group of interconnected stakeholders that directly or indirectly influence the patient’s care. In this project, the involved stakeholders are people undergoing treatment for their hand and wrist and healthcare providers from seven disciplines; orthopaedic surgeons, hand therapists, general practitioners, plaster technicians, orthopaedic instrument makers, rheumatologists and rehabilitation physicians.

A literature review and a user research study sketch the context and underlying problem. The context is shaped by ongoing developments that cause an increase in the care demand, an increase in healthcare costs, empowered patients and digitalisation. This asks for care that is efficient and gives patients more control. Currently, both are lacking in orthopaedic hand and wrist care. The user research, which consists of interviews with the stakeholders, shows that patients are not feeling involved, and inefficient guidelines and lack of cooperation prevent an efficient treatment process. The hand and wrist is a speciality within the medical field of orthopaedics. It entails a wide range of care disciplines that could benefit a well-connected network, which is currently missing. This prevents effective cooperation, which research showed would lead to more efficient and improved care, fewer treatment sessions and a reduction in costs (Ypinga, 2018).

The developed design aims to create more involvement of the stakeholders in the orthopaedic hand and wrist care and active participation of the patient. This design is developed through ideation using the “How-Tos” method, which resulted in three ideas that three healthcare providers reviewed. This approach gave insight into the aspects that were perceived as most relevant by them. These were: an overview of the whole treatment, which helps in contacting other healthcare providers, holistic treatment and patient involvement. In addition, allowing patients to set a goal for their treatment allows for more control and better treatment. With this input, the concept of WegWijs is developed and evaluated with patients.

WegWijs means to be wise, informed and in control in healthcare. It provides all the stakeholders with the knowledge needed to create a holistic and patient-centred care process by providing an overview of the treatment process and the involved parties. The patient actively shapes their treatment by formulating a treatment goal and co-creating their treatment plan with the doctor. The care providers remain actively involved throughout the process and in close contact with each other, creating a well-connected healthcare network. Two patients and two healthcare providers validated these aspects.

The established implementation strategy outlines the required steps that include the co-creation of new protocols and the execution of a pilot. However, further research is needed to develop this concept and implement it in the RHOC, and eventually in the wider healthcare system.



	Patient	Healthcare provider
Role	Active participants, involved and in control	Active collaborators and communicators
Activities	Expressing goals and needs, active participating in recovery	Sharing knowledge, guiding and encouraging patients
Capabilities	Knowledge, awareness	Expertise/ knowledge, holistic thinking

Figure A. The WegWijs system and the associated newly defined roles of the healthcare provider and patient

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Chapter 1

Project Introduction

This first chapter introduces the topic of my thesis, namely patient-centred network healthcare in the context of the Reinier Haga Orthopaedic Centre. It elaborates on the background and motivation for this project, how it is framed and the desired goal of the project: to design a patient-centred resilient healthcare network for orthopaedic hand and wrist care. Finally, the approach of this project, which is based on a design process model, will be discussed which also explains the structure of my thesis.

1.1 Project background

The Reinier Haga Orthopedisch Centrum (RHOC) is the largest centre for orthopaedic care in the Netherlands. The centre is an initiative of the Haga Hospital in the Hague, the Reinier de Graaf Hospital in Delft and the LangeLand Hospital in Zoetermeer. Twenty orthopaedic surgeons from the three hospitals, each with their specialisation, work here and provide orthopaedic care for their patients. RHOC collaborates with general practitioners, physiotherapists, other medical specialists (rehabilitation physicists, rheumatologists, trauma surgeons, e.g.) and home care organisations to provide care around the recovery.

The goal of the RHOC is to offer the best care for their patients and to “maintain and where possible improve the quality of your life”. They say they put the patient in the centre of their care by working with personalised treatment plans, taking into account not only the symptoms but also the cause of the problem (OC Zoetermeer tilt zorg naar hoger niveau, 2020). However, due to long waiting periods, the required care can take a while. The waiting time for the orthopaedic department of hand and wrist was measured as 38 days on May 2022 (Wachttijden Poliklinieken (in dagen), 2022). This is increasing because an orthopaedic care process consists of several care providers, which accumulates waiting times and prolongs the patient’s recovery.

A network is a structure consisting of members with links that connect them. Network services are aimed at enabling connections and exchanges between people. Networked healthcare means an organisation with interconnected members, which is less hierarchical and more reliant on the self-organisation of the network members (Fjeldstad et al., 2020). A lack of inter-professional collaboration between different healthcare providers can result in a lack of efficiency, loss of knowledge and miscommunication. A clear link has been demonstrated between inter-professional miscommunication and poor patient outcomes. Patients often feel lost in the healthcare system and in between different professions and medical opinions (Stewart, 2017).

Currently, a new path is being pursued in the domain of healthcare, which is the shift from a doctor-centric model to a patient-centric model. Patients will demand more information about health issues and more access to their health data, which allows them to monitor their behaviour and health status. This will provide them with more control over their care (Enders et al., 2013). Patient-centred care is about involving the patient in the entire process (Ponte et al, 2003). And treating the patient as a unique individual, seeing them as a person rather than a patient (Redman, 2004).

The goal of this project is to develop an orthopaedic hand and wrist care network and infrastructure that connects the patient with healthcare providers and connects the services and workflows for optimal patient-centred treatment. The focus will be on hand-wrist care within the scope of the RHOC. This focus was chosen because it is a defined specialised area in healthcare, where multiple stakeholders are essential in recovery. This makes it a good case study for creating a healthcare network. The patient is treated by both the hand therapist and the orthopaedic surgeon and they are both involved in the patient’s recovery, sometimes in collaboration with healthcare providers that produce wrist braces and additional parties that will be specified in Chapter 2.3. This small network will be my starting point for designing a new patient-centred healthcare network, with redefined roles, an implementation strategy and a future vision for the new positioning of the RHOC.

1.2 Project approach based on a design process model

The project process is structured based on the Double Diamond model, launched by the Design Council in 2004 (Design Council, 2019), and corresponds to the structure of this report. This model describes the different phases of the design process, which are divided into four phases: discovery, definition, development and delivery, as illustrated in Figure 1.

Discover (Chapter 2 & 3)

The first phase is the discovery phase. This divergence phase shows the context of healthcare and hand and wrist orthopaedics, explored through a literature review, as described in Chapter 2. This helps to analyse the context in which the design is made. In addition, in Chapter 3, user research is carried out by conducting interviews with stakeholders and observations in the field. This provides insight into the current situation and the subject and helps to discover the pain points in the current process.

Define (Chapter 4)

In this phase, the insights and knowledge from the previous phase are translated into the formulation of a design brief. The problem is defined, and the design direction is determined based on the insights gathered in the research phase. The design brief describes the cause of the problem, the design goal, the design and solution direction and the vision for the RHOC.

Develop (Chapter 5)

The second divergence phase begins with the results of the definition phase. In this phase, the first ideas are developed using the solution directions from the design brief. With a feedback session with health care providers and an input session with patients, these ideas are further developed into a concept.

Deliver (Chapter 6 & 7)

In the last phase, the whole process converges to the final results. The concept is elaborated into a future network with well-defined roles for all stakeholders, and a strategy for implementation is outlined in Chapter 6. Finally, the final design is validated and evaluated by several stakeholders in Chapter 7. The report concludes with a discussion on the design goal and recommendations for the RHOC.

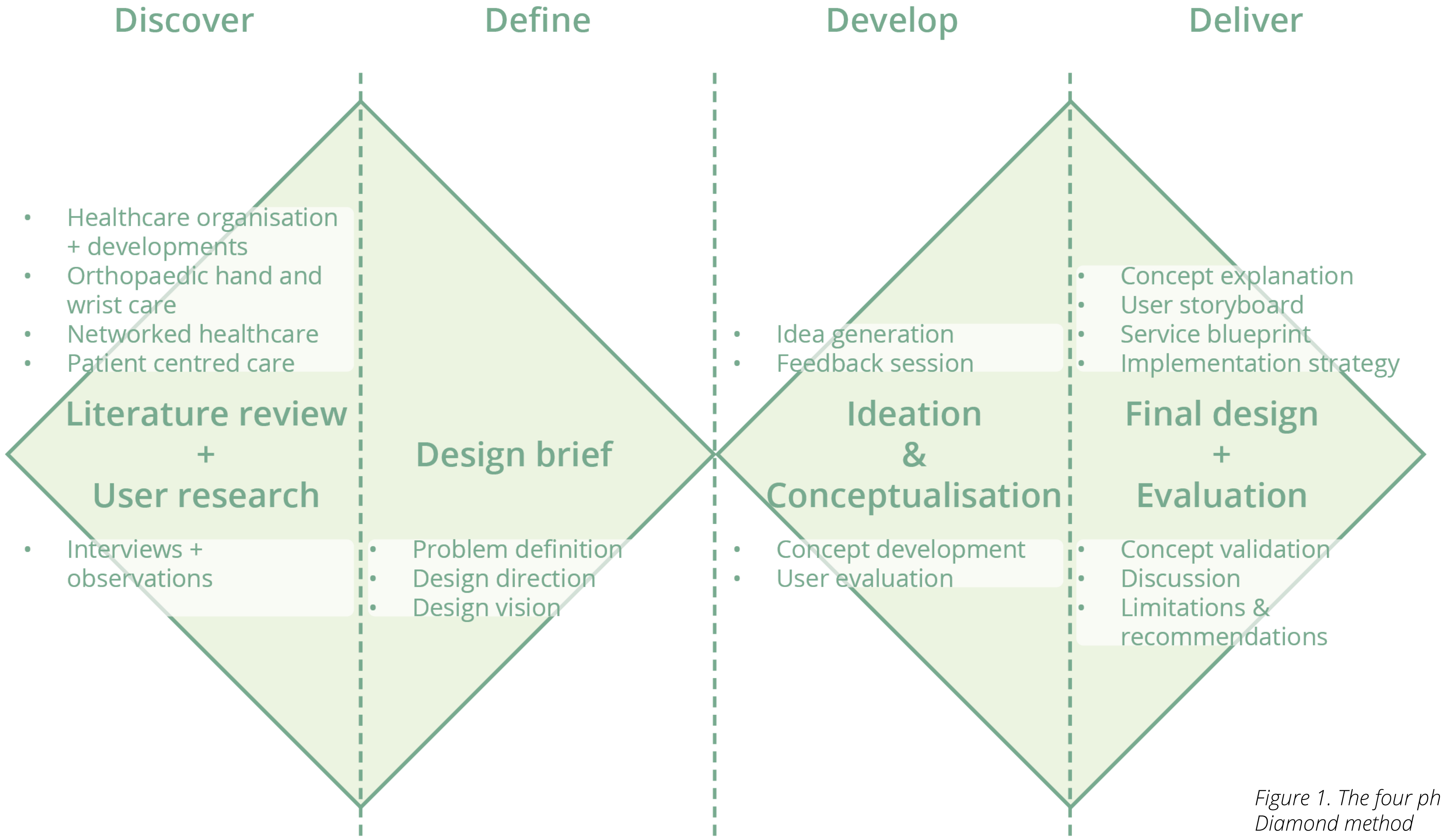


Figure 1. The four phases of the Double Diamond method

Chapter 2

Literature Review

In this chapter, the context of the project will be explored in depth through a literature study. A literature review is a method that is carried out to investigate and evaluate the existing literature on the subject in question. For this purpose, various sources are consulted, such as web pages, reports, scientific articles and books. This provides a basis for the concept to be designed.

Orthopaedic hand and wrist care take place within the context of the Dutch healthcare system. Before delving into the specific topic, it is important to outline this context further. First, a picture of healthcare, its organisation in the Netherlands and the macro-developments that will determine the future of healthcare will be sketched, to get an idea of the context for which the project will be designed. The medical field of orthopaedics and the hand and wrist speciality is then addressed, providing insight into this field and describing the key stakeholders in this care. In addition, networked healthcare will be investigated in terms of social network structures, networked healthcare in the Netherlands and existing healthcare networks. Networked care has attracted a lot of international attention and is seen as the future of care. However, not much is known about it yet and it is hardly applied, certainly not in the Netherlands. To gather more background information and to map what is already known, this literature study is conducted. Finally, patient-centred care will be further investigated, the co-production of healthcare services and the attributes that contribute to the patient's perception of the quality of care, to see how this approach can be used by the RHOC.

2.1 Organisation of healthcare in The Netherlands

Designing for the RHOC means designing something in the context of the healthcare system in The Netherlands. This requires an understanding of how this system is organised, the healthcare laws that apply in the Netherlands and how the different parts of the healthcare system are classified and discussed. In addition, it will specify which stakeholders are relevant in this context of hand and wrist care. These include the health insurers, the citizens and the care providers, in which the general practitioner plays an additional role

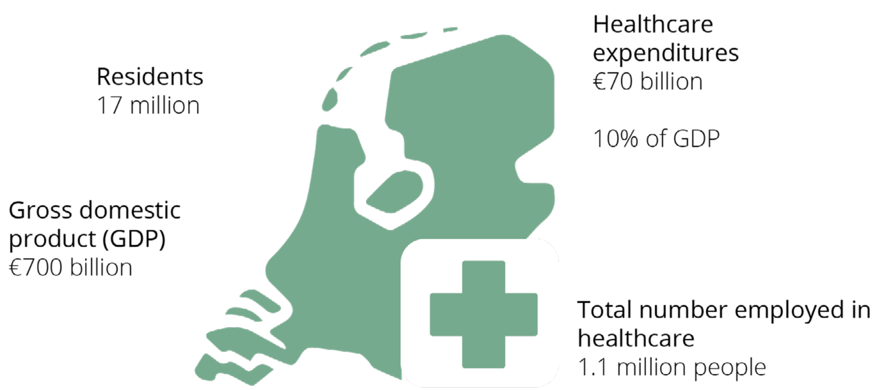


Figure 2. Statistics on healthcare in The Netherlands (Ministerie van Volksgezondheid, Welzijn en Sport, 2016).

The Dutch health care system is based on international principles: access to care for everyone, solidarity through health insurance that is compulsory and accessible to everyone and good quality care. The Dutch healthcare system consists of four system laws: the Health Insurance Act (Zorgverzekeringswet), the Long-Term Care Act (Wet langdurige zorg), the Social Support Act (Wet maatschappelijke ondersteuning) and the Youth Act (Jeugdwet) (Ministerie van Volksgezondheid, Welzijn en Sport, 2016).

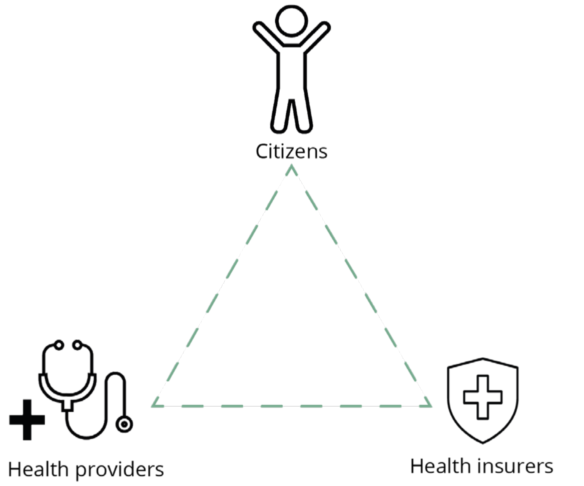


Figure 3. Relevant stakeholders in the healthcare system (Ministerie van Volksgezondheid, Welzijn en Sport, 2016)

The Health Insurance Act covers standard care, e.q. visits to the general practitioner or when to be admitted to the hospital. The execution of this act is taken care of by private health insurers and is based on a demand-driven system. Since citizens can choose their health insurance provider they exert influence on the policy of health insurers. Health insurers in their turn can influence the efficiency and quality of care provided by healthcare providers. In the end, the healthcare providers decide on how care is delivered.
In the care system, the general practitioner (GP) has a central role. The GP determines what care is needed and can provide a referral to a specialist when this is necessary. They act as the gatekeeper from the first to the second line of care. This is important and contributes to the quality of care; care in the first line is cheaper but also more accessible and quicker for the patient (de Jong et al., 2016). The GP must refer patients efficiently and with restraint, once in the second line, the GP has little influence on the patient's care. The first line of care includes GP's, dentists, physiotherapists etc. The second line of care consists of the specialists for which a referral is needed, e.g. health providers in hospitals, revalidation care and psychological care (Verschil eerstelijnszorg en tweedelijnszorg , n.d.).

Conclusion

Citizens, health insurers and care providers can influence the care that is provided. Health insurers respond to the demand for care by targeting a large group of people. The citizens have the freedom to choose their health insurance and the healthcare providers determine how the care is delivered.
The project focuses on the development of a healthcare infrastructure that, among other things, leads to more efficient care. As far as the course of the care process is concerned, the general practitioner plays an important role.
The GP chooses whether to refer patients to the orthopaedic surgeon or to treat them in the first line. They will therefore be counted among the relevant stakeholders that play role in hand and wrist care.

2.2 Macro developments that shape the future of healthcare

Many ongoing and expected developments will shape the future of healthcare. Trend analysis has been carried out to identify these developments, looking at four macro-factors, namely demographic trends, economic trends, technological trends and socio-cultural trends. These factors influence the organisation indirectly and can only be influenced to a limited extent by the organisation. The most important changes that require or cause a shift in the care offer will be explained. The concept to be designed in this project must fit the RHOC in the context formed by these factors.

Increasing demand for care (demographic)

The Dutch population is ageing due to the growing number of elderly and a rise in life expectancy. This will increase the care demand, both formal care and informal care, which is caused by the increase of elderly living alone while, relatively speaking, fewer children can help out (from 1 to 10, to 1 to 4 in 2040) (Rijksinstituut voor Volksgezondheid en Milieu, 2018b). Whereas the care already copes with a shortage of healthcare staff that is only expected to continue to increase in the next ten years (Scheffe, 2022).
In 2030, almost a quarter of the Dutch population will be 65 years of age or older, and the number of over-85s will be increased by 48,7% in 2030 compared to 2017 (Rijksinstituut voor Volksgezondheid en Milieu et al., 2019). This means that in the coming years, age-related diseases, i.e. those occurring mainly at older ages, will increase much more rapidly than other diseases. In addition, due to the ageing of the population, more people will use care due to musculoskeletal disorders. The number of people visiting medical specialists and hospitals will increase; for rheumatoid arthritis, this increase is 13,9 per cent due to demographic changes. The use of care for middle-aged conditions will increase at a much slower rate because the total middle-aged population will remain roughly the same in the coming years.

Increase in healthcare costs (economic)

Healthcare expenditures are increasing by an average of 2.9 per cent per year and will have doubled in 2040 compared to 2015 (Rijksinstituut voor Volksgezondheid en Milieu, 2018a). Besides the ageing of the population, technological development is also a cause. These developments include new (often expensive) medications, new equipment and technical appliances. Although developing these new techniques is a significant expense, they can also lead to cost savings.
For example, more effective medications or a technical appliance that can remotely check how a patient is doing can result in fewer hospital appointments, thus saving costs.
Our ageing population means that the costs of caring for musculoskeletal disorders will increase. For example, the cost of hospital care and medical specialists for gout will increase by 24.2 per cent, from €14.2 million in 2017 to €17.6 million in 2030 (Rijksinstituut voor Volksgezondheid en Milieu et al., 2019).

Patient empowerment (socio-cultural)

The patients' role and their demands for care are changing. They are becoming more critical of their care and their healthcare providers. Consumers increasingly use technology and apps to measure and maintain their health (Betts et al., 2020). This, and information that is more transparent and readily available due to the internet, will result in patients taking more control over their health. They will be able to compare options, prices and specialists and choose their healthcare insurers and providers. Patients will demand more information about health issues and more access to their health data, which allows them to monitor their behaviour and health status. This will give them more control over their care (Enders et al., 2013).

Digitisation (technologic)

Internet and mobile network technology are increasingly being used with Internet of Things devices. Forms of traditional care can therefore integrate with new digital forms such as video calling, home automation and e-health applications. This evolution accelerated during COVID-19 and will probably continue. These developments make care more flexible and accessible (Spijkman, n.d.). The rise of e-health will make care from home possible, more accessible during recovery, and allow patients to go home earlier while still being monitored. This could save time and costs and prevent unnecessary doctor appointments. In this scenario, the patient is increasingly part of a physical and digital network in which various healthcare providers work together. Digital care providing and monitoring with digital devices give access to a big amount of data that can provide valuable insights to optimise care.

Conclusion

These macro-developments manifest in an increasing demand for care, an increase in healthcare costs, empowered patients and digitalisation, paint a picture of the future of healthcare and offer opportunities for developments within orthopaedic hand and wrist care. An efficient treatment process with an effective result, without unnecessary costs and appointments is becoming increasingly important. This is due to the increasing demand for care, while the sector suffers from a shortage of personnel in relation to the number of patients requiring care.
When designing orthopaedic hand and wrist care, the accessibility and effectiveness of the current care system must be considered and subsequently addressed in the new design. Furthermore, the extent to which patient empowerment plays a role in orthopaedic hand and wrist care should be investigated. Technological developments can provide new opportunities; for instance, e-health can contribute to involving patients in the physical and digital network of care providers. This requires research into networked care and existing network solutions.

2.3 Orthopaedics

As the Reinier Haga Orthopaedic Centre initiated this project topic, knowledge of what orthopaedics is forms the basis for designing a concept for this company. The focus within orthopaedics is on the speciality of hand and wrist care, making further insight into this area highly relevant. It addresses the specific challenges characterising this area, the consequences for the patients, and the relevant stakeholders within this care speciality.

Orthopaedics is a medical speciality that deals with treating disorders of the musculoskeletal system. Orthopaedic surgery is the branch of medicine concerned with diseases, injuries, and conditions of the musculoskeletal system relating to the body's muscles and skeleton. This includes the joints, ligaments, tendons, and nerves.

In the Netherlands, orthopaedic surgeons receive broad training, enabling them to treat all patients with musculoskeletal complaints. Since 2018, they choose one or two specialisations during their education ("De Orthopedisch Chirurg Wordt Steeds Meer Specialist," 2018).
An orthopaedic surgeon (OS) is a specialist in the second line of care, requiring a general practitioner referral. Patients often see an orthopaedic surgeon if they have pain in the musculoskeletal system. An OS can offer several treatments: conservative treatment or surgical treatment. Conservative treatment is without surgery and may include physiotherapy, pain medications, a splint or brace prescription. Surgical treatment can consist of replacing a joint or placing a splint in the event of a bone fracture. The treatment aims to reduce pain and improve or restore mobility (Wat is orthopedie?, n.d.).

Hand and wrist speciality

The hand and wrist is a complex area; see Appendix A1 for the anatomic explanation. Its anatomy allows for wide mobility and flexibility and makes it prone to complicated injuries. The complexity of this area can present challenges for diagnosis and treatment. Misdiagnosis or inadequate treatment can lead to discomfort, chronic pain, or the inability to perform daily tasks. The implications of seemingly minor injuries can be significant and result in missing work. This has a major impact on the individual's personal life, as well as financially; 65% of the total costs are caused by indirect costs of productivity loss, compensation, sickness/injury benefits etc. (Robinson et al., 2016).

In 2017, 24% of men and 35% of women aged 12 years and above suffered from a movement restriction due to joint problems in the hand, wrist or elbow (Centraal Bureau voor de Statistiek, 2019). In 2016, 160,250 hand/wrist injuries were reported in the Netherlands, of which 57% were male. The age range went from 0 to 107, with the mean age of 33 years of people suffering from hand and wrist complaints (van Leerdam et al., 2021). General practitioner care expenditure on hand/finger symptoms/complaints is 13.6 million euros, and wrist symptoms/complaints are 6.4 million euros (Rijksinstituut voor Volksgezondheid en Milieu et al., 2019).

Important stakeholders within the hand and wrist care

Orthopaedic hand-wrist care consists of multiple stakeholders. For a complete picture of the whole process, the most important stakeholders are identified with the help of an orthopaedic surgeon so they can get included in the research in Chapter 3. An overview of these stakeholders can be found in Figure 4, and a first simplified overview of the care process, also in consultation with the OS, with the four main involved disciplines, can be found in Appendix A2.

Patient

The patient is the essential stakeholder in this orthopaedic hand-wrist care network; RHOC mentions putting the patient first. The patient requires care and has to deal with one or more healthcare providers to receive the required care during this treatment process.

General practitioner (GP)

The General Practitioner is the gatekeeper between the first and second line of care. The GP assesses the patient based on their knowledge and their indicated hand and wrist complaints. Based on the patient's story and the physical examination, a policy is drawn up for which the NHG (Nederlands Huisartsen Genootschap) guidelines can be used, possibly with a clear diagnosis. This includes issuing the patient a referral to a specialist or treatment in the first line of care.

Hand therapist

The hand therapist focuses on conservative treatment for complaints of the hand and wrist by performing exercises. This treatment can remedy the complaints in itself or be part of the treatment process before or after surgery. It aims to eliminate or reduce pain, swelling, stiffness, tingling or loss of strength so that daily activities can be continued as well as possible.

Orthopaedic surgeon (OS)

An Orthopaedic Surgeon is a medical specialist who treats patients who suffer from complaints of bones, tendons, muscles and joints. The OS draws up a diagnosis and treatment plan based on photos and physical examination. An OS's treatments can consist of simple interventions or complex operations. The treatment aims to make patients mobile again and/or to reduce pain.

Plaster technician

The plaster technician, also known as the orthopaedic technician, is the practitioner in the plaster room located in the hospital. The plaster technician is an independently working care provider who applies plaster casts on behalf of various specialists. The plaster technician looks at the diagnosis made, the patient himself and the wishes of the specialist for the production of the plaster brace.

Orthopaedic instrument maker

An orthopaedic instrument maker mainly focuses on orthotics, especially the hand and wrist. They produce custom-made 3d-printed braces based on a 3D-scan of the hand. The braces are made from durable materials for long-term use.

Rehabilitation physician

A rehabilitation doctor looks at how someone with a chronic condition can participate in society as much as possible within his possibilities.
After surgery, a specialist may choose to send the patient to a rehabilitation physician. 20% of patients come to rehabilitation (mainly referred by the plastic surgeon); these tend to be complicated and complex cases. This includes cases where a tendon or nerve is broken, or something is replaced. The remaining 80% goes to a physiotherapist for treatment.

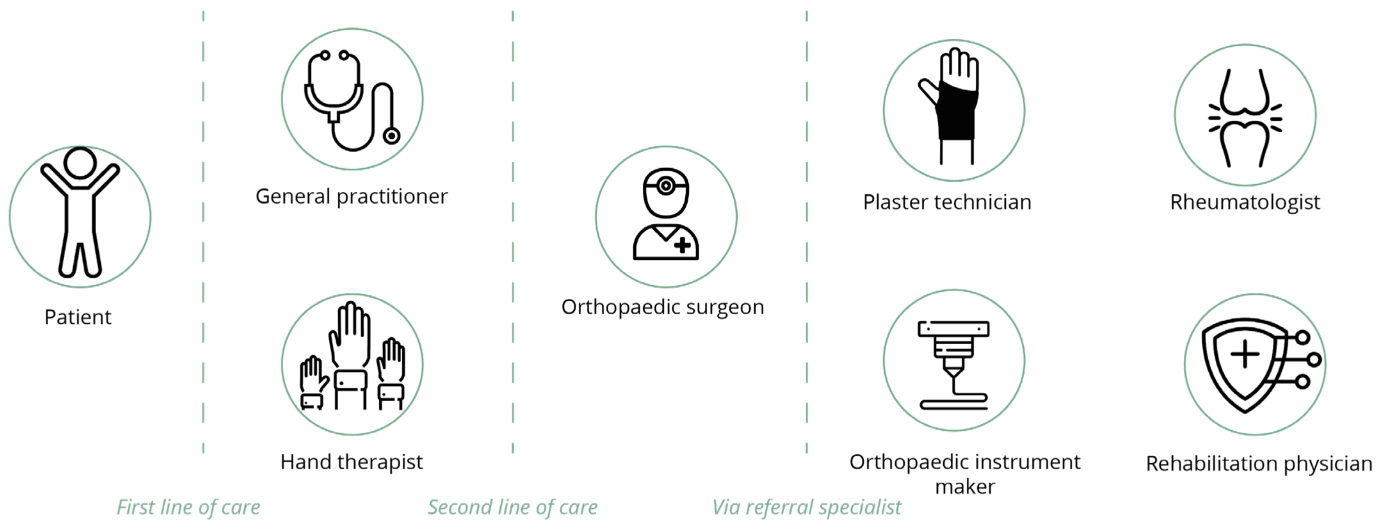


Figure 4. An overview of the most important stakeholders in the hand-wrist care as identified by an orthopaedic surgeon

Rheumatologist

The rheumatologist treats complaints in the joints, muscles or bones caused by inflammation. The most common condition is rheumatoid arthritis. The rheumatologist diagnoses patients and treats them by prescribing medication, giving an injection or referring them to a physiotherapist.

Conclusion

Orthopaedics is a medical speciality that deals with disorders of the musculoskeletal system. Treatment can be non-operative (conservative) or operative. Hand and wrist is a speciality within the orthopaedic field. The complexity of this area makes diagnosis and treatment a challenging task, while its complications can have significant consequences for the community. Not only because the physical pain hinders daily activities, but it also leads to high medical costs and absenteeism with all the associated financial consequences.

The hand and wrist area is complex, and the treatment involves many stakeholders. Therefore, this area could benefit from a networked structure that facilitates cooperation, which could allow them to complement each other's discipline, resulting in better treatment for the patient. The stakeholders who are part of the orthopaedic hand and wrist care and who will be involved in this project are limited to eight parties, namely: patients, an orthopaedic surgeon, a general practitioner, a hand therapist, a plaster technician, an orthopaedic instrument maker, a rehabilitation doctor and a rheumatologist.

2.4 Networked healthcare

Orthopaedic hand and wrist care represent all healthcare providers who are part of this process, which can form a network together. A care system with poorly connected healthcare providers that work insufficiently together can have negative consequences for the patient. This project is aimed to design a well-connected network that connects patients with healthcare providers. For this, research is needed into constructing a healthcare network, existing networks and theories.

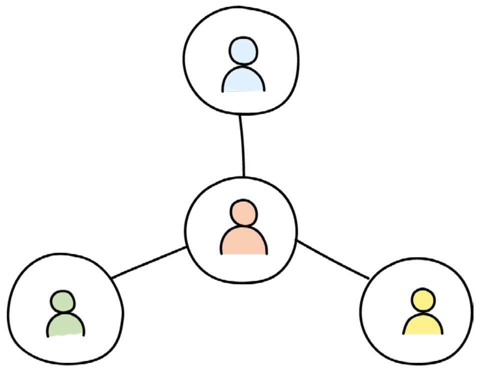
A *healthcare network* can be defined as a group of interconnected stakeholders that directly or indirectly influence the patient's care and health. The use of the word network in this context often refers to collaboration and is used to describe the relationship between people, groups or organisations. A network enables patients and healthcare providers to collaborate in co-creating and co-producing healthcare services. Such a network can be pretty complex, as the realisation of care often requires multiple stakeholders, and is getting even more complex over the years as more stakeholders want to have an influence and the roles of the stakeholders are changing (Pesse et al., 2006).

Network services are aimed at enabling connections and exchanges between people. This focus results in a shift in the organisational structure that is more actor-oriented. The work is not oriented top-down but relies on a more horizontal structure with collaboration and communication between all actors. This organisational, architectural structure has three elements: 1) the actors, the people and organisations that play a part in the process; 2) a system where knowledge and resources are shared and 3) protocols, processes and infrastructures that enable and guide this multi-actor collaboration (Fjeldstad et al., 2020).

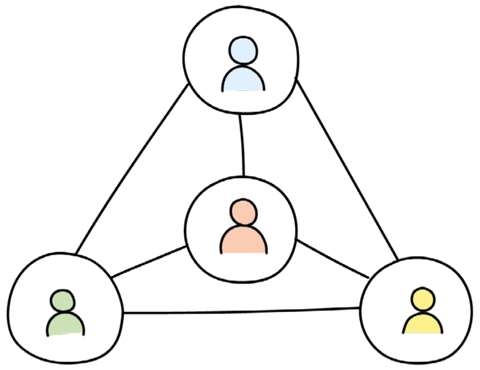
Social network theory

A social network consists of 'nodes', the people or groups, and the links that describe the relationship between them. In the literature on this topic, two leading theories are widely discussed, visualised in Figure 5. First, there is the "closure theory" (Coleman, 1990) that argues that a social network with a high density, where everyone is connected, facilitates trust and reliable communication channels. The second theory is the "structural holes theory" (Burt,1992), where people do not interact closely, which provides the opportunity to broker information between groups, which gains a competitive advantage as they are less homogeneous and can come up with better solutions.

A study has found that hierarchy and brokerage are important features for quality-related performance rather than density in a knowledge-sharing network. This means leaders of subgroups act as connectors between those groups rather than a network where everyone is connected (Rangachari, 2008).



Strucural Holes Theory



Closure Theory

Figure 5. Structural Holes and Network Closure

A systematic review of healthcare networks and their influence on healthcare quality and safety (Cunningham et al., 2011) shows that creating cohesive, collaborative networks can help coordinate care and contribute positively to quality and safety issues. Here, leaders who act as connectors between different groups and parts of the network are vital since they can arrange communication and trust in the network. A vulnerability of this composition is that the network relies heavily on those players. Another challenge in creating coherent inter-professional collaboration is "homophily", the phenomenon in which people tend to cluster with people they like, often people who are similar to themselves. This challenge can be addressed through active connectors between these subgroups. An effective network that promotes communication and builds trust seems to affect the people who are part of it positively. They contribute to an effective organisational structure which provides a foundation for social networks but can also enable effective healthcare organisations (Cunningham et al., 2011).

Networked healthcare in The Netherlands

In The Netherlands, there is a type of care where several healthcare providers are involved in the same treatment, which is referred to as chain care. Chain care consists of a sequence of steps and is supply-oriented, and is mainly applied to chronic diseases. However, this type of care has only a minimal impact on the quality of care and on the saving of costs, which can be ascribed to the fact that only the first line is involved (Valentijn & Arends, 2019). In networked healthcare, care providers from the first and second line of care work together to decide in mutual understanding with the patient, what care the patient needs and when. This type of care is demand-driven, with the essence that the patient has control over his care (Rennink, 2019).

However, vertical cooperation between the first and second lines is complicated for several reasons. First of all, this has to do with exchanging patient information via an electronic patient record (EPD). And, as Fjeldstad (2020) states, to realise network services, a system is needed to share knowledge and resources. The complexity lies in the different software systems used by hospitals and organisations, which are unable to communicate with each other. Data protection legislation (AVG) makes this even more difficult, as various privacy regulations must be complied with. In addition, there is a lack of interdisciplinary guidelines and protocols, and multidisciplinary education and training for healthcare professionals (Valentijn & Arends, 2019).
In addition to organisational change, networked healthcare requires a shift from the individual healthcare providers. They require skills in collaboration and knowledge sharing as well as receptiveness to input from others. This needs trust in each other's knowledge and skills (Rennink, 2019).

Existing care networks

There are a few initiatives for network creation in the health sector. However, these are limited and good examples are hard to find. Two initiatives that were found are explained below. Their description includes the purpose and function, and in addition, research is brought in to examine their effects. This provides insight into the existing solutions in this area, which elements are effective and what is still lacking.

ParkinsonNet

In Parkinson care, 19 disciplines are involved, making the care complicated. The individual care provider often treats only a few people with Parkinson's and therefore has little experience and knowledge about this disease. Furthermore, there is little contact between the different healthcare providers (ParkinsonNet, 2020).
ParkinsonNet is an initiative of the Radboudumc that facilitates a network around people with Parkinson's disease and 3400 Parkinson specialists. It aims to increase cooperation and expertise between different healthcare providers, with the patient being central in their care.
ParkinsonNet offers training, develops treatment guidelines and connects healthcare providers and people with Parkinson's disease. Research has shown this leads to better contacts within the network: 43% more contacts (Van der Eijk, 2015), and this better cooperation has been shown to lead to more efficient and improved care. Research has also shown a reduction in costs, fewer treatment sessions and fewer complications (Ypinga, 2018).

ParkinsonNet focuses mainly on connecting the care providers and thus improving the quality of care. This, of course, also has positive consequences for the patient. However, it brings little or no change regarding the role of the patient in their care and the network.

Patient Journey App

The Patient Journey App is an application that aims to improve the role and experience of patients with musculoskeletal disorders during their perioperative period. The underlying theory states that dosed information provision via an application enables patients to take control of their treatment.
One hundred hospitals and clinics use the Patient Journey App in over 20 countries.
It educates patients by providing information about their care so they can actively participate. It monitors patients remotely, allowing intervention when necessary.
A study by Willems et al. (2021) examined the app's user experience. The patients expressed their likeness to the app caused by the additional information provided and would recommend it to others. However, the app had an insufficient impact on improving confidence to discuss health with others and to more actively manage their care. Given explanations entail a lack of personalised information provision, lack of contact with healthcare providers and generalised protocols (Willems et al., 2021).

The Patient Journey app focuses on the role of the patient and how they can be more involved in their care and the network. The aspects that are missing in ParkinsonNet. However, the research found shows that merely providing general information does not reach the intended result.

Conclusion

Networked healthcare could provide value to the complex care of the orthopaedic hand and wrist care. The organisational structure of such a network consists of involved parties between whom trust is important, and an information exchange system and clear protocols to make this multi-actor cooperation possible. However, the current healthcare system lacks these last two elements, complicating cooperation between different parties. ParkinsonNet meets these requirements, with clear positive results. However, it still lacks in strengthening the role of the patient in their care, which the Patient Journey app attempts but does not succeed due to a lack of personalised information. Whereas patient-centred care is a core value for networked care. Both discussed solutions fall short, offering room for development and asking for additional research on this topic.

2.5 Patient-centred care

An ongoing path that is being pursued in healthcare is the shift from a doctor-centric model to a patient-centric one. This concept is not new, but it is still relevant today, keeping in mind the trend of patient empowerment where patients demand more say in their care. RHOC states that it provides patient-centred care, to understand what this means, how this can be realised and what the challenges are concerning this topic; literature on this topic is reviewed.

Patient-centred care (PCC) is about involving the patient in the entire process and empowering them to take an active part in their care (Ponte et al, 2003). This includes empowering patients, paying attention to the relationship between the patient and the healthcare provider, and enabling the providers to collaborate with patients to meet their goals (Bokhour et al., 2018). “Patient-centred care seeks to ensure that the needs of individuals requiring care are met with respect and responded to as persons, through respect for their values, preferences, choices and relationships” (McCormack et al., 2021).

Patient-centred care has shown to result in a decrease in the use of medical resources. The number of visits to specialists, hospital admissions and the number of medical examinations. The referrals to speciality care were cut back as well, which resulted in a significant decline in health charges (Bertakis & Azari, 2011). One given explanation is that the greater involvement of the patient during the doctor visit results in less ambiguity and uncertainty for the patient, as they feel better understood and are better informed, which lessens the perceived need for more specialist care visits. Moreover, if they are more confident in being understood and taken seriously, they will ask less for extra care and medical examinations as they are more trusting toward their health provider. From the perspective of the healthcare provider, more consultation with the patient leads to more knowledge about the patient and a better diagnosis. The literature illustrates that trust and effective communication are vital elements in this approach and contribute to better management and patient satisfaction (Chandra et al., 2018).

Patient-centred healthcare attributes are shown in Figure 6 from the system theory of McCormack and McCane (Lateef & Mhlongo, 2020).

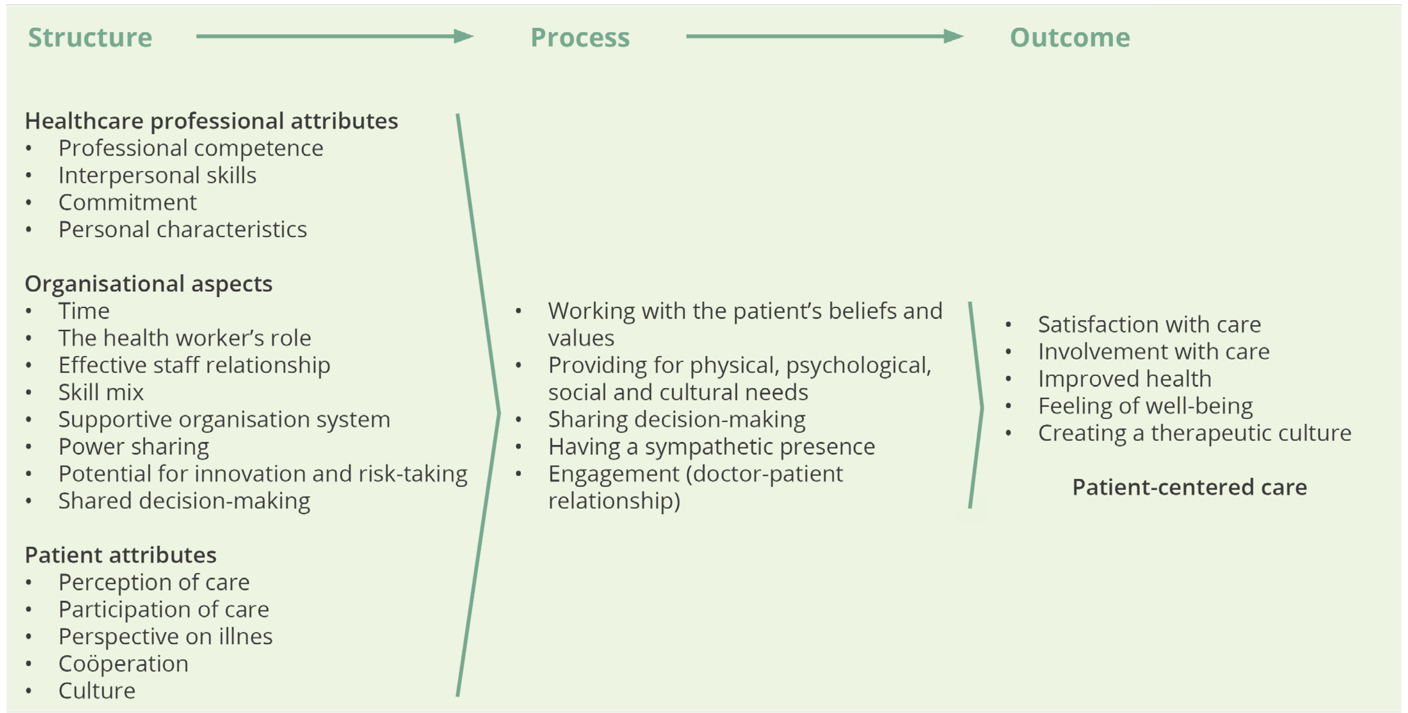


Figure 6. System theory of patient-centred care by McCormack and McCane (Lateef & Mhlongo, 2020)

This model shows that in patient-centred care, certain characteristics of the caregiver and the patient are needed, as well as organisational aspects. The care process of PCC requires mutual understanding of the parties to accommodate each other. To allow the patient to participate in their care, the care provider must offer space for their input, which the patient should make use of. This model is focused on general care, and can therefore be applied to a certain extent to orthopaedic care. However, the content of the attributes and aspects have yet to be specified for orthopaedic hand and wrist care.

Adopting patient-centred care requires many adaptations on the organisational level, which is a complex task. It requires changes in the healthcare culture regarding norms and expectations. To make this shift, new routines and strategies are needed to support the values of PCC (Håkansson Eklund et al., 2019). According to Bokhour et al. (2018), seven constructs are relevant for this organisational transformation. 1) PCC committed leadership that actively supports and encourages the staff, 2) engaged patients, 3) engaged staff, 4) focus on PCC innovations on all levels, 5) aligned staff roles and priorities, 6) organisational structures and processes that are enabling PCC, and 7) a care environment that facilitates patient-provider interaction.

The realisation of this approach can provide challenges and difficulties to be overcome for the healthcare provider. Work or time pressure can make doctors go back to a paternalistic approach, dedicating something is often easier and faster (Dunn, 2003). This misses the point of PCC as the doctor does or cannot take the time to understand the patient. A shortage of healthcare professionals (an ongoing development) increases this risk.

The doctor has the medical expertise, while the patient knows best what they need to fulfil their personal needs. At the same time, the patient is not always right or able to make the right choice (Hilborn, 2006). Furthermore, some patients do not wish to actively participate in their care or are simply not able to do so (Summer Meranius et al., 2020).

Co-producing healthcare services

As indicated, patient-centred care requires active contribution and collaboration from the healthcare provider as well as the patient. Together they can co-produce healthcare services which provide value and add to the quality of care.

Co-production is a collaborative process in which both the patient and the healthcare provider contribute value. It requires patients to share their goals and needs, and healthcare providers should actively encourage patients by involving in these steps. Well-implemented co-production can result in increased patient resilience and autonomy, it can save time and cost (Elwyn et al., 2019).

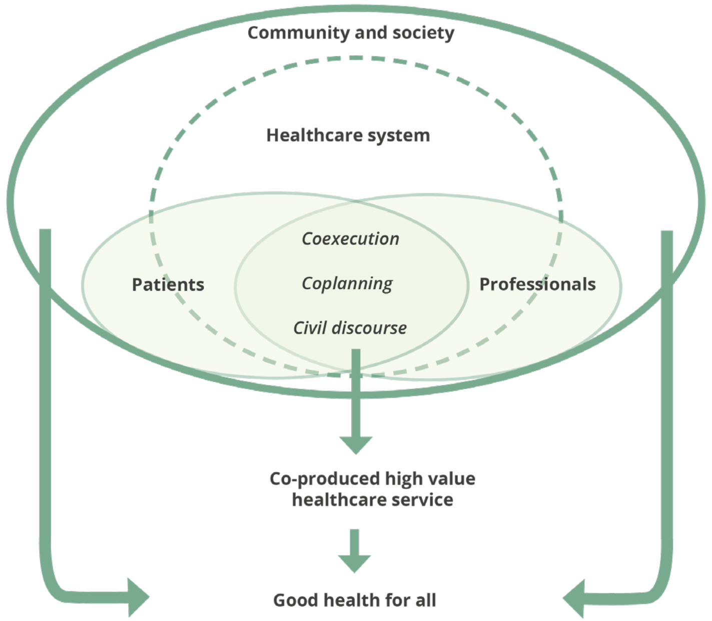
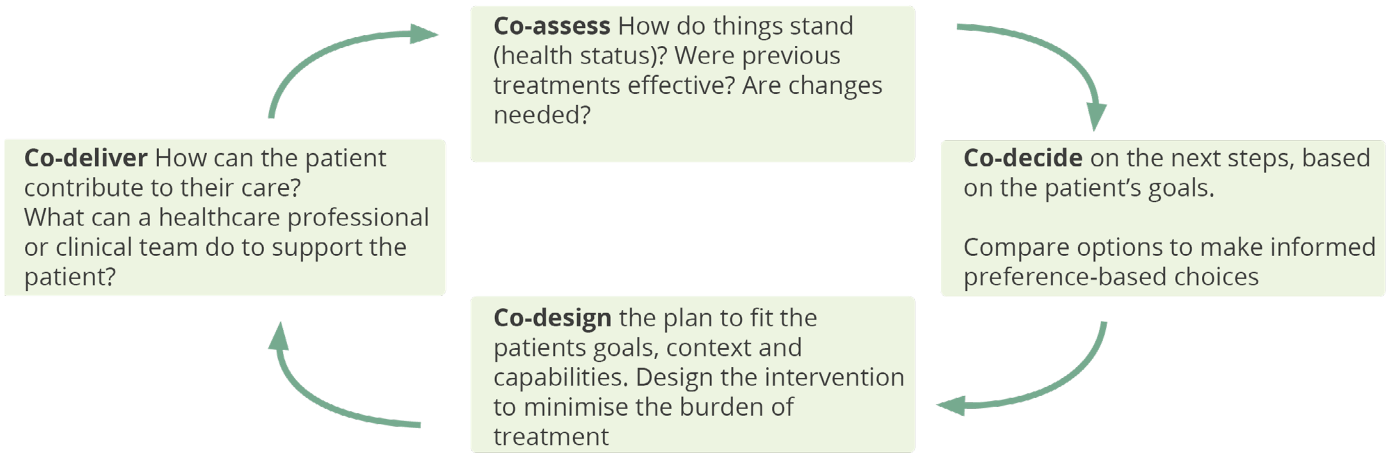


Figure 7. A conceptual model of healthcare service co-production by Batalden et al. (2015)

In Figure 7, a conceptual model by Batalden et al. (2015) of the co-production of healthcare services is shown. Co-production of good services requires civil discourse; respectful interaction and effective communication. This is especially important when talking about sensitive personal situations and health conditions. Co-planning asks for understanding each other’s expectations and values, unalignment can result in false expectations. Co-execution requires trust, aligned goals, and mutual responsibility and accountability



Co-assess How do things stand (health status)? Were previous treatments effective? Are changes needed?

Co-decide on the next steps, based on the patient's goals.

Compare options to make informed preference-based choices

Co-design the plan to fit the patients goals, context and capabilities. Design the intervention to minimise the burden of treatment

Co-deliver How can the patient contribute to their care?
What can a healthcare professional or clinical team do to support the patient?

Figure 8. Co-production cycle (Elwyn et al., 2019)

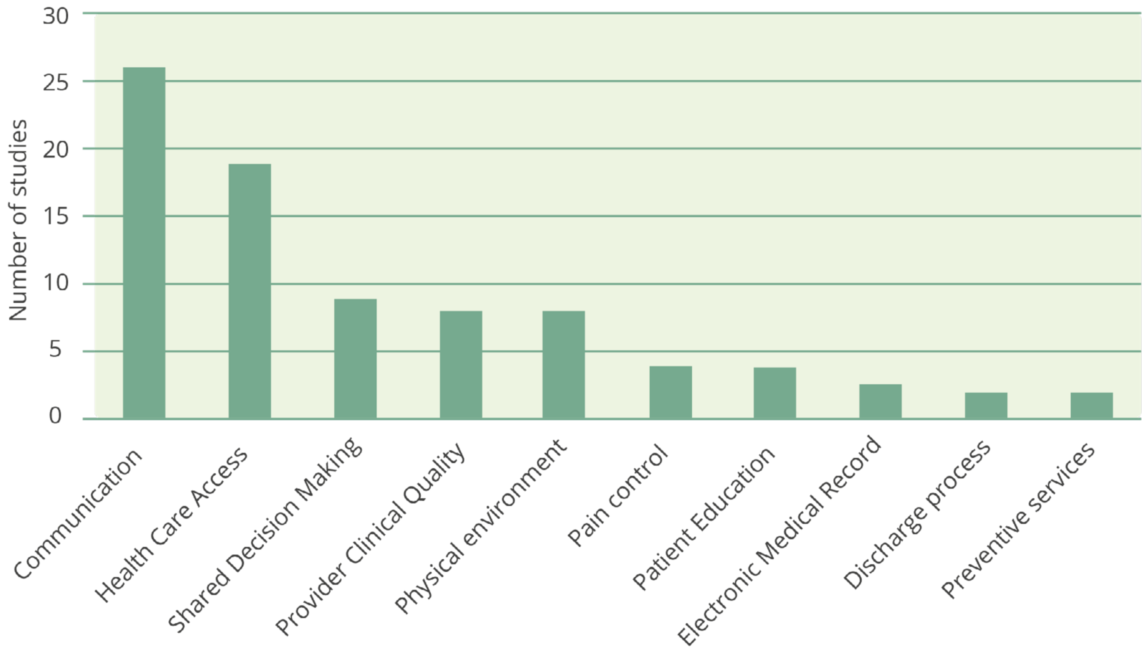


Figure 9. Health care quality dimensions identified by Mohammed et al. (2014)

for the achievement (Batalden et al., 2015). This coproducing can be viewed as a cycle consisting of four steps: co-assess, co-decide, co-design and co-deliver, see Figure 8.

Patient participation in the co-creation of their care by valuing their competencies has a positive impact on their perceived quality of care. Healthcare providers must understand the needs of the patient and adopt a holistic approach (Moretta Tartaglione et al., 2018). Realising care networks requires a great deal of steering at the organisational level, for example, clear guidelines and well-defined roles (den Breejen et al., 2014).

An article by Vennik et al. (2015) looks into the co-production process and concludes that the patients' message is not the most important. Most significance is derived from the process and the opportunity is given to patients to have their say. When patients talk about their experiences of care, most of what they say is already known, but hearing it directly from patients increases the urgency and willingness to do something about the problems.

Five elements appear to be essential for the active patient participation needed for successful co-production. These elements are: 1) patient knowledge, 2) explicit encouragement of patient participation by healthcare providers, 3) appreciation of the patient's responsibility/rights to play an active role in decision-making, 4) awareness of choice and 5) time (Fraenkel & McGraw, 2007).

Attributes that add to the patient's perception of care quality

To design a patient-centred concept, it is important to know which topics are valued by patients, so that this can be considered when designing a concept.

Certain indicators determine the patient's perception of the quality of care they receive. A total of 10 main dimensions of healthcare quality were identified in a literature review study by Mohammed et al. (2014), as seen in Figure 9.

Communication was identified as the most common indicator of high-quality care. This describes the relationship between the patient and the health care provider, in terms of how well the patient feels being listened to, and the communication between multiple providers in terms of efficient collaboration.

Health care access is the second most common indicator and describes the ease of making an appointment with a healthcare provider, the length of the waiting period and the communication accessibility with the healthcare provider.
Shared decision-making is another indicator where patients find it important to be able to take part in the decision-making and the responsiveness of health care providers to their values and needs.

Conclusion

In patient-centred care, the patient plays an active part in the shaping of their care and decision-making process. Patient-centred care is the outcome of a structure of professional healthcare attributes, organisational aspects and patient attributes that come together in a process. PCC has shown a positive effect on the patient outcome and a decrease in the needed care. To adopt this approach, adaptations are needed on the organisation level to implement it on all levels.

PCC poses new challenges in shaping the new roles of the different parties. Especially between the patient and the health care provider, where they both need to be aware of their abilities and limitations, the challenge lies in finding the balance to work together as a team. This is why clear definitions of these roles are important and should be formulated in the concept of the new orthopaedic hand and wrist network.

Although patients' experiences and perceptions may not tell us everything about the medical quality of care, the perceived domains valued by patients should be taken into account when designing care processes and the elements that contribute to the implementation of patient participation. And it should be identified how these currently are part of the orthopaedic hand and wrist care, and if this can add value to the current process.

2.6 Conclusion Chapter 2 | Literature Review

The literature review resulted in an understanding of the context for the new orthopaedic hand and wrist care network, in addition to what a patient-centred network requires to function. This includes the formulation of well-defined roles for the stakeholders, systems and guidelines to enable inter-disciplinary communication and engagement and participation from the stakeholders. These requirements will be applied in the development and finalising of the design in Chapters 5 and 6.

Continuing developments in the area of ageing, shortage of care providers and increasing demand in the health sector require efficient care with effective results without unnecessary costs and appointments. This requires research that will be done in the next chapter into the extent to which this is the case in the current process and how this can be improved if necessary.

Orthopaedic hand and wrist care consist of multiple healthcare providers. Due to the complexity of the hand and wrist area, networked healthcare can provide value in terms of improving the quality of care, efficiency and knowledge exchange between the different disciplines. In the next chapter, it will be analysed to which extent a network currently exists in hand and wrist care and the level of cooperation between the various parties. To this end, the role of each healthcare provider in this care and the role they could play in the new network will be examined.

In addition to the healthcare providers, the role of the patient will also be addressed in Chapter 3. Patient-centred care offers many advantages and is gaining in demand, as can be seen in the developments around patient empowerment. The RHOC says they offer patient-centred care, so they are already aware of the added value. Therefore, it will be looked at how this is currently applied in orthopaedic hand and wrist care and how the patient experiences it. Furthermore, whether further improvement and implementation of this care approach are desirable by the patients and care providers.

Chapter 3

User Research

This chapter examines whether and how the theory from the literature review is applied in orthopaedic hand and wrist care. From this, the themes relevant for developing a new care network can be identified.

User research is conducted to gain insight into the process of orthopaedic hand and wrist care, the role of the users in this and their experiences with it. User research is an essential part of the design process. It allows the creation of something truly relevant to the group for which the design is intended, and puts the user at the centre of the design (User Research: What It Is and Why You Should Do It, 2020). To design something for orthopaedic hand and wrist care, it is crucial to learn and understand the stakeholders that are part of this care and learn about their needs and values.

From the literature review, questions were raised about the efficiency of the current care process and the extent to which there is a healthcare network and patient-centred care in this specialised area of healthcare. In addition to mapping out how things currently are, it is necessary to identify what is still lacking and thus where the new design can contribute to positive change and improvement. The first part of the chapter will outline the research plan, which entails the aim of the research, the chosen methods, the included participants and the used procedure. The second part of this chapter will describe and discuss the found insights, which are largely in line with what has been found in the literature. These insights are then clustered into three relevant themes that present themselves as possible design directions for the concept to be designed. In the next chapter, the direction for further design is chosen from these themes.

3.1 Research set-up

Aim

The research aim is to map the care process during the current system of hand-wrist care in the RHOC and identify the pain points and areas for improvement.

Therefore, the following questions will need to be answered:

- What does the current treatment trajectory for hand wrist care look like?
- How is this system perceived by the stakeholders involved?
- What are the wishes/needs of those involved within this system that could be improved?

Method

Qualitative research methods were chosen to map out the problems and needs that those involved encounter during the treatment process in hand-wrist care. These took the form of field research and semi-structured interviews.
The interview questions are arranged based on the Path of Expression of Sanders and Stappers (2012), as illustrated in Figure 10, to help recall past experiences. First, questions are asked about the current situation, their experiences from the past, and finally about possible future improvement points.

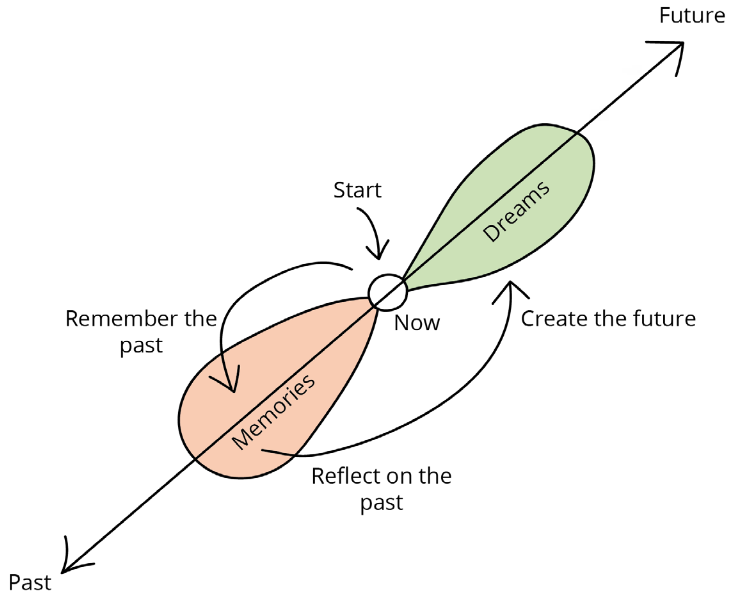


Figure 10. The Path of Expression (Sanders & Stappers, 2012)

The field study is aimed at making direct observations. Direct observation is a method in which the researcher observes the situation without interfering (Farrell, 2016). This method allows for identifying occurring aspects in the process that people involved are not aware of or are not mentioning in the interviews.

Participants

The participants consist of the list of important stakeholders within the hand and wrist network as identified in the literature review (Chapter 2.3) in consultation with an orthopaedic surgeon.
For this research, the focus has been limited to seven parties to keep this project feasible within the set time frame. Therefore, the rheumatologist is excluded from this part of the research. The stakeholders included five patients, a general practitioner, a hand therapist, an orthopaedic surgeon, a plaster technician, an orthopaedic instrument maker and a rehabilitation physician.

Procedure

Conducting interviews
A distinction is made between the interviews with the health providers and with the patients.

A total of six interviews have been held with healthcare providers. These include a hand therapist, an orthopaedic surgeon, an orthopaedic instrument maker, a plaster technician, a rehabilitation doctor and a general practitioner. These interviews were conducted either online or on location and had a duration of approximately 45 mins.

Five interviews were conducted with patients, three in the hospital after they consulted with the orthopaedic surgeon and the other two through a phone call. These patients were selected by an orthopaedic surgeon, taking into account a diverse selection and patients who would benefit from more networked care. For example, because they have been sent back and forth a lot. The interviews in the hospital were reduced to approximately 15 minutes to not increase the burden of their hospital visits. The phone interviews had a duration of approximately 30 minutes.

Field Study

The field study took place over three half days. The first day was with an orthopaedic surgeon and a surgical resident at the hospital, which took place simultaneously with the three patient interviews conducted at the hospital. In the morning, they had several consultations with patients with various hand and wrist complaints. The second day took place in the practice of a hand therapist, where an external orthopaedic technician was present that day. The hand therapist had several appointments with patients and occasionally a joint consultation with the orthopaedic technician. The third day occurred at the hospital again, but the orthopaedic surgeon had a joint consultation with a hand therapist.

The focus of the observations was mainly on how such an appointment proceeds. This question is also asked during the interviews, but the observations can provide a more accurate impression. It is observed how the roles are divided between the patient and the caregiver, which things are discussed, to what extent the patient's wishes are taken into account, etc.

Analysis

The interviews and observations have been analysed with qualitative data analysis. The answers have been written out, in which the interesting information was highlighted. This includes information related to the connection with other stakeholders, the communication between these parties, the course of the care process and experiences and problems experienced in this. These were then clustered and formulated into insights.

3.2 Results

Healthcare providers

The healthcare providers' interviews focused on identifying their role in the process and their relation to other stakeholders.

Stakeholder Map

Stakeholder Mapping is used to categorise the stakeholders that are directly and indirectly involved in the care of the patient, as illustrated in Figure 11. The rings are prioritised based on the level of influence in the patient's care trajectory. This provides insight into each stakeholder's impact and shows whom to focus on in the concept. The degree of impact for each stakeholder was determined based on the healthcare providers' answers to the questions about their roles and responsibilities in hand and wrist care.

In the first ring, closest to the patient, are the general practitioner, the hand therapist and the orthopaedic surgeon. Based on the interviews conducted, it has been established that they direct the patient in their treatment trajectory. The stakeholders in the second ring are the rehabilitation physician, the plaster technician and the orthopaedic instrument maker. These stakeholders are usually active later in the treatment process and only when the actors in the first ring have decided to involve them in the care process. In the third ring are the government and the health insurers. They indirectly influence the care by drawing up rules and guidelines.

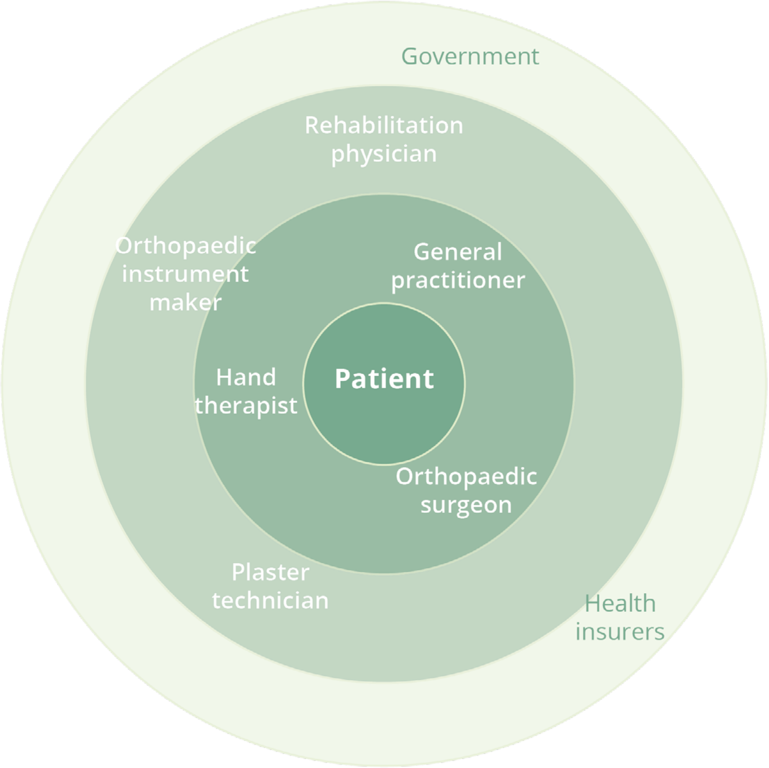


Figure 11. A stakeholder map visualising the level of impact on the patient's course trajectory from the healthcare providers' perspective

Insights healthcare providers

Derived from the data collected during the interviews and the observations, for each healthcare provider the treatment steps and the collaboration and communication with other stakeholders are visualised and can be viewed in Appendix B1. Furthermore, Appendix B2 contains the statements that the participants made about other disciplines, clustered by the discipline of concern.

During the interviews, many insights emerged about the way the system currently works and the problems that exist in this network. In Figure 12 a visual representation is made of the most common problems found in the system, and how they relate to each other. Subsequently, these problems are clustered and explained in more detail in the following paragraphs.

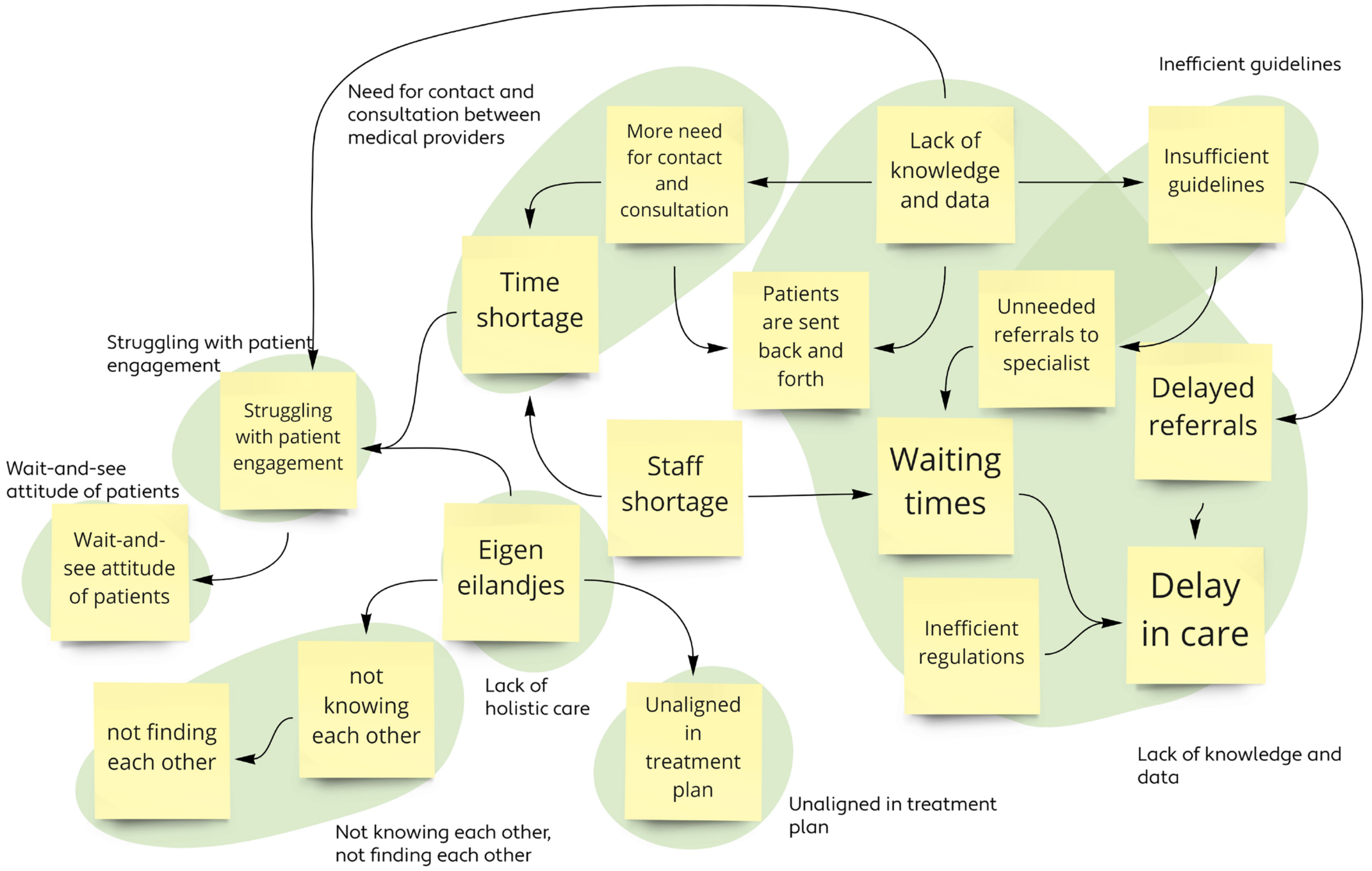


Figure 12. A representation of the related issues in the hand and wrist care system from the perspective of the interviewed healthcare providers

Need for contact and consultation between medical providers

Overall, healthcare providers indicate that more frequent and direct contact with other stakeholders would be appreciated in the majority of cases, but is not always achievable due to the high workload caused by a shortage in healthcare personnel. The most common communication channels over a distance are via calls, referral letters or a secured application.

Contact with other stakeholders is usually sought when something is unclear or when there is a need for consultation. For example, when there is doubt about the diagnosis or the treatment choice. The hand therapist uses the secure app or a letter transferred via the patient to update the specialist on a patient before they come for a check-up. This takes a lot of time, partly the patient's time, partly not compensated time. The plaster technician in the orthopaedic centre works (literally) closely with the specialists, as they work under the same roof. The specialist walks by when something more complex is needed, and due to the experience of working together, they can understand each other well. However, for an external party such as the hand therapist, this contact is less close and their description is not always sufficient, resulting in incorrectly made braces and patients having to return. In this case, calling the other party for clarification is an option, but it takes time.

There is face-to-face contact between healthcare providers during joint consultations. The orthopaedic technician has a joint consultation every fortnight at the hand therapist's practice. Once a week, there is a joint consultation in the hospital with the hand therapist, plastic surgeon, a trauma doctor and orthopaedic surgeon for patients about whom there is doubt regarding the best treatment, surgical or conservative. Due to the complexity of the wrist, it is not always clear which treatment will work best. In the case of complex complaints, the different perspectives of healthcare providers from different disciplines can clarify this.

Inefficient regulations

Due to regulations, the hand therapist is not allowed to refer patients to the second line of care, which can result in additional steps for the patient, who has to go through the general practitioner for a referral to a specialist. Furthermore, referral to the plaster technician or an orthopaedic instrument maker is reserved for the medical specialist, which means patients need to go through the general practitioner and the specialist for a referral for a brace. The waiting times before the patient can be admitted, which can be up to three months, can significantly delay the patient's recovery process.

Lack of knowledge and data

A lack of knowledge and scientific data about the hand and wrist hinders diagnosis and treatment and causes delays in the care process. General practitioners have to use their knowledge, the NHG guidelines, physical examination and the patient's story to make a possible diagnosis and decide if and where the patient should be treated; is it in the first line by a hand therapist or in the second line of care by a specialist. GPs indicate that there is a lack of knowledge about the hand and wrist and that the NHG guidelines are incomplete because there is insufficient scientific data, which means that there are few assessment tools for referring patients to second-line treatment. This leads to GPs that are unable to make a diagnosis which can lead to the use of more medical imaging. If they cannot make a diagnosis, they regularly advise patients to wait and see if the symptoms do not go away on their own. Only if they come back several times are they referred to a specialist. The hand therapist indicates that a quicker referral to them would help half of the patients. Patients are often referred to a specialist only because the GP cannot make a diagnosis, resulting in too many patients being referred to secondary care when primary treatment would have sufficed.

Something else that can occur in this situation is that the patients are sent to the therapist with the request to make a diagnosis. However, this is not part of the responsibilities of the hand therapist as they are not trained for this. This results in hand therapists playing a central role in the network due to the lack of knowledge among other professions.

A solution could be a joint consultation with a GP and an orthopaedic surgeon. However, the OS interviewed did not experience this as a positive addition. This is because the orthopaedic surgeon at such consultation, in general, has too little knowledge about the hand and wrist. If necessary, a specialised hand orthopaedic surgeon can be called. However, the OS indicated that to make a diagnosis, a physical examination is in many cases required, which means that a telephone consultation is often not sufficient.

The lack of knowledge is also a reason for the delay in the plaster room. The hand therapist encountered problems in this collaboration, where the brace was not made as it should be. Which patient results are sent back and forth.

"The fewer doctors know, the more they think they can do." - Orthopaedic Surgeon

Lack of holistic care *("eigen eilandjes")*

To create a well-connected network, stakeholders must look beyond their expertise. According to the hand therapist, many doctors are focused only on their field with specific ideas about who should do what, leaving little room for other input. The orthopaedic technician also recognised this as he had observed that once a surgeon decides surgery is not the best option, they are not putting in the effort of thinking about the follow-up steps for conservative treatment. He said it often happens that patients are sent from the specialist to get a brace without explaining why it is needed. Also, in his opinion, some surgeons, especially at private clinics, are too quick to opt for surgery. Whether this is due to short-sightedness or if it is money-motivated is not clear.
The orthopaedic surgeon believes that, in many cases, therapy is not necessary. Nevertheless, he also indicates that they should beware of bias; as an orthopaedic surgeon only sees the people for whom therapy does not work. Of course, that does not mean it never works.

Not knowing each other; not finding each other

Some stakeholders would like to see other healthcare providers become more aware of their discipline's possibilities. The hand therapist thinks that with more knowledge among GPs about what hand therapists can do, GPs would be able to refer patients more quickly. She indicated this would benefit half of the patients.
The rehabilitation doctor feels there could be more contact with hand therapists, which is currently lacking because they do not know each other. She would like to see better mapped out who the hand therapists in the area are so that they can have better contact. Only 20% of the hand and wrist patients are sent to the rehabilitation doctor, of which the majority come from the plastic surgeon, and the orthopaedic surgeon sends only a small amount. This may be because the plastic surgeon and the rehabilitation physician have a partly shared education program which means they are more aware of each other's abilities. The orthopaedic instrument maker also believes that specialists have room for awareness about what they do.
When the stakeholders are aware of each other's roles and capabilities, they should be able to select and contact the person who can best help the patient.

Struggling with patient engagement

Consultation with the patient is a part of the treatment where sometimes difficulties are encountered. Some doctors are inclined to choose something because they know that it generally gives the best result, but that does not mean that it is the best option for every individual patient.
The GP sees "patient empowerment" as patients being in complete control over their care and feels this is only suitable for the intellectual five per cent of the population. For the remaining, Shared Decision Making is the best approach, with a lot of guidance and information. In his opinion, the healthcare providers should inform the patient of the available options to enable the patient to make a decision. The patient has to think for themselves, it is about their own body, so the responsibility lies with the patient.
The rehabilitation physician sketched different patient types. One type already knows what he or she wants, one type likes to hear the different options, and the remaining type says "you have to choose for me". She said this last group poses a difficulty because as a doctor you can not decide the best option for this specific patient since you miss a clear picture of the entire situation.
Healthcare providers mentioned that patients should be more aware of the fact that they can participate in the decision-making process. However, in the plaster room and at the orthopaedic instrument maker, the patient often lacks the knowledge to make active decisions. Here, there should be more room for listening to the patient and explanations, they sometimes get stuck too much in technical knowledge.

"Everything that the patient can control himself will positively influence the result. A self-made choice provides more motivation to achieve a goal than a therapist or doctor who makes this choice for you." - Hand Therapist

A wait-and-see attitude of patients

The patient needs to be aware of their role in the recovery process. The healthcare providers notice some patients take a passive stance in their recovery, expecting the doctor to provide them with a 'quick-fix'. The recovery process can take up to 12 months, and will only work if the patient actively participates. Exercising every day is difficult to maintain, and the hand therapist indicated the first three months are often the most difficult.

Unaligned in treatment

When stakeholders are not aligned, patients may have less confidence in the care they receive and are more likely to be disloyal to their treatment and demand additional checks, which can lead to additional costs and delays in their recovery. The hand therapist gave the example of sending a patient to the plaster room with the description for a brace, which she based on the specific situation of this patient. However, the plaster technician had doubts and contacted the specialist. The specialist looked at the protocols and suggested something else, based on generic outcomes. This resulted in a brace that was not suited for this patient and had to get remade.

The GP indicates that it is better to first discuss any doubts directly with the other care provider than to worry the patient unnecessarily. If the care provider thinks the treatment is not working, they will blame the diagnosis and vice versa. When healthcare providers are on the same page about treatment and diagnosis and communicate this consistently to the patient, it is likely to improve recovery. A patient who hears something more than once is more likely to be compliant which results in more confidence in their practitioners.

Patients

The interviews with the patients were focused on their role in the treatment process and their experiences in it.

Patient Journey Map

Based on the data collected through the observations and patient interviews, an example care trajectory of a patient undergoing treatment for their wrist is compiled, to illustrate what the patient encounters when entering the orthopaedic hand and wrist care network (Figure 13). The pain points are marked in this process, from which points for improvement are derived.

In addition, the steps of the healthcare providers are mapped out to accompany the steps of the patient. Here it is decided to exclude the rehabilitation doctor from this journey map to focus on the remaining 80% of the patients. Icons indicate the communication channels between the healthcare providers.
The patient's journey map shows the patient being sent back and forth between different healthcare providers. The first delay occurs at the general practitioner's referral because he cannot make a diagnosis. The patient starts their treatment with hand therapy while exercising sporadically, which does not contribute to the recovery. Eventually, the patient gets a referral to the orthopaedic surgeon, but there is a waiting time which results in more delay.

Before the appointment with the orthopaedic surgeon, the patient is sent to the radiology department without understanding the reason. Subsequently, the patient expects a quick fix from the orthopaedic surgeon, which is not a realistic expectation. After the consultation, the patient starts googling because they feel that the knowledge provided was insufficient and comes across wrong information. Finally, the second appointment with the orthopaedic surgeon takes place, which is again postponed.

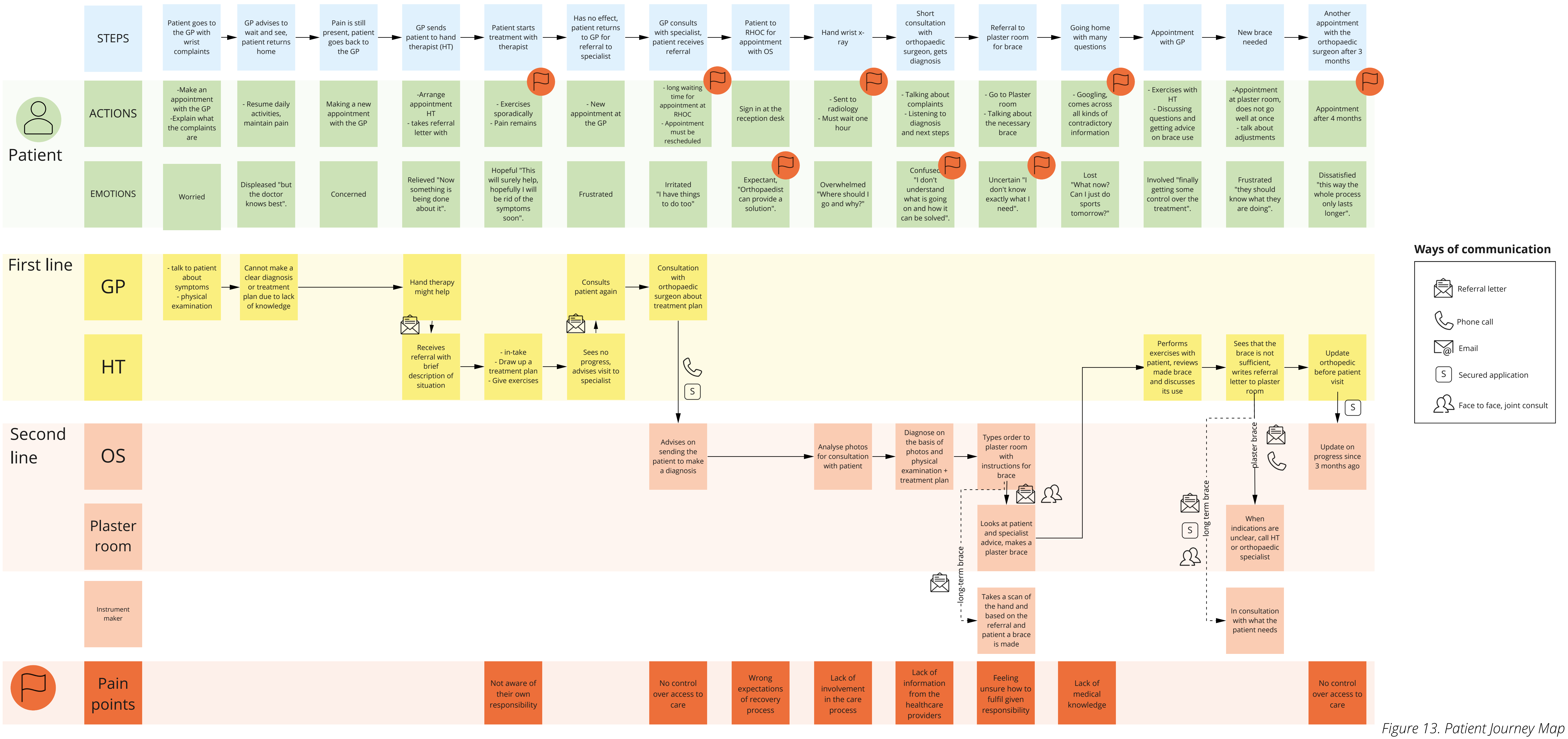


Figure 13. Patient Journey Map

Insights patients

During the patient interviews, many insights emerged about the patients' perceptions of the hand and wrist care process. Figure 14 provides a visual representation of the system's most common effects on patients and how they relate. Subsequently, these effects are clustered and explained in more detail in the following paragraphs.

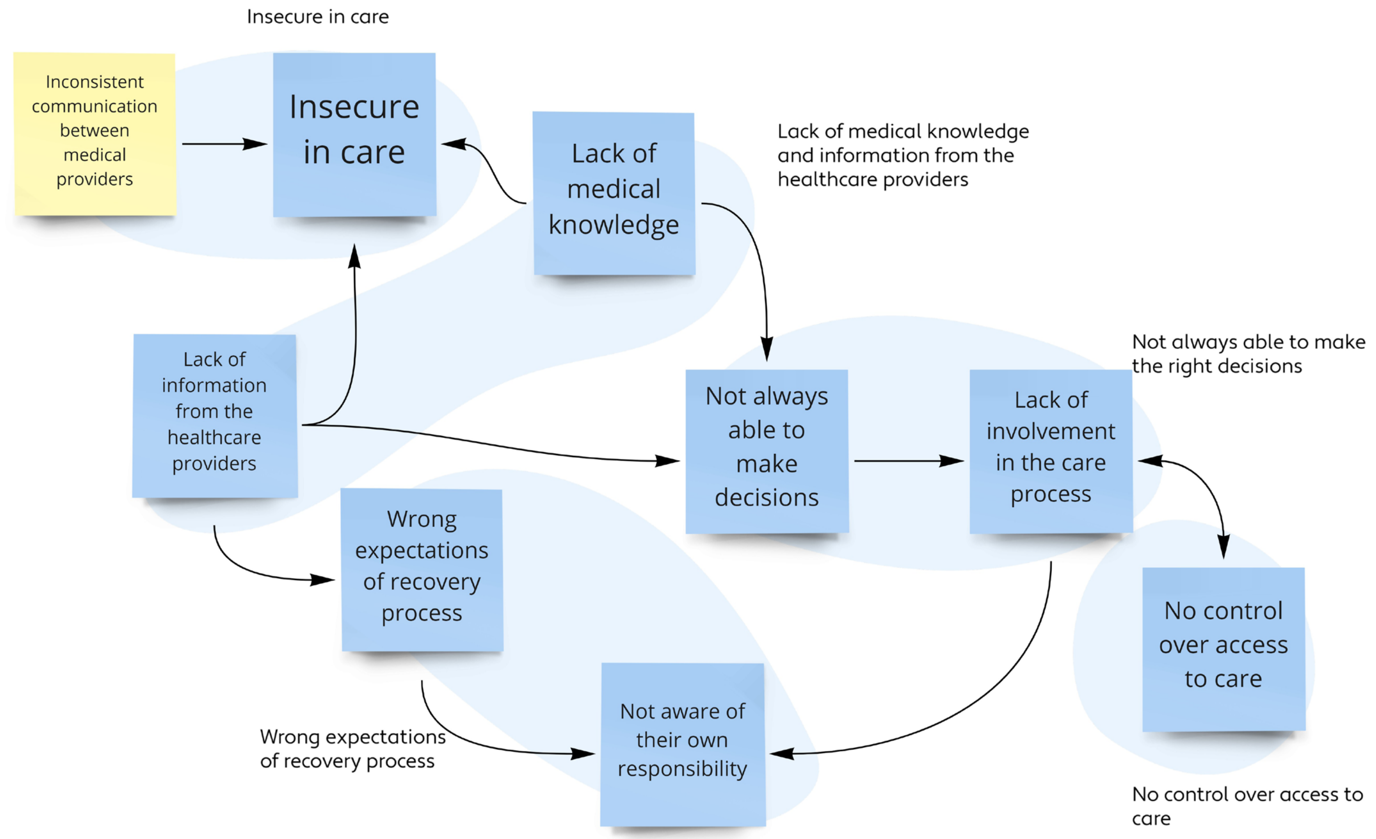


Figure 14. A representation of the related effects of the system on the patients as perceived by the patients

Lack of medical knowledge and information from the healthcare providers

Patients often feel that there is a lack of information provided by healthcare providers. This can lead to feeling uncertain about their role in their recovery, as well as their care process.

About half of the patients spoken with were dissatisfied with the orthopaedic surgeon's explanation of the diagnosis. The explanation can be perceived as terminological, which contributes little to comprehension. Patients appreciate it when the doctor takes the time to look at the photos together and explains them properly. Patients require more than the opportunity to ask questions, as one patient indicated that it was difficult to come up with the right questions at that time, especially if it feels as if everything happens to you and you do not feel in control.

Explanations of the treatment plan are sometimes lacking concerning the choice of treatment and the reason why. One patient was told that she needed hand therapy and a brace. However, the reason behind this was not clear to her. She had already had hand therapy before, which had not helped. So why would it help this time? And why the brace? She felt that the orthopaedic surgeon did not explain much and used a lot of "doctor's language", which led her to leave the consultation with many questions. Another patient did not receive any instructions on how to use her wrist after the operation. So she just kept using it as much as possible and was only told afterwards that she should not do certain things.
This patient also said that she could not explain by herself what exactly was done during the operation, because she had too little knowledge to do so. The choice to operate was actually because she followed the doctor's advice, she believes he can make the best choice.

Patients themselves usually do not have the knowledge to make complicated medical decisions or to know how best to behave to recover. Therefore, when the information they receive seems incomplete, it can result in a feeling of loss.

Lack of involvement in the care process

The steps in the care process are not always clear to the patient. Where does the responsibility lie for which steps, when does what happen and for what reason. Patients may feel that they are not involved in the process of their care.

One patient expressed the need for a doctor who would take the time to explain the process clearly; currently, it feels like everything just happens to you. A recurring story was that patients were not informed about the need to have X-rays of their hands before their appointment with the orthopaedic surgeon. They only heard about it when they came for their appointment but still received no explanation. This resulted in an unforeseen hospital visit delay and patients feeling confused and overwhelmed.
"You are almost like a little ball rolling from one side to the other"
In another patient's case, the operation's result and the outcome of her wrist surgery were not communicated afterwards. Since the procedure was unclear beforehand, she wanted to know what had happened. But afterwards, the nurse present could only tell her that she could go home and that they would explain it at the next appointment a few weeks later. Only after insistence did the surgeon call her later that same day to explain.

Patients acknowledge that it would be appreciated if the necessary events were communicated beforehand and explained.

"You feel like you are a case, rather than a person."

No control over access to care

Patients have encountered several problems with the administrative side during the process. Hospital appointments are one of them. Only after the hospital has scheduled an appointment can they ask to change the date, time or place. In addition, they have encountered long waiting times and delayed appointments.

There is a waiting time of 1-3 months before you can get your first appointment in the hospital. After this first appointment, it is standard procedure to schedule the second appointment three months after the first. However, some patients reported that this can be delayed up to five months, without them being informed. The appointment is made by the hospital and patients have no say in this. Only after the hospital has scheduled it, can they contact it if they wish to reschedule.

As the orthopaedic centre is part of three hospitals located in The Hague, Delft and Zoetermeer, the location of the appointments can also be a problem. The appointments for residents of Delft can take place in the hospital in Delft, but can just as well be scheduled in Zoetermeer. This can be a problem for patients who are not very mobile or do not have a car. Usually, it is possible to reschedule the appointment to Delft, but this is not always the case, which can be frustrating.

“The hospital does not think from the patient’s point of view, but mainly thinks about what is convenient for itself.”

One patient also experienced problems making appointments with the plaster room. If a new brace is needed and the patient is known to the hospital, the hand therapist can refer the patient to the plaster room. The patient had to make an appointment herself, which she did, but at the time of the appointment, she was told that she did not have an appointment. She felt that they were blaming her.

Additionally, a patient expressed the wish for flexible appointments. Due to the limited time he had available, this would be convenient.

“Every minute of waiting in the waiting room is one too many.”

Insecure in care

Problems also arose about sharing and communication of medical records and treatment. Some indicated that this information was not passed on properly between specialists; these patients were given a responsibility that they were not sure how to fulfil.

The specialist referred a patient to the hand therapist, who said he would send an email about the diagnosis and treatment. However, the hand therapist did not receive anything, and the patient had to explain herself. She felt insecure about it and indicated that she would have preferred that the medical professionals communicate it to each other so that you could be sure that it is transferred correctly.

Wrong expectations of the recovery process

Sometimes, patients have different expectations before their appointment than what happens. They may expect a certain treatment or a quick fix that will allow them to continue with their normal daily activities. But then they are told they face a long recovery process of several months to a year. This expectation is not always adequately corrected by the healthcare provider, as there is a lack of detailed information about the treatment steps and the diagnosis that the patient can understand. As a result, patients can be left with many questions and uncertainties and not be aware of their responsibility. Moreover, it is also often unclear to them why a particular choice is made and what the concrete consequences of this choice are for their lives.

A patient expected the wrist problems she had been having for a year and a half to be solved after the first appointment, but she was given a brace and hand therapy. She felt confused because she did not understand how this would help her. Another was expecting to be able to do push-ups again after three months of therapy. But as the recovery period is up to 9-12 months, this is not yet possible. Yet another patient came for a consultation expecting to receive an injection against the pain and to be able to use his hands properly again. He too was to be disappointed. He got prescribed a brace, which will only restrict his hands further, whereas he was expecting a quick solution

Discussion user research

The issues of the medical providers in the system and their effects on the patients’ perception are put together to identify the common problem areas, see Figure 15. These will be explained in further detail in the next pages.
The insights are clustered into three themes: involvement, efficiency and alignment.

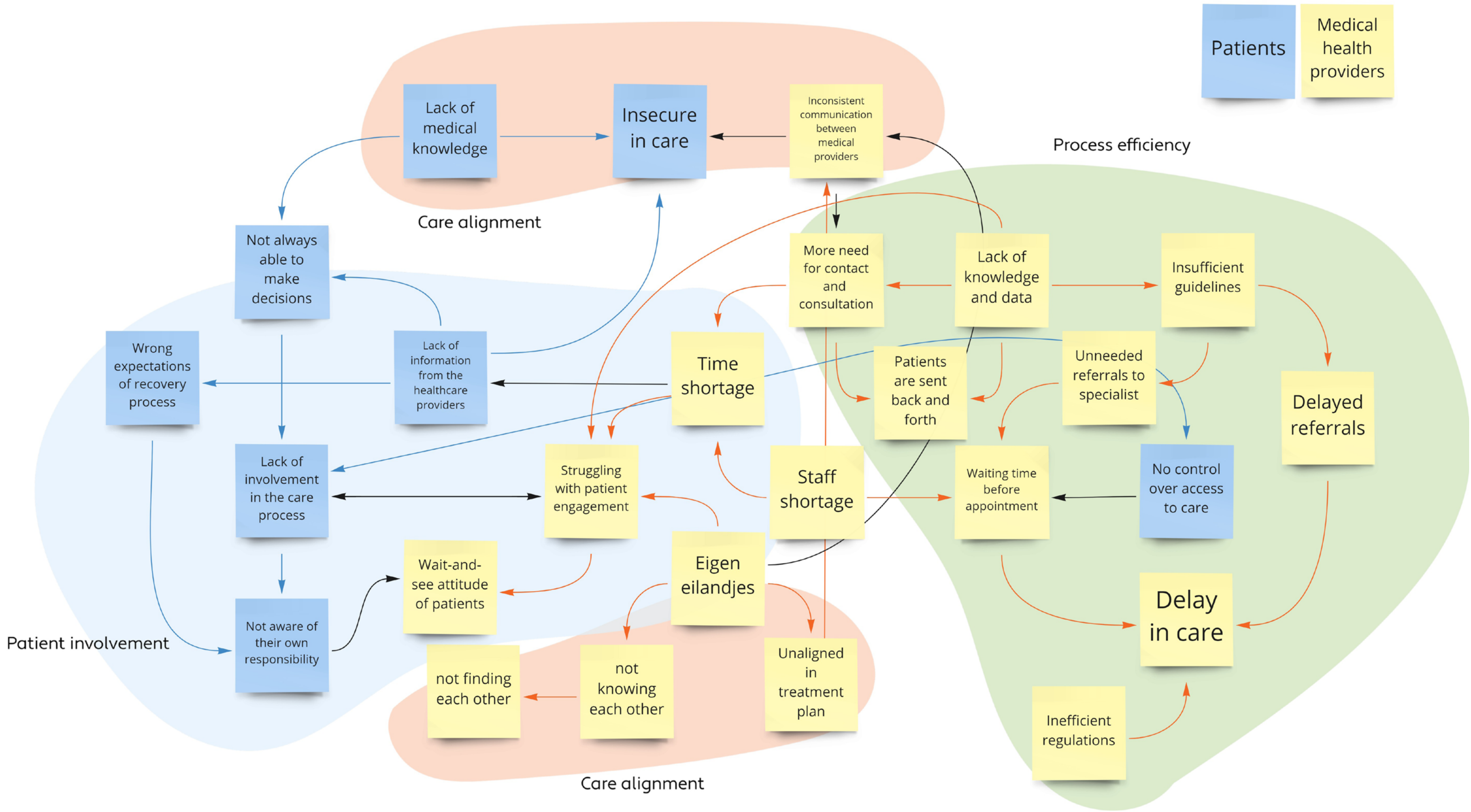


Figure 15. A visual representation of the relation between the issues of the medical providers and the patients combined.

Patient involvement

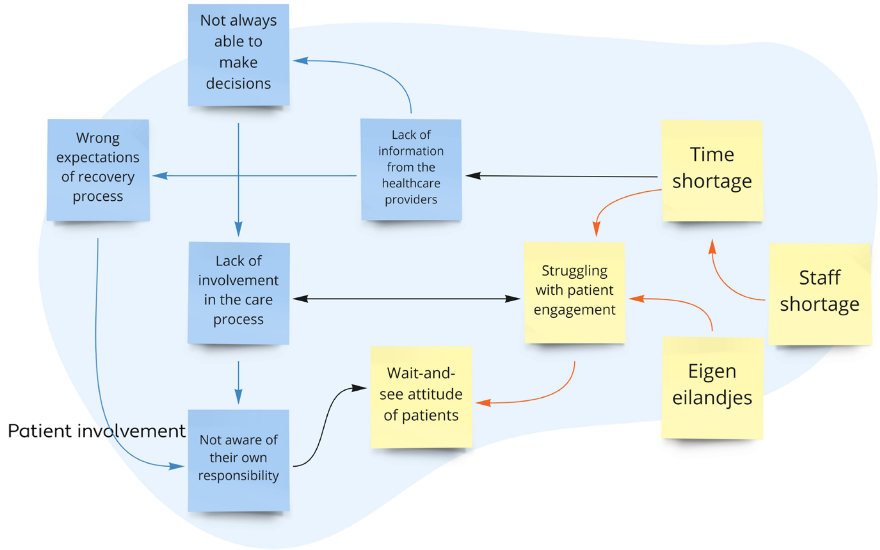


Figure 16. Clustered insights leading to the theme of patient involvement

Healthcare providers frequently have difficulty involving patients. This is due to the lack of time they have to deal with, which often means there is not enough time to sufficiently inform patients. In addition, their focus may be limited to their medical field of expertise, thus missing the complete picture for the patient. As a result, the patient may feel lost among the various disciplines and in the entire care process. Due to the lack of information, they may not know what to expect, understand why certain choices are made and be unaware of their responsibility in their recovery. This can lead to a wait-and-see attitude of patients, which may harm recovery. Patients may feel uninvolved and unable to take control, resulting in the sense of being lost.

Care alignment

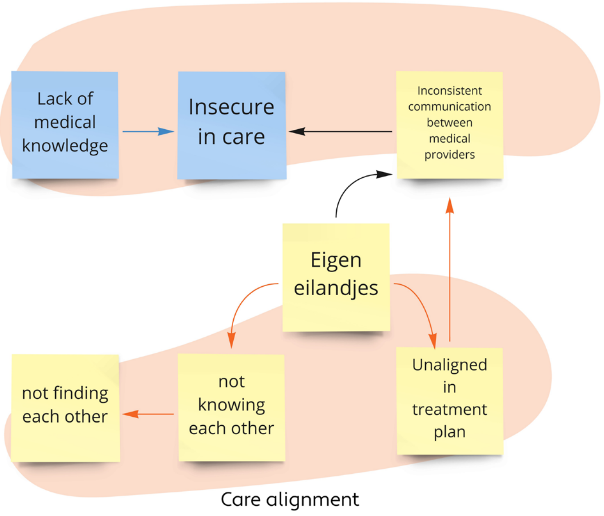


Figure 17. Clustered insights leading to the theme of care alignment

The various disciplines each have their medical expertise and fulfil a different part of the process. To offer a holistic care process to the patient, these components must be coordinated and the disciplines should work together. However, the connection with others might be lacking. This can be because they are not aware of the capabilities of the other disciplines, so they do not know how to find each other at the necessary moments. This can cause the treatment plan to be misaligned and patients to feel uncertain about their treatment.

Process efficiency

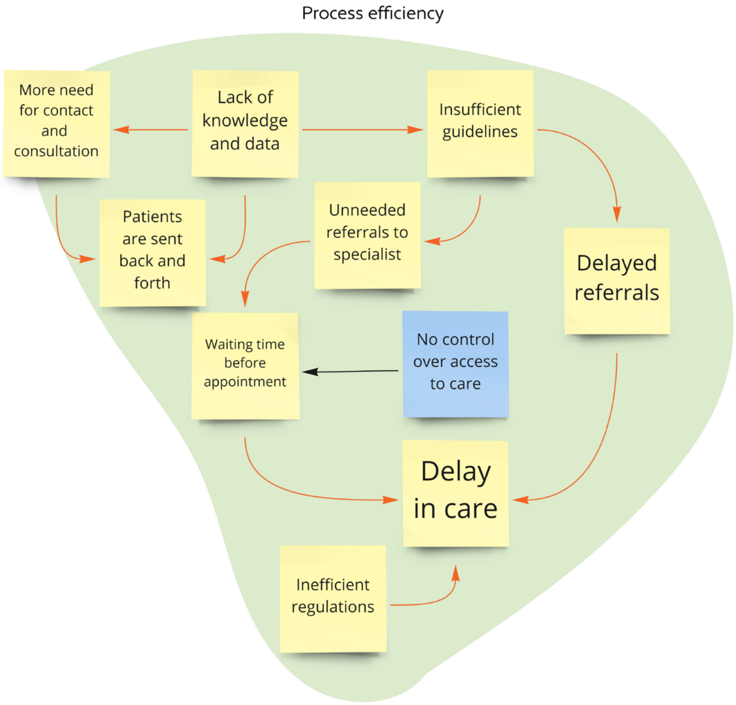


Figure 18. Clustered insights leading to the theme of process efficiency

Due to a lack of knowledge and data on the hand and wrist, guidelines are inadequate, increasing the need for contact and consultation with healthcare providers specialised in this area. This can result in delays in the care process and patients are sent back and forth between different disciplines. It is noteworthy that the patients themselves have not reported this inefficiency, perhaps because they do not know any better and have no overview of the system. However, it is inconvenient for the patients and can cause a delay in their recovery. Moreover, it takes up time in the already limited time of the specialists and causes an increase in costs.

3.3 Conclusion Chapter 3 | User Research

The user research led to a clear picture of the current process and system of hand and wrist care. The role of the stakeholders and their interconnectedness have been mapped, and the degree of involvement of the stakeholders in the patient care process has been identified and visualised in a stakeholder map. The problems in the system were identified and their interrelationships visualised. The process from the patient's point of view is mapped in a patient journey, from which the pain points are derived. These are also visualised to show their relationship to each other.
Finally, the problems experienced by patients and healthcare providers in the system are mapped to identify common themes. The three areas identified for improvement are patient involvement, process efficiency and care alignment.

It can be concluded that in the current orthopaedic hand and wrist care there is currently no functioning healthcare network. This is in line with what emerged from the literature on networked care in the Netherlands (Chapter 2.4). There are insufficient guidelines and resources to enable cooperation between various stakeholders and disciplines from different lines of care. There is communication between care providers, but this is insufficient.
Moreover, there is inefficient care and redundant appointments. And therefore, the efficient care process that is needed (Chapter 2.2) is not yet in place.

The patients interviewed said they wanted more control over their care and to be more involved in the process. Which is in line with the trend of patient empowerment (chapter 2.2).
Currently, this is insufficient, as patients have indicated that they feel insecure about their care and are not sufficiently involved in the care process and the rest of the network. The care providers also mention having difficulty involving the patients in their care.

More development is needed to make orthopaedic hand and wrist care patient-oriented, which requires engaged care providers and engaged patients (Bokhour et al., 2018).
Moreover, patients indicate that they do not have sufficient knowledge to make their own decisions and that they are not always aware of the options open to them. According to the essential elements for patient participation (Fraenkel & McGraw, 2007), knowledge and awareness on the part of the patient are two important elements, as is the fact that care providers must actively encourage patients to participate in their care. These elements are currently missing, and are needed to ensure patient-centred care.

The three main characteristics for quality perceived care; communication, healthcare access and shared decision making, are not yet sufficiently met, according to the patients' insights.

In general, the healthcare providers involved in the study are relatively speaking a selection of a more engaged group. The contact details of the healthcare providers involved in this study were obtained from an orthopaedic surgeon at the RHOC. This means that a certain degree of contact already exists with these individuals and the OS, while the individuals with whom this is completely lacking have not been reached. Furthermore, the healthcare providers who were willing to participate may be more open to innovation and change, which is not necessarily the case for everyone. The group involved may not be a complete representation of all healthcare providers.

In addition, five patients were interviewed, which is not a very large group. Good insights and results were obtained, and information is also derived from observations which included more patients, but it should be taken into account that these cannot be generalised to everyone.

Chapter 4

Design Brief

The design brief defines the core details and the direction of the concept. It was established based on the literature review and user research insights. One direction has been chosen from the user research and formulated into a problem definition, and a new design goal and direction are defined. The design vision for the concept and the future vision for the RHOC is composed.

The design brief defines the problem and gives direction to the design solution. Insights gained from the literature review (Chapter 2) and the user research (Chapter 3) come together in the formulation of this brief. The user research provided insight into the problems experienced during the process of orthopaedic hand and wrist care. There is a lack of involvement from the care providers and the patients, the care process is inefficient, and the care provided is not coordinated. The literature review provided insight into networked healthcare and patient-centred care. With this knowledge background, it became clear that both are lacking in the current orthopaedic hand and wrist care.

4.1 Problem scope

Three design themes were derived from the user research: patient involvement, process efficiency and care alignment. From these three themes, a problem statement was formulated focusing on patient involvement, as greater involvement of both patients and healthcare providers will be the first step in achieving organisational change. From this, a problem definition was formulated describing the challenge to be solved.

Problem definition

The orthopaedic hand and wrist care system is divided into separate areas, with each care provider involved focusing on their part of the process. Moreover, the lack of guidelines and protocols prevents effective interdisciplinary cooperation. As a result, holistic care is lacking, preventing healthcare providers from involving the patient. As a result, the patient is insufficiently involved in his care and is treated as a passer-by, resulting in them feeling lost and unable to take control, which is important for a smooth recovery.

4.2 Design vision

From the problem definition, a design goal is determined that offers a solution to the stated problem. Next, a design direction is determined that describes how this design goal can be realised. Finally, there is the design vision, which is the aim of the final design. Figure 19 illustrates this.

Design goal and direction

The design aims to create more involvement of all stakeholders involved in the orthopaedic hand and wrist care and active participation of the patient.

Better cooperation has been shown to lead to more efficient and improved care. Research has shown a reduction in costs, fewer treatment sessions and fewer complications (Ypinga, 2018). Furthermore, patient involvement results in less ambiguity and uncertainty for the patient, as they feel better understood and are better informed, which lessens the perceived need for more specialist care visits (Bertakis & Azari, 2011).

This goal has two components; 1) to increase the patient's participation in their care and change their role as a passer-by into someone who is part of the care team. Furthermore, 2) to increase the cooperation and involvement of the whole orthopaedic hand and wrist care network and make it one connected network instead of a system that is divided into separate areas. This will result in a coordinated treatment process contributing to recovery.

To achieve more patient participation, patients need to be aware of their role in their recovery, which appeared to be lacking in user research. In addition, healthcare providers need to give patients space to contribute to their care, as stated in the literature (Fraenkel & McGraw, 2007), which the user research shows are lacking. One conclusion drawn from the insights was that the hierarchy between patient and healthcare professional could be an obstacle to a free conversation and room for input from both parties. Heath also supported this theory in their research (2018). A more balanced relationship can lead to more cooperation and an open conversation, which requires understanding between the healthcare provider and patient.

To increase cooperation and involvement of the network, more contact between healthcare providers is needed during patient treatment. This requires that they know each other and can find each other, which, as the care providers have indicated, is currently not always the case. For more involvement, healthcare providers must also be more connected throughout the process, and not limit their involvement to only their part. For this to happen, the mutual distance between the different parties must be reduced.

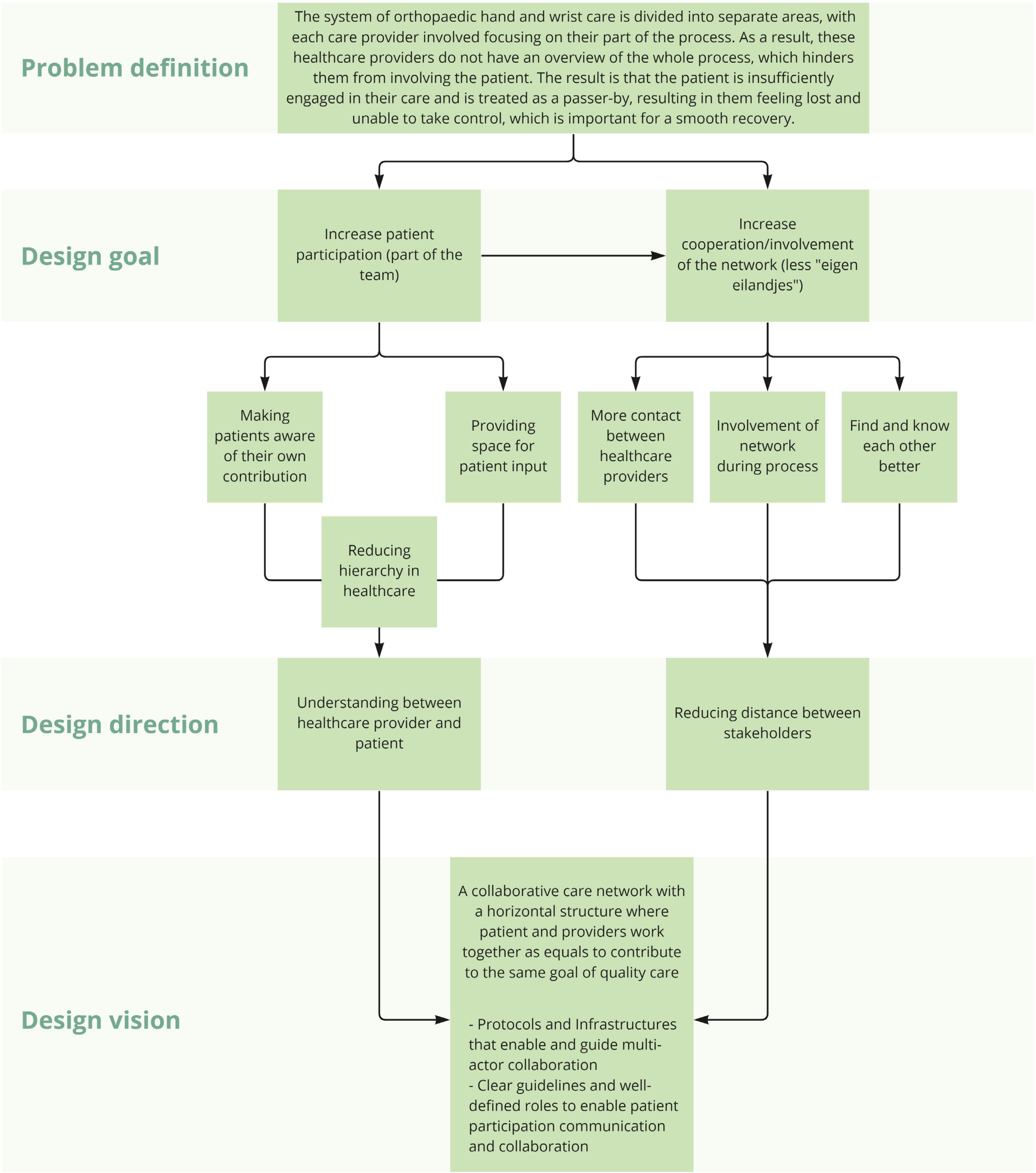


Figure 19. Overview of the problem definition, design goal, design direction and design vision.

Design vision and design components

This will result in the design vision to create a collaborative care network with a horizontal structure where patients and providers work together as equals to contribute to the same quality care goal, resulting in an aligned vision and shared responsibility. It has been learned from the literature that for a patient-centred network to work, the following aspects must be present: protocols and infrastructures that enable and guide multi-actor collaboration (Fjeldstad et al., 2020) and clear guidelines and well-defined roles to enable patient participation (den Breejen et al., 2014).

A future vision for the RHOC

The Reinier Haga Orthopaedic Centre will be part of a collaborative network of patients, healthcare providers and other healthcare organisations. Together, they will co-produce patient-centred healthcare services and share knowledge and innovations in a well-connected network.
This will result in an organisation that has embraced and implemented a truly patient-centred approach to providing holistic care, resulting in empowered patients that are satisfied with their care. Good collaboration leads to clear and efficient care with no longer unneeded appointments, referrals, and waiting times. This reduces the total costs.

Chapter 5

Ideation & Conceptualisation

In this chapter, initial ideas are generated from the design brief and presented to the stakeholders. These ideas are further developed into a new concept with the input generated during the sessions with patients and care providers.

Idea development is used to address the problem defined in the design brief (Chapter 4). The problem describes the insufficient involvement of the patient and the care provider in the entire care process. The ideas to be developed aim to create more understanding between the healthcare provider and the patient and reduce the distance between the different stakeholders in orthopaedic hand and wrist care. The goal is to design a concept that enables a patient-centred healthcare network.

First, ideas are generated through a brainstorming session, from which three more elaborate ideas are developed. After developing three ideas, feedback will be generated through a co-creation session with three care providers, who can give insight into which aspects are most relevant to them. By combining these aspects, a concept can emerge, which is a further elaborated idea. At the end of this chapter, this concept will be evaluated with patients to gather their input before presenting the final design in Chapter 6.

5.1 Ideation

From the design direction specified in Chapter 4, a brainstorming session was held to generate several ideas that could provide a solution to the framed problem of lack of stakeholder involvement in orthopaedic hand and wrist care. The ideas to be generated are aimed at creating a more balanced relationship and understanding between the healthcare provider and patient, and closer cooperation between healthcare providers. The 'How-Tos' brainstorming method (van Boeijen et al., 2020) is used for this purpose. In this method, the problem is reformulated into several "how-to" questions that support the generation of ideas and focus on different aspects of the problem.

The four formulated "how to" questions:

- How can you make patients aware of the space they have for their input?
- How-to bring healthcare providers into contact with each other?
- How-to make patients and care providers equal?
- How can you make the caregiver give the patient room to contribute?

See Appendix C for the results of the brainstorming, and Figure 20 for the ideas based on the four "how to" questions

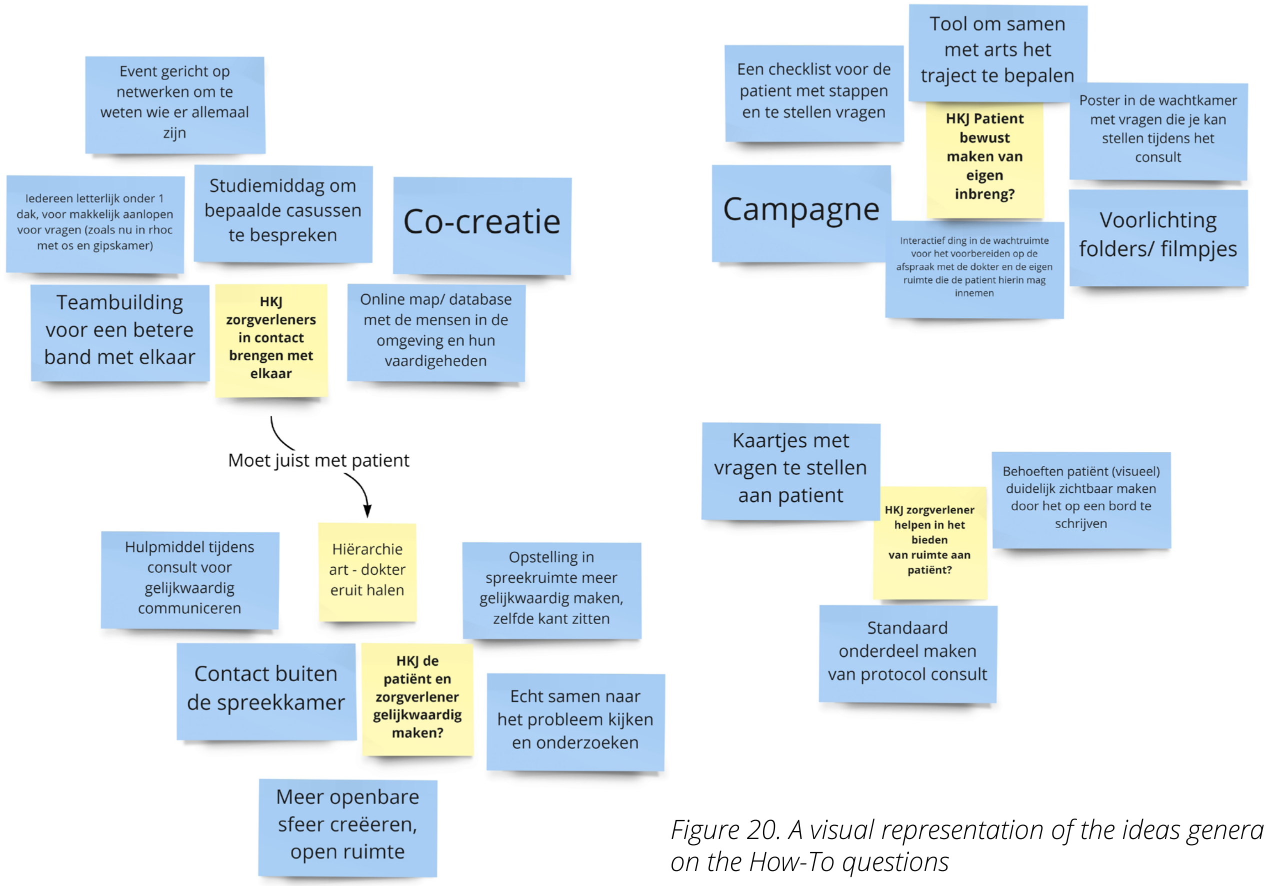


Figure 20. A visual representation of the ideas generated on the How-To questions

Ideas were generated on how to establish contact between caregivers, such as organising activities to bring them into contact with each other. However, this contact should not be limited to the healthcare providers alone, but is especially important to involve the patients. One of the reasons why they are not on the same level is the hierarchy that exists between them. One way to solve this could be to change the set-up in the consulting room to make it feel less official and make people feel more at ease or let the consultation take place in a neutral environment. Patients could become more aware of the space they have for their input by providing information on how they can take this initiative. Healthcare providers could assist in this by allowing the patients' wishes to be more present and making this part of the standard protocol.

The ideas generated on these questions are merged by combining several ideas into one, resulting in three developed ideas.

Three developed ideas

Idea 1

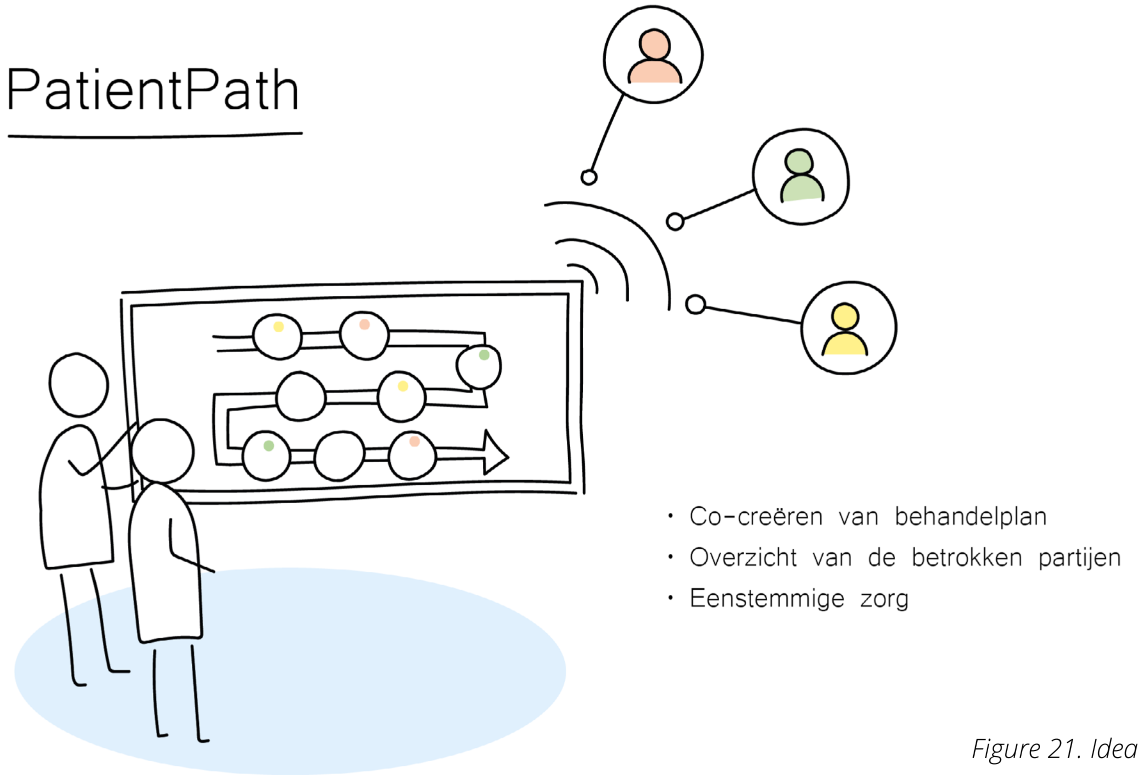


Figure 21. Idea PatientPath

The first idea, “PatientPath”, is an empty customer journey of the entire process that can be filled in by the doctor and patient together. This ensures that every treatment step and possibility is discussed and allows the patient to participate. What, when, with whom and why.
The completed journey is digitised and added to the online patient file to which all involved healthcare providers have access. This way, everyone is informed and on the same page regarding the patient’s treatment. Other healthcare providers can view the other parties involved, allowing them to establish contact. This journey can be adjusted and updated in consultation (always with the patient) when necessary.

Idea 2

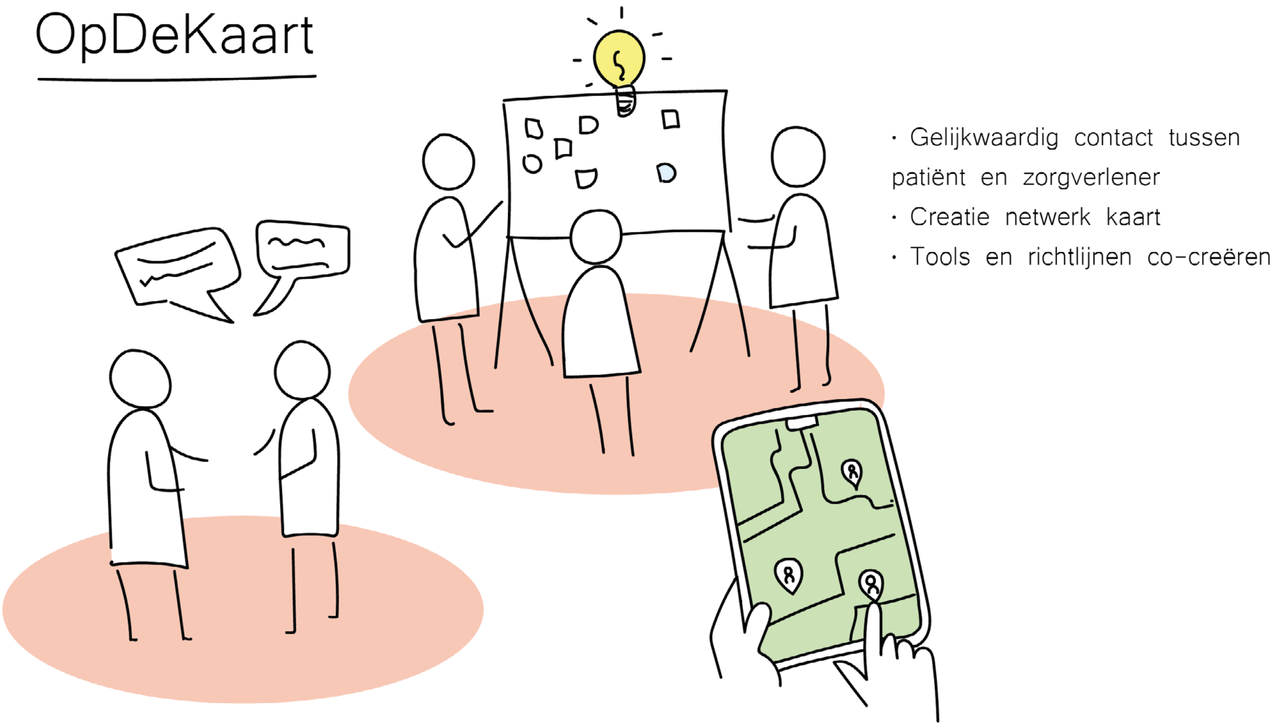


Figure 22. Idea OpDeKaart

The second idea is an event for patients and healthcare professionals called “OpDeKaart”. Here, healthcare providers can network with each other and make new contacts, patients can exchange experiences and patients and healthcare providers can get to know each other on an equal footing. Visitors can put themselves ‘on the map’ so that everyone can easily find each other again later. Healthcare providers and patients give presentations, and workshops and co-creation sessions are organised. Here, new tools and guidelines can be developed that meet everyone’s wishes and needs and contribute to better care.

Idea 3

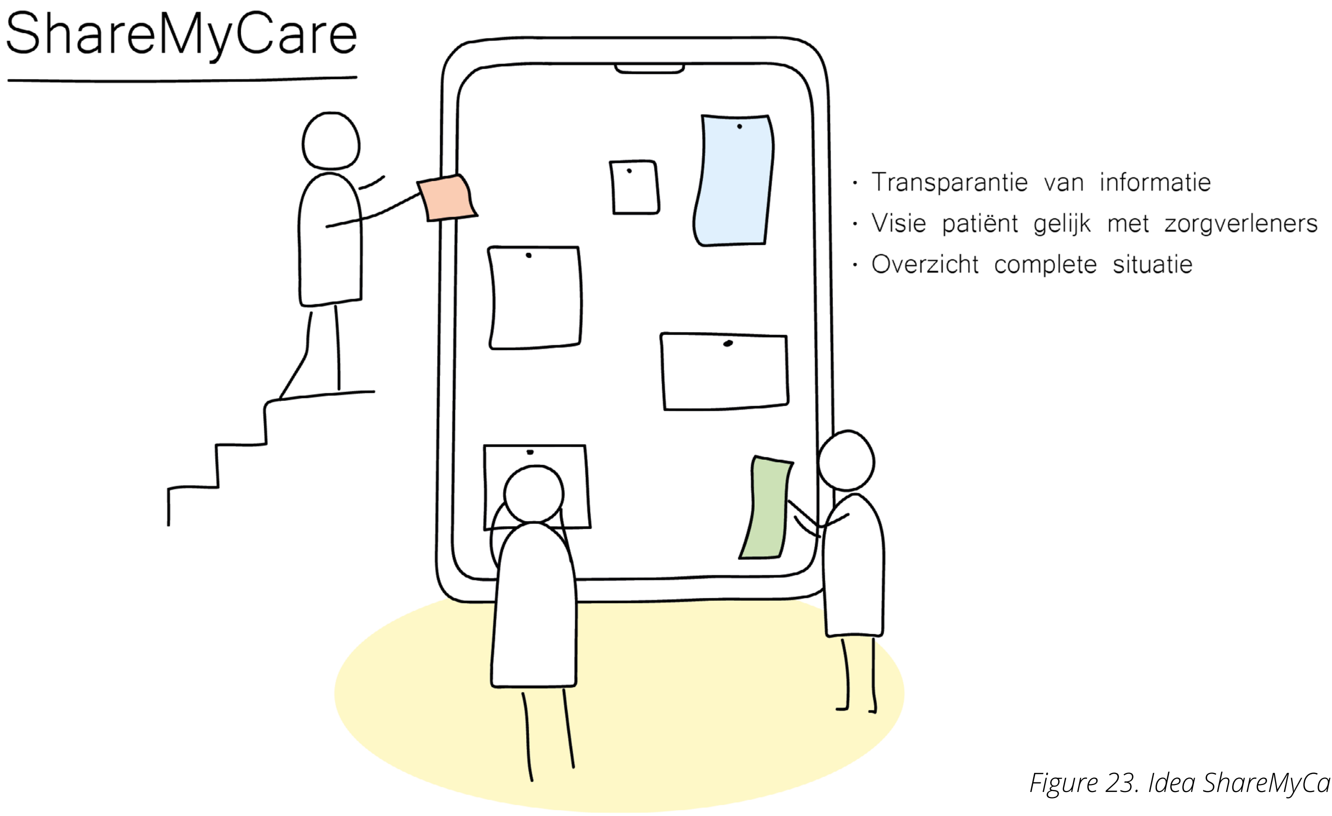


Figure 23. Idea ShareMyCare

The third idea is called “ShareMyCare”, which lets the patient describe their problem, goal and expectations by themself. This is shared on an online notice board. During the appointment, the patient discusses this with the healthcare provider. The healthcare provider then adds his findings and vision to the notice board. This is accessible to all parties involved in the care process and offers insight into the total picture. This ensures all parties remain involved and informed of the process, the patient as much as the healthcare providers. A specialist or other party can easily take a look when their assistance is necessary and provide a complete picture of the situation.

5.2 Co-creation session

A co-creation session is aimed at actively involving users in the design process by letting them participate in developing a solution to the problem. For this purpose, the three ideas are presented and feedback is requested, after which the users can reflect on how they can create their ideal idea based on these three ideas.

Set-up

Aim

This session aims to generate feedback on the three ideas and build on them to develop a new concept. The perspective of healthcare professionals is very valuable and relevant as, together with the patients, they are the experts in the field. By providing their perspective, they can help develop a viable concept that can work.

Participants

The session will be held with three healthcare providers: an orthopaedic surgeon, a hand therapist and a rheumatologist. This choice was made to include perspectives from different parts of the care process. The first two have a major role in determining the treatment plan (see Figure 11, stakeholder map), while the rheumatologist is involved later in the patient’s treatment process. The latter was not included in the initial user research and can therefore provide a fresh perspective on the subject.

Method

The session will be held online using Zoom, and Miro will be used for online collaboration. First, background information will be given. Here the problem and the design goal from chapter 4 will be told. Then, with the help of Figures 21, 22 and 23, the three ideas will be explained. To generate feedback, a template is created with a feedback matrix where participants can fill in their feedback in predefined categories. Under each idea, this template is placed for the participants to fill in, as illustrated in Figure 24.
This template is intended to get participants thinking about different types of feedback. The categories are likes; to find out which elements they like, challenges; what are the risks that need attention, additions/adjustments; new ideas to improve the concept and questions; what is still unclear. With the help of post-its, the participants can fill in their thoughts. These are discussed together and follow-up questions are asked.

In the last part of the session, a new concept is generated together. The participants can take the three existing ideas as a starting point and derive elements from them to use in their new idea. A template is created to help them generate the new idea, allowing them to think about multiple aspects to help define the idea (Appendix D1).

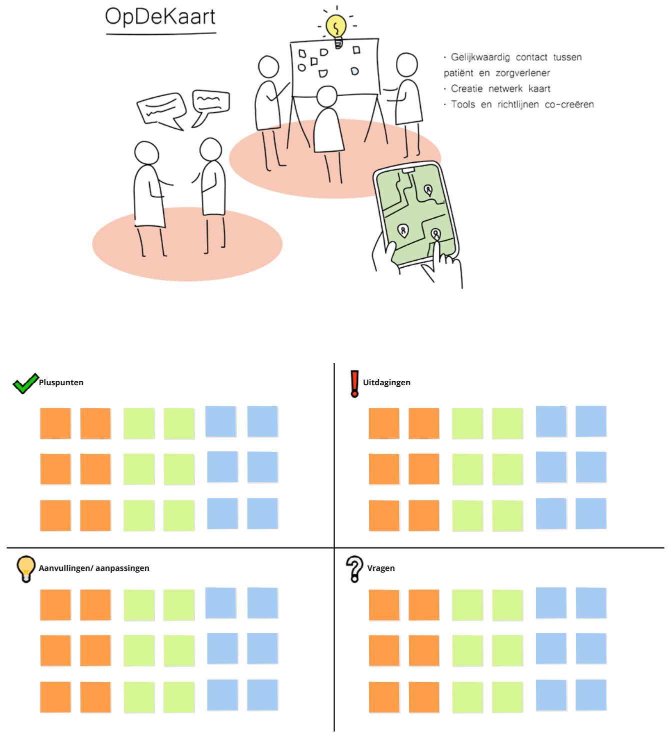


Figure 24. Set-up feedback templates

Results session

During the session, the three ideas were evaluated by the healthcare providers. The insights can be viewed in Appendix D2. A summarised overview of their input can be seen in Figure 25.

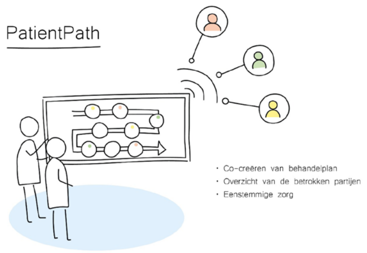
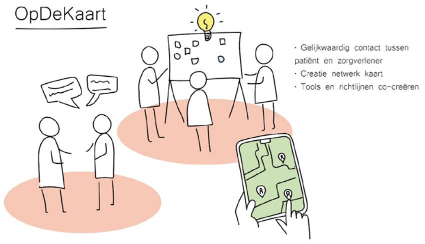
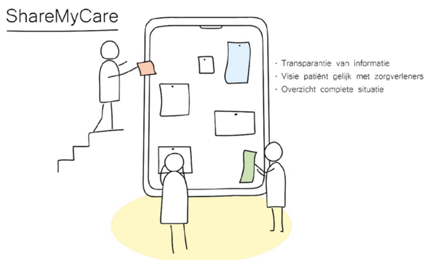
	Keep	**Develop**
	- Overview of pathway helps healthcare providers and patient - In consultation with the patient, organise a care path - Overview of path provides insight into bottlenecks/points for improvement	- General Data Protection Regulation (AVG) - Connection to general practitioners is a challenge
	- Sharing knowledge - Making the patient's perspective visible may lead to better quality of care - Equivalence	- Takes a lot of time: emphasising the added value for care providers in order to get them on board - Change of working method
	- Actively expects the patient to think along; where do I want to go and what is needed to achieve this (this is often lacking in patients) - in a total picture, an overview of who contributes what	- Transparency of information - Many different thoughts when everyone is thinking along

Figure 25. Overview of the input generated during the feedback session

Idea 1 PatientPath

The healthcare providers were positive about the visibility of the patient's journey and an overview of all the involved parties. Visualising this process and the collaborative decision of this path has a lot to contribute. They also said that the overview of the process with the treatment steps could benefit the healthcare providers, which can help them become more aware of the common goal and thus better involve the patient in this process. Which was indicated as a factor that could help prevent ineffective appointments. Currently, due to extensive specialisation, patients are constantly referred to all specialists. Someone suggested that it may help the patient if they can review the decisions made and the needed contribution.

Idea 2 OpDeKaart

The participants were enthusiastic about the equality and personal contact it enabled between the patient and the healthcare providers, the co-creation in which decisions are made, and the possibility of exchanging knowledge. They recognised that learning from each other is a valuable resource. By enabling conversations about the care that is experienced, improvements in care can be achieved. A point of concern with this idea is the inclusion of the participants. How can you involve a representative group of patients and convince healthcare professionals to devote their valuable time to this event? The aspect of the co-creation sessions also provoked thoughts. Because the interpretation is still very open, it was felt that this could provide room for creative ideas, possibly even small changes that will significantly benefit the patient. However, it may also create false expectations of changes that may not be possible/attainable at all.

Idea 3 ShareMyCare

This idea was much favoured, mainly because in this idea they saw the patient in control. Here, the patient is asked to actively participate in their care by thinking about their goal; where do I want to go and what is needed to achieve this. Currently, they see this is often lacking in patients. This also enables healthcare providers to work in a goal-oriented way. In addition, this idea provides a clear overview of everyone's opinions and input, though it may also lead to unclarity if these opinions are not aligned. It was also pointed out that it is not only the patients who must actively participate but that healthcare providers can also be indifferent, especially when they feel something is not their responsibility.

Conclusion session

These insights resulted in a selection of the aspects that were perceived as most valuable by the healthcare providers, which are :

- Overview in pathway helps healthcare providers and patients (Concept PatientPath) :
  - Healthcare providers
    - Contact with each other
    - Overview of the process helps to involve the patient
    - Overview of what happened
  - Patients
    - Overview of made agreements
    - Insight into the responsibilities of the patient
- Emphasising the added value for healthcare providers to get them on board (Concept OpDeKaart).
- Insight into the patient's perspective also brings about a great deal of change (this was also found in the literature, Vennik et al. (2015)) (Concept OpDeKaart).
- Patient control (regie); let the patient think actively about goals and expectations (Concept ShareYourCare).
- Information where you complement each other instead of telling ten different stories (general discussion).
- More frequent contact between healthcare providers; also helps them to learn from each other and about certain assumptions that may not be true (general discussion).

5.3 Concept development

The following design step is to develop a concept from the three ideas. A concept combines different ideas and therefore focuses on different aspects of the problem. Moreover, a concept is more extensive and better defined than an idea. For this concept development, the input generated by the three healthcare providers from the co-creation session forms the basis. The care providers identified the most relevant aspects, which will be combined and developed into a concept. When the concept has been refined, the patient's opinion will also be sought to see what they think of the proposal. After all, they are important stakeholders in this project.

The three ideas' most valuable aspects, as perceived by the healthcare providers, are combined to develop a new concept. The PatientPath concept is used as a baseline because a clear, co-created overview of the process is an effective way to involve both the patient and the healthcare provider in the whole process. It helps caregivers connect and creates one coordinated care process instead of "telling ten different stories". Moreover, this idea can be implemented as a first step to achieving a state of patient empowerment that appeals to the caregivers in the third idea. The PatientPath offers opportunities to combine it with the vital aspects of the other ideas into one more elaborate concept.

The OpDeKaart concept appreciations included the importance of paying attention to the patient's perspective. This can be integrated by adding the possibility for them to express their experiences throughout the process. The ShareYourCare concept was much preferred because it asked the patient to actively think about their goals and needs and formulate their care request so that they become more active in their care. This can be added to creating the care plan and strengthens the concept as it also helps the caregiver support the patient by defining the treatment plan.

Two other additions based on ideas contributed by the healthcare providers is to document and share at each step what has been done and what is needed from both the patients and the other parties. This can help to understand why certain decisions were made, which helps to make caregivers more aware of each other's abilities, and for the patient to understand and remember their role.

Concept WegWijs

The concept is described in steps and visually represented in Figure 26. In this concept, patients are asked to think about their goals up front: "what do I want?". From there, a treatment plan can be outlined with the doctor for achieving this goal: "what could be done". The options are considered for each step, specifying the patient's contribution. In this way, the patient can choose what works best for them. The plan will be set up on a high level and completed at the micro-level; the primary goal of each step is set, and the active healthcare provider completes the detailed steps. Also, decision points are made visible for steps that are still uncertain as some information is not yet available. At those points, the following steps will be reviewed.

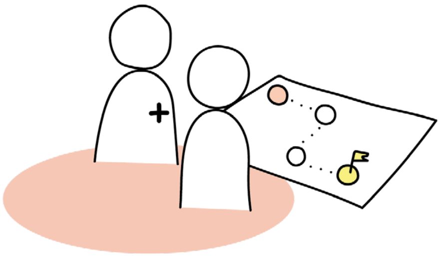
In addition to the patient, all healthcare providers gain insight into this path. This provides an overview of the entire treatment process, helping them to see the whole picture and to involve the patient. Due to access to information on the involved parties, they can be contacted when consultation is necessary.

For each step, the healthcare provider notes what has been done, what has been agreed on and what is expected from other parties, including the patient. This saves time in writing up referrals and provides transparency for all parties. The patient can share their perspective on each step, which also keeps the healthcare providers aware.

1

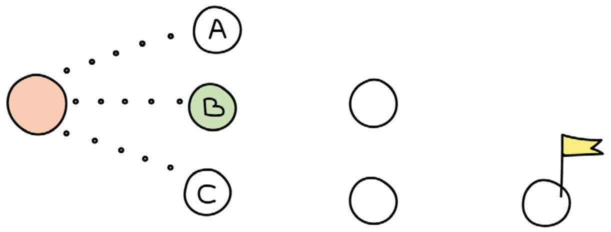
Patient is asked first to reflect on their goals "what would I like?"

2



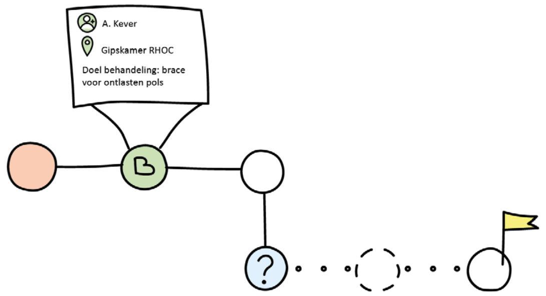
From this request for help, the healthcare provider can specifically help the patient formulate the treatment plan "what could be done?

3



For each step, the options are considered and the patient's contribution is considered. In this way, the patient can make the choice that works best for them.

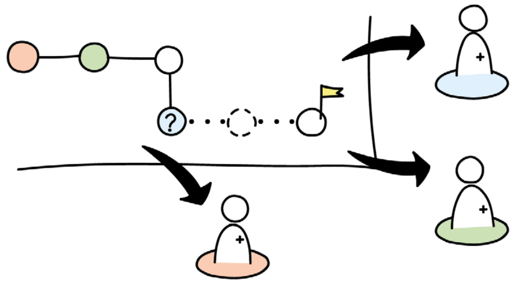
4



The goal of each step is determined, and the detailed steps are completed by the healthcare provider in that step.

Not everything can be determined beforehand (e.g. because certain information is still lacking), which is why decision points have been set at which the best follow-up steps must be reconsidered.

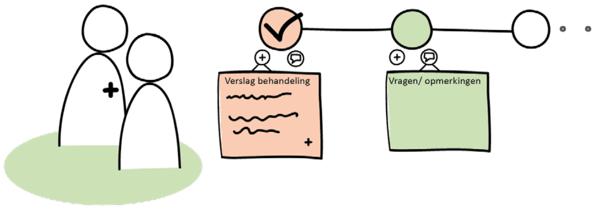
5



In addition to the patient, all care providers gain insight into this path. This provides an overview of the entire treatment process, which helps them to see the whole picture and also involves the patient.

Having an insight into who the involved parties are allows them to contact each other when consultation is necessary.

6



For each step, the healthcare provider notes what has been done, what has been agreed and what is expected from other parties (including the patient). This saves time in making referrals and provides transparency for all parties.

The patient can also share his own perspective in the shape of questions and comments at each treatment step, thus keeping the caregivers aware of this as well.

Figure 26. The concept explained in steps

Evaluation with patients

To evaluate the concept, it was presented to patients to learn about their opinion on the concept in general and on specific steps, so this can be taken into account in the further development of the concept. As patients are important stakeholders, their opinion is valuable and an essential aspect of the final design development, which will be presented in the next chapter.

Set-up

Aim

This evaluation aims to ask patients for feedback on the concept, validate its purpose and ask their opinions on specific actions. The research questions are:
What do they think of the concept in general?
What do they think of specific steps?
What works well and what needs to be improved?

Participants

The participants are two patients with hand or wrist complaints who are familiar with the process of hand and wrist care. They have experience with multiple disciplines and going through multiple steps during this treatment process.

Method

The sessions are carried out online using Zoom. Through screen sharing, the concept is shown and explained step by step, and specific questions are asked with each step. The more general questions were about whether they think it is a good concept, whether they think it would be helpful, what aspects contribute to it and whether there are things they miss or think will not work. More specific questions were asked about how and when they would like to carry out specific actions and how they see the role of the caregiver versus their role.

Results

The patients indicated that drawing up a request for help can be very useful. This would also allow the doctor to indicate whether this is a feasible goal and, if necessary, to adjust expectations. For these patients, the doctor retains the leading role in the choice of treatment. But knowing all the options is seen as something important, and it is preferable to receive this verbally, possibly with visual support. The information they need about the treatment options to choose is the pros and cons, what it entails and what the recovery period is.

They also liked being able to read the information afterwards, as it can be very overwhelming at the time itself. They thought it would be better if most of the contact went via the health care providers, otherwise, there is a risk that they will be inundated with messages or that people will start acting as doctors themselves. Thereby, they liked being able to ask questions (preference for an open text box) or to indicate in another way whether things were clear.

In general, they were positive about the concept. They saw how it could help to link the disciplines within care, without creating a lot of extra work steps. Besides, they thought it gave them more control over their care.

"That you have more control over yourself, that you are more of a person than a number, so to speak".

The possibility of asking questions using the system remained a point of concern; how this could be organised without creating too much work for the doctors.

Discussion

Without mentioning the aimed goal of the concept, they noted on their own accord that this concept would bring more cooperation between the various parties, as well as more control for the patient. This confirmed that it could contribute to these aspects, which are currently lacking in orthopaedic hand and wrist care.

An option to ask questions is something that needs further development. This possibility was desired by the patients spoken to. However, it should be carefully considered how this can be done without overwhelming the doctors with questions or creating false expectations among the patients. Furthermore, the parts and functions of the system were perceived as relevant and valuable so that they can be kept as part of the final concept.

The purpose of this test with the patients was to gain insight into their views on the idea and collect information with which the concept could be further improved and elaborated. However, the test mainly confirmed the existing idea and did not provide much new input. This could be because the concept was presented rather globally. Therefore, after the final design, a validation will be performed with a more detailed explanation to generate more input.

5.4 Conclusion Chapter 5 | Ideation & Conceptualisation

The generation of how-to ideas led to three elaborated ideas that could be further developed into a concept based on the input of three caregivers generated during a feedback session. This concept was presented to two patients, which allowed them to give their views and opinions on it. Since their view was quite positive, this concept can form the basis for the final design, for which further development is still needed.

The input of healthcare providers could provide insight into which aspects were most important to them. Much of this coincided with what had been found in the interviews. Such as the need for more contact and cooperation with other care providers, and to involve and activate the patient in their care (Chapter 3.2 Insights healthcare providers). More control for the patient had been mentioned earlier, but this session emphasised how important the healthcare providers found this too. The phenomenon that insight into the patient’s perspective can cause change was recognised, which was also found in the literature study (Vennik et al.,2015).

The results of the evaluation of the patients corresponded to the insights from the interviews in the user research (Chapter 3.2 Insights patients). Here, they said they wanted to receive more information from the healthcare providers, and more control over their care. These aspects were again emphasised in the concept, and the importance of their inclusion was expressed.

It is necessary to elaborate on what is needed for the realisation of this concept, how to develop clear protocols and guidelines to enable networked healthcare, to define the new roles for this patient-centred treatment and what the rules are regarding the privacy of sharing medical information. In the next chapter, these final adjustments will be made and presented.

Chapter 6

Final Design

This chapter describes the final design, called WegWijs (RoadWise), which is a system that enables a collaborative care network in which patients and caregivers work together as equals to provide the best care. The following sections explain this concept in more detail, using design methods of user storyboarding that visualise the use process, a service blueprint that provides more detail on this system's operation and components, and a roadmap, which sets out an implementation plan for the RHOC.

This design results from the preceding chapters, where the outcomes from the literature research, user research and concept development come together. The problem, as defined in the design brief in Chapter 4, states that healthcare providers in orthopaedic hand and wrist care lack a holistic view, which prevents them from involving patients, resulting in patients being unable to take control of their care. The feedback sessions (Chapter 3) further emphasise this importance when patients and healthcare providers were involved in giving their input. Their opinions were used to create the final design. The literature will be used to elaborate this design further, to define the network structure, the roles of the healthcare provider and the patient, and the implementation strategy, which connects the different parties, defines the establishment and uptake of the network and takes into account the medical rules and regulations.

6.1 WegWijs

WegWijs means to be wise, informed and in control in healthcare. It provides the stakeholders with the knowledge needed to create a holistic and patient-centred care process by providing an overview of the treatment process.
WegWijs creates connections and involvement between the stakeholders as it provides a means of finding each other by sharing the information of all the involved parties. The patient takes an active role in shaping their treatment by formulating a treatment goal and deciding with the doctor on a treatment, which the healthcare provider encourages. The care providers remain actively involved throughout the process and in close contact with each other, creating a well-connected healthcare network.

A connected system

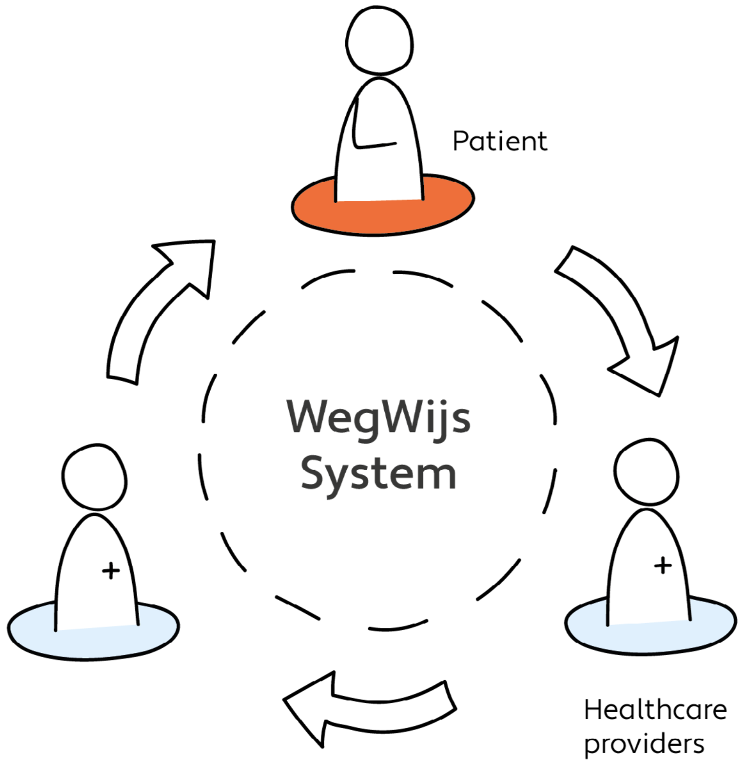


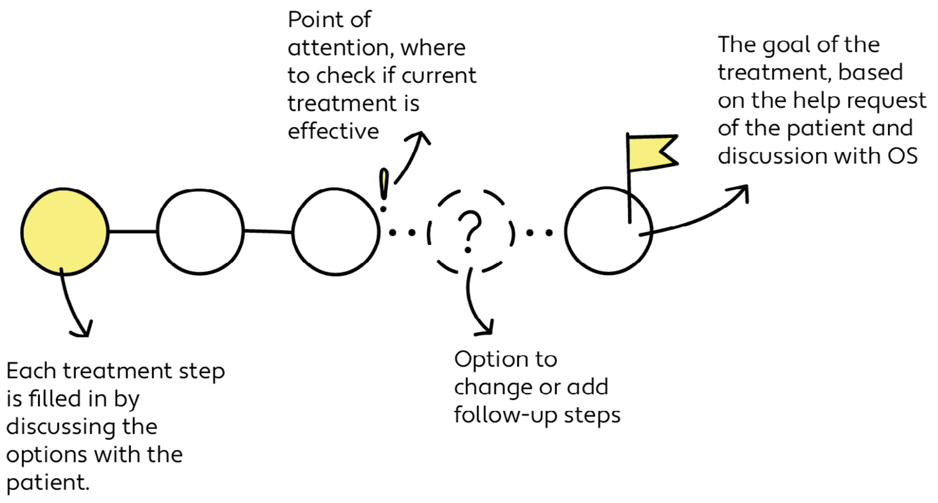
Figure 27. WegWijs System

WegWijs contains a system that provides for sharing knowledge and information, connecting multiple people and devices. This ensures cooperation and brings different parties into contact. The healthcare providers operate the system via the computer and the patients via the app on their phones or a website.

The system creates a central point that connects all the information in one spot instead of it passing through various individual lines, see figure 27. This links up with the closure theory in social networks (Coleman, 1990).

Co-creating a treatment plan

The concept revolves around the co-creation of a treatment plan by the patient and the healthcare provider and the sharing and centralisation of this plan. This should be part of the new care protocol organising this cooperation between different actors. It requires patient participation and knowledge and information from the healthcare providers. The healthcare providers must explain the treatment options so the patient can choose. In turn, the patient must be active, express his needs and formulate his treatment goal. Explanation of the content of the treatment plan can be seen in Figure 28.



- Aligned treatment plan
- Clear and realistic expectations of recovery
- Active patients

Figure 28. Explanation of the content of the treatment plan

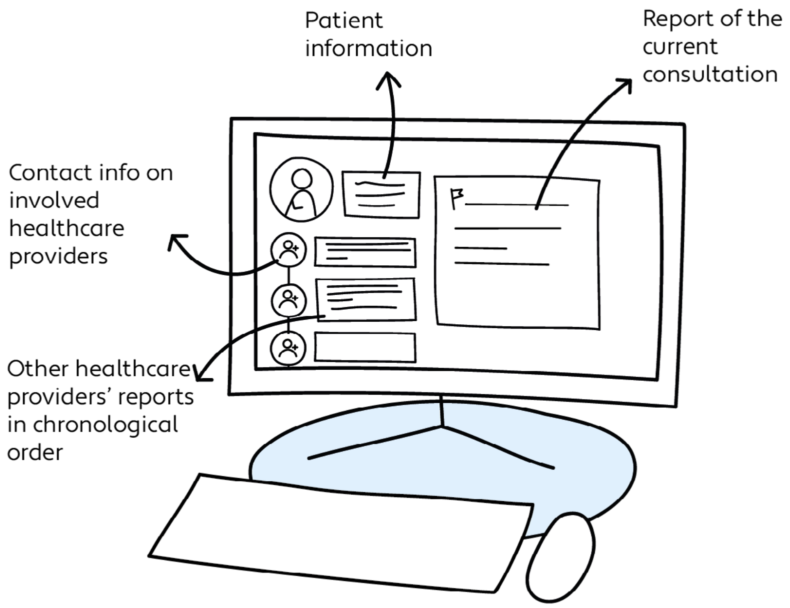
In this way, a treatment plan is drawn up, in which each step describes the goal and the care discipline involved. Later, the treating healthcare provider further completes each goal with more detailed steps. This plan is documented and shared through the system with all involved healthcare providers. This ensures that everyone is informed and that cooperation can be improved by coordinating care. The orthopaedic surgeon discusses the treatment options with the patient and the patient's needs, thus creating realistic expectations of the recovery process. In this way, an appropriate treatment plan is made for each patient, and at the same time, the patient is asked to participate actively. The plan also includes a moment of reflection on the treatment status. If this indicates that the treatment is not progressing well and the goals are not being achieved, patients can be referred back in time, or the orthopaedic surgeon can be contacted to discuss a new treatment plan with the patient.

Tackled problems:
- *Unaligned in treatment plan (Chapter 3.2 Insights healthcare providers)*
- *Wrong expectations of recovery (Chapter 3.2 Insights patients)*
- *A wait-and-see attitude of patients (Chapter 3.2 Insights healthcare providers)*

The healthcare provider's view

The healthcare providers will operate the system via a computer, corresponding to their current way of working during a consultation.

Explanation of the content of what the healthcare provider sees can be seen in Figure 29.



Healthcare providers:

- Able to find each other
- Holistic treatment
- Able to involve patients
- Consistent communication

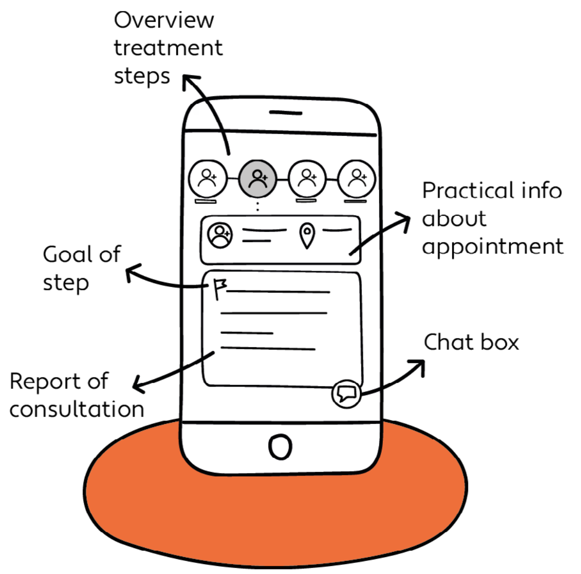
Figure 29. Explanation of the content of what the healthcare provider sees

On the screen, they can view the personal patient data on the left-hand side and note the patient's care requirements. Furthermore, they can scroll through the compiled treatment plan and view the details of the other healthcare providers involved, enabling them to find each other. The typed appointment reports can also be found here, giving them an overview of the earlier steps. On the right-hand side of the screen, there is space for typing their report of the current consultation.

Tackled problems (chapter 3.2 Insights healthcare providers):
- *Not knowing each other; not finding each other*
- *Lack of holistic care*
- *Struggling with patient engagement*
- *Inconsistent communication between healthcare providers*

The patient's view

The system will be accessible to the patient via an app or a website. A phone is almost always brought along, so the app is easily accessible anytime. Nevertheless, since the elderly make up a large part of the population and are not always digitally literate, it is important to have the option of a website as well. Moreover, a website can also be accessed via a phone without having to install an application. For the explanation, the design of the system for the patient will be illustrated as a display on a phone. Explanation of the content of what the patient sees, can be seen in Figure 30.



Patients:

- Involved in the care process
- Informed by healthcare providers
- Confident in the care process

Figure 30. Explanation of the content of what the patient sees

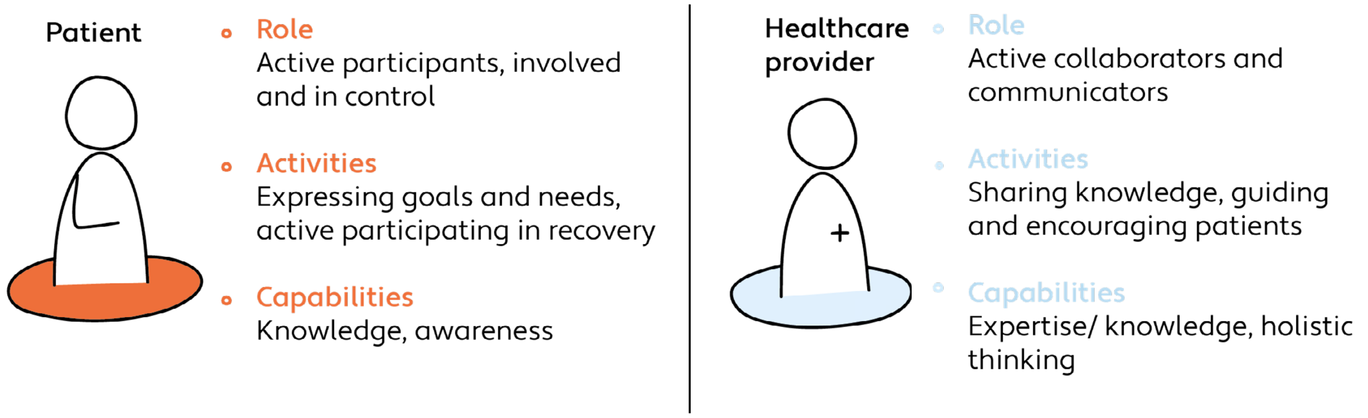
The patient can view a scrollable overview of the treatment steps on the screen. By clicking on a step, they can see more information, such as the care provider, the location, the goal of this treatment step and the typed report by the care provider. In this way, they remain involved in the process and are informed by the healthcare providers. They can feel more confident in their care by having control and overview.

In addition, there is an option for a chat box, where they can ask any pressing questions. This chat box has a database of FAQs, with which most questions can be answered automatically using artificial intelligence. If this is not the case, it is forwarded outside the system to a contact person in the RHOC.

Tackled problems (Chapter 3.2 Insights patients):
- *Lack of involvement in the care process*
- *Lack of information from the healthcare providers*
- *Insecure in care*

Defined roles in the future network

As the literature on care networks shows, realising care networks requires a great amount of steering at the organisational level, including well-defined roles (den Breejen et al., 2014). In this newly designed network, the roles of both the care provider and the patient shift to a more involved and active role throughout the care process. These new defined roles can be seen in Figure 31.



Patient

- **Role**
  Active participants, involved and in control
- **Activities**
  Expressing goals and needs, active participating in recovery
- **Capabilities**
  Knowledge, awareness

Healthcare provider

- **Role**
  Active collaborators and communicators
- **Activities**
  Sharing knowledge, guiding and encouraging patients
- **Capabilities**
  Expertise/ knowledge, holistic thinking

Figure 31. New defined roles, activities and capabilities

Patient

The patient will fulfil the role of an active and engaged patient, in control of their care. They will express their goals and needs during treatment so the caregivers can involve them. Furthermore, they will actively participate in their recovery. For this, they will require knowledge about the treatment and available options and be aware of their choice (Fraenkel & McGraw, 2007). They will need to be aware of their role and responsibility in their recovery process.

Healthcare provider

In this new network, the healthcare provider takes on the role of active communicator and collaborator. This is necessary to build a well-connected network with interprofessional cooperation. They will share their knowledge with patients and other stakeholders to improve the quality of care. To initiate patient participation, they will guide and explicitly encourage patients to take an active role and appreciate their rights to participate in decision-making (Fraenkel & McGraw, 2007). They need knowledge and expertise about the other disciplines involved in the hand and wrist network and patient needs and values. This knowledge will be established through co-creating the new protocols (further explained in the implementation strategy). They will require holistic thinking to view the treatment process as a whole in which all parties work together to achieve the same goal.

6.2 User storyboard

A storyboard is a tool to communicate a story using images. A storyboard can help visualise the interaction between the users and the concept and display their experiences with it. This clearly explains how WegWijs is used and how it shapes the renewed treatment process.

This scenario follows Franka (Figure 32), a woman that gets treated in the Orthopaedic Centre for her wrist problems. The story begins with Franka receiving an email about her upcoming primary appointment at the RHOC with an orthopaedic surgeon. The rest of the storyboard, as seen in Figure 33, outlines her treatment process within the hand and wrist network, with an appointment with a plaster technician and a hand therapist.

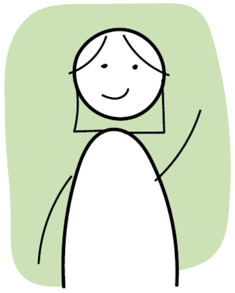
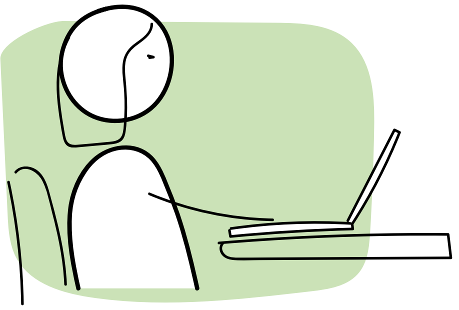


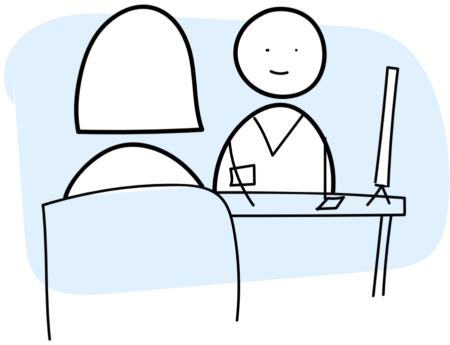
Figure 32. Franka

1



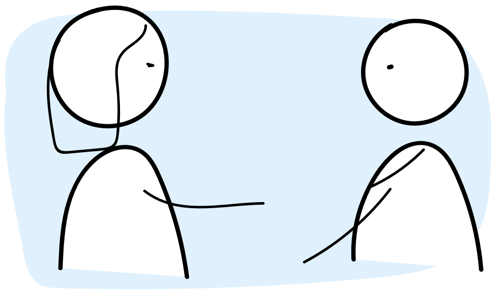
Franka receives an email about her upcoming appointment with the orthopaedic surgeon. It asks her if she will think about the purpose of her treatment.

2



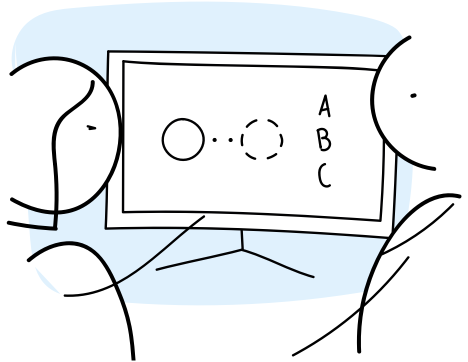
At the appointment with the orthopaedic surgeon, Franka tells about her symptoms. The doctor does a physical examination and makes a diagnosis.

3



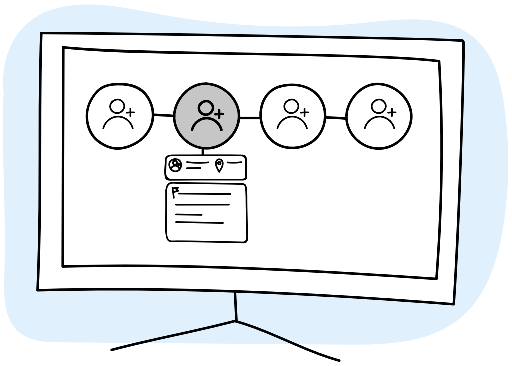
Together they discuss whether Franka's goal of treatment is achievable. If not, they adjust it so that Franka knows what to expect.

4



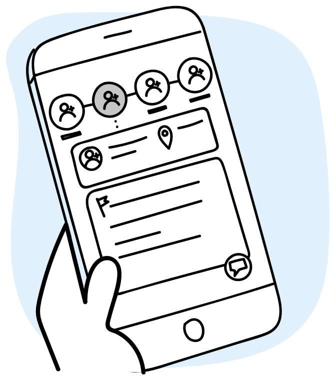
The doctor explains the different treatment options. Franka and the doctor decide on conservative treatment with a brace and hand therapy.

5



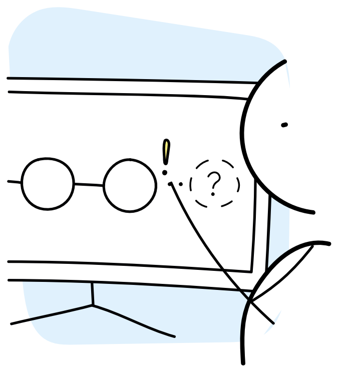
In this way, a treatment plan is made that describes, step by step, what is going to happen, with whom, and why.

6



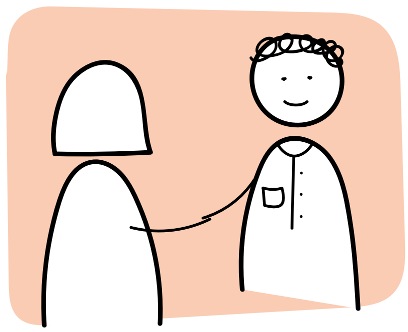
This can be viewed by Franka and the healthcare professionals involved in her treatment.

7



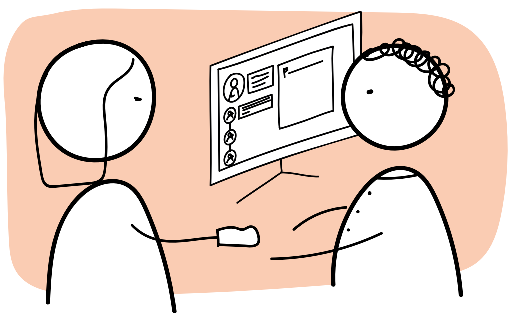
They schedule a check-up in a few weeks to see if the chosen treatment is working or if a new plan needs to be devised.

8



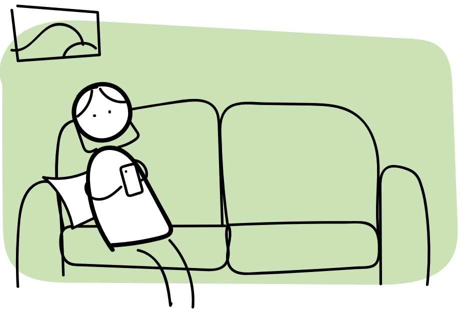
After the appointment with the orthopaedic surgeon, Franka can immediately go to the plaster room of the RHOC to get a plaster brace.

9



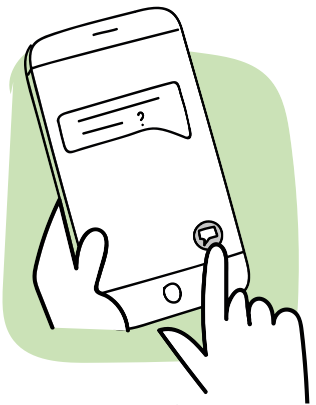
The plaster technician reviews the treatment plan. He consults with Franka about her wishes and makes a suitable brace.

10



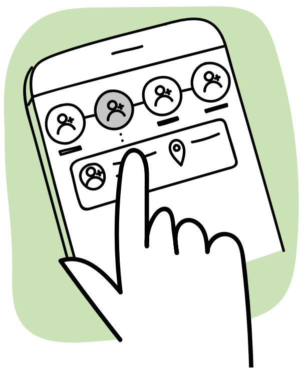
When Franka is back home, she looks up the treatment plan on her phone, and reads the doctors' notes on the past two treatments.

11



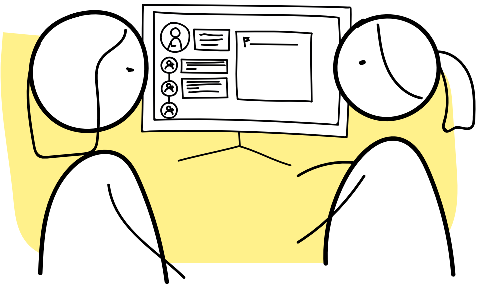
It is still unclear to her how often she has to wear the brace, so she decides to ask via the chat function in the app.

12



At the same time, she looks at her next step: a visit to the hand therapist.

13

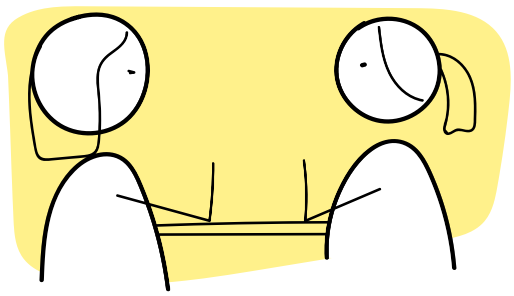


The hand therapist discusses with Franka what her symptoms are and what her goal is.

14

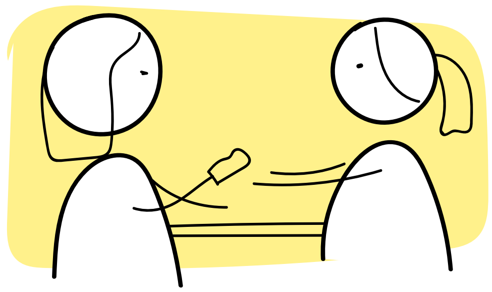
The hand therapist reviews the treatment plan and the doctors' notes. She also includes her own notes for the treatment.

15



Together they do some exercises for the wrist, which Franka takes home to repeat three times a day.

16

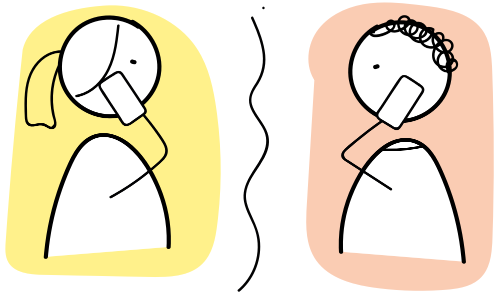


Franka discusses with the hand therapist that her brace is bothering her.

17

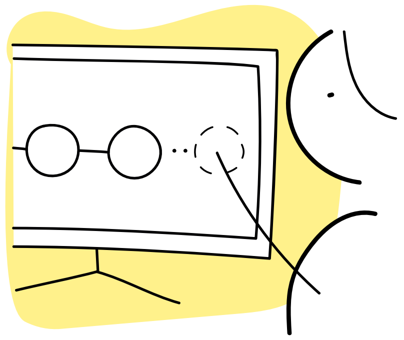
The hand therapist checks in the treatment plan who made the brace.

18



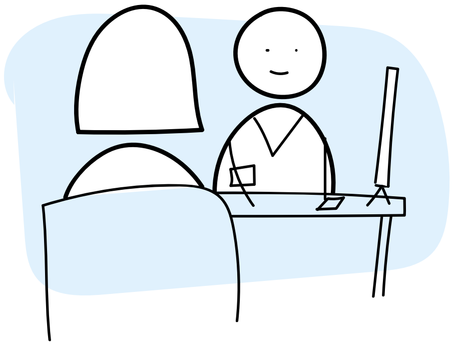
The hand therapist calls the plaster technician about a solution for the brace.

19



The hand therapist adds an extra visit to the plaster room to the treatment plan so that Franka can have a new brace made.

20

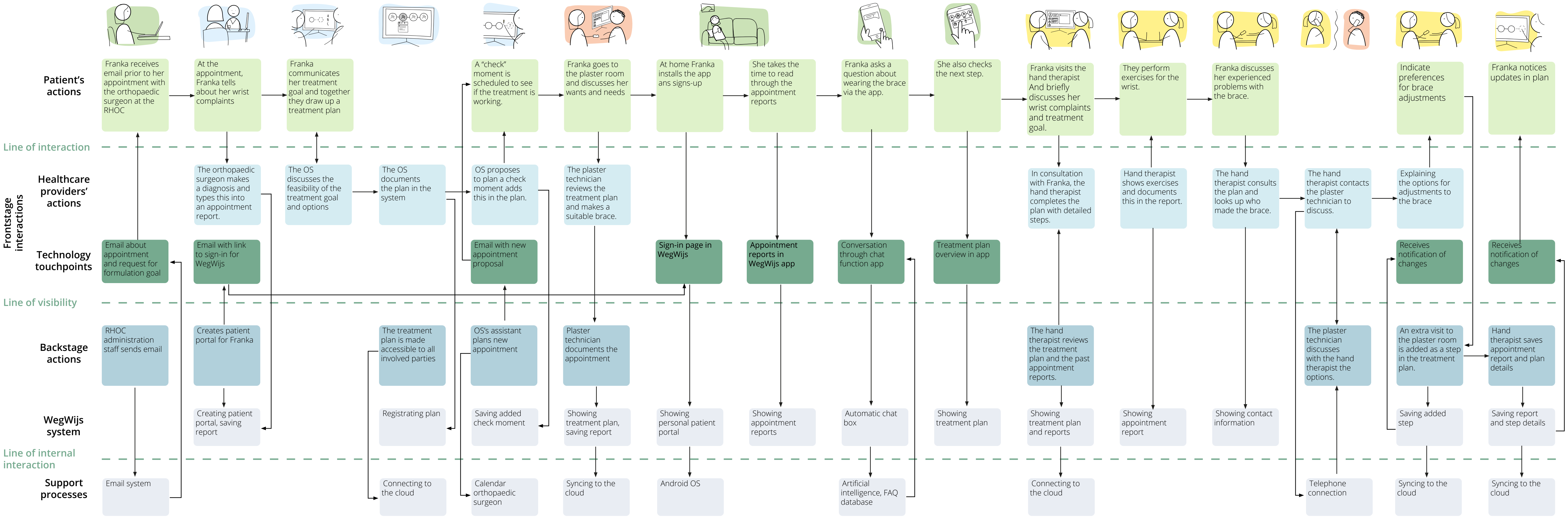


Finally, Franka has a check-up appointment with the orthopaedic surgeon to see how the treatment is going, and to change the treatment if necessary.

Figure 33. User storyboard

6.3 Service blueprint

A service blueprint is constructed to map the underlying processes that support the steps in the storyboard. A service blueprint is a diagram that visualises the relationships between different service components — people, props (physical or digital evidence), and processes — that are tied to user journey steps (Gibbons, 2017).



Patient's actions	Franka receives email prior to her appointment with the orthopaedic surgeon at the RHOC	At the appointment, Franka tells about her wrist complaints	Franka communicates her treatment goal and together they draw up a treatment plan		A "check" moment is scheduled to see if the treatment is working.	Franka goes to the plaster room and discusses her wants and needs	At home Franka installs the app ans signs-up	She takes the time to read through the appointment reports
Healthcare providers' actions		The orthopaedic surgeon makes a diagnosis and types this into an appointment report.	The OS discusses the feasibility of the treatment goal and options	The OS documents the plan in the system	OS proposes to plan a check moment adds this in the plan.	The plaster technician reviews the treatment plan and makes a suitable brace.		
Technology touchpoints	Email about appointment and request for formulation goal	Email with link to sign-in for WegWijs			Email with new appointment proposal		Sign-in page in WegWijs	Appointment reports in WegWijs app
Backstage actions	RHOC administration staff sends email	Creates patient portal for Franka		The treatment plan is made accessible to all involved parties	OS's assistant plans new appointment	Plaster technician documents the appointment		
WegWijs system		Creating patient portal, saving report		Registrating plan	Saving added check moment	Showing treatment plan, saving report	Showing personal patient portal	Showing appointment reports
Support processes	Email system			Connecting to the cloud	Calendar orthopaedic surgeon	Syncing to the cloud	Android OS	

Patient's actions	Franka asks a question about wearing the brace via the app.	She also checks the next step.	Franka visits the hand therapist And briefly discusses her wrist complaints and treatment goal.	They perform exercises for the wrist.	Franka discusses her experienced problems with the brace.		Indicate preferences for brace adjustments	Franka notices updates in plan
Healthcare providers' actions			In consultation with Franka, the hand therapist completes the plan with detailed steps.	Hand therapist shows exercises and documents this in the report.	The hand therapist consults the plan and looks up who made the brace.	The hand therapist contacts the plaster technician to discuss.	Explaining the options for adjustments to the brace	
Technology touchpoints	Conversation through chat function app	Treatment plan overview in app					Receives notification of changes	Receives notification of changes
Backstage actions			The hand therapist reviews the treatment plan and the past appointment reports.			The plaster technician discusses with the hand therapist the options.	An extra visit to the plaster room is added as a step in the treatment plan.	Hand therapist saves appointment report and plan details
WegWijs system	Automatic chat box	Showing treatment plan	Showing treatment plan and reports	Showing appointment report	Showing contact information		Saving added step	Saving report and step details
Support processes	Artificial intelligence, FAQ database		Connecting to the cloud			Telephone connection	Syncing to the cloud	Syncing to the cloud

Figure 34. Service blueprint

The service blueprint can be seen in Figure 34. It is built up from the following core elements:

The *Patient's actions* describe the steps that our persona Franka makes during her treatment process, which are derived from the steps in the user storyboard.

The *Frontstage interactions* are the actions that are visible to Franka and with which she interacts, which explains the *line of interaction*. These include two categories :

- *Healthcare providers' actions* describe the interactions and actions that the healthcare providers perform in Franka's presence.
- The *Technology touchpoints* are the digital touchpoints that Franka interacts with directly.

The *Backstage actions* are the activities that occur behind the scenes and are therefore not visible to Franka and thus are separated from the frontstage interactions within the *line of visibility*.

The *WegWijs system* describes the functions that the system performs to support the actions of the users who interact with this system.

Support processes describe the external processes that are deployed to support the system functions. These are from external sources, therefore it is separated with the *line of internal interaction*.

6.4 Implementation strategy

A strategy is needed to implement this concept in hand and wrist care. First, information is consulted on the rules surrounding the concept within the healthcare context. Finally, a step-by-step plan is made that maps out the necessary actions for the further development and implementation of WegWijs in the RHOC.

Medical rules and regulations for the implementation of WegWijs

Because the system is implemented in the healthcare context, and the concept includes sharing sensitive healthcare information and patient data, it will face additional regulations that need to be considered.

Medical device

Medical devices must comply with extra strict regulations to be used in the healthcare environment. The system is not categorised as a medical device, according to the letter report of the RIVM on Apps under the medical devices: "Software that is not acting on data (i.e. only storing data and/or communicating data) is not considered a medical device" (van Drongelen et al., 2019). As a result, these additional regulations do not have to be taken into account when implementing the concept.

Creating a personal health environment, connecting with MedMij

The national EPD (elektronisch patiëntendossier) was developed several years ago as an electronic data exchange system between healthcare providers. Whereas the national EPD focused on the exchange between healthcare providers, MedMij is mainly intended to give citizens access to their health data. To this end, personal health environments (PGOs) are developed based on the MedMij agreement system. Any admitted PGO must meet strict requirements concerning privacy and security, among other things (Bruins, 2018).

By connecting WegWijs to MedMij, the patient has easier access to their care file and can thus gain insight into their health data. In the implementation plan, a PGO-supplier and Service Provider Care (DVZA) will be added to help connect to MedMij (MedMij, 2021).

Sharing of and access to medical information

The concept requires medical information to be kept and shared between different parties securely. The General Data Protection Regulation (AVG) requires that healthcare providers properly secure medical records and make them accessible only to authorised persons. These include the patients, who have the right to inspect their medical file and request its correction, addition or destruction. They can also ask for their data to be transferred (right to data portability). In addition, these include the treating healthcare providers who need to consult the medical dossier (Medisch dossier, n.d.). Keeping a medical file is an obligatory part of care providers' duties, based on the Medical Treatment Agreement Act (Wet op de geneeskundige behandelingsovereenkomst). As a result, writing a report on the consultation is not an additional task that requires more of the healthcare providers' spare time.

Implementation roadmap

A strategy is created to implement WegWijs, which is displayed in a roadmap, Figure 35. The Three Horizons model by Simonse (2017) is used to create this roadmap. This model consists of three horizons that overlap to create ongoing change for the future. The first phase focuses on enhancing the value of existing products and services, and the second phase focuses on enhancing user value. It forms the bridge of the business transformation between the first and third phases, and the third horizon is about implementing the value proposition and represents a state of growth in the long run.

Required from the parties to adopt the concept:
Knowledge of each other('s roles)
Awareness and willingness for change

Horizon 1: Create awareness of patient participation

The first step is about the enhancement of current products and services. This will start with creating awareness of patient participation by healthcare providers and patients. Currently, not all healthcare providers allow patients' active input, and not all patients are aware of the role and space they may take. Patients will be challenged to be more active in their care by formulating their goals and request for their treatment, which will be considered by the healthcare providers and will make them more aware of the needs and values of the patient. This start is a small step to prepare the system for more change without being disruptive and can be implemented within the first year.

Horizon 2: Co-designing the new care system

In the second horizon, the new value proposition is developed. Through co-designing with patient groups and multiple healthcare providers, the design is refined, creating shared ownership and contributing to a change in the healthcare culture. Furthermore, this contributes to enhancing knowledge among healthcare providers. With a pilot, the concept is tested and evaluated. The design development consists of multiple steps:

Step 1: Co-creating protocols

Facilitating a session with healthcare providers and patients to co-create new protocols. They will discuss example cases that are suited for network care. This first development step focuses on one type of patient group and includes healthcare providers from 3 disciplines; orthopaedic surgeons and plaster technicians of the RHOC, and hand therapists from one practice. Together, they develop treatment plans based on the patient's care needs, which are then translated into protocols. This session is initiated by RHOC and organised by an external design agency to facilitate the session.

Step 2: Pilot system

An existing care app provider is contacted to discuss and explore the options for a system that can be used in the pilot. Simultaneously a PGO supplier and Service Provider Care (DVZA) will be appointed to assist in connecting to MedMij.

Step 3: Pilot execution

The next step is the execution of the pilot. This pilot involves the same stakeholders as in the co-creation session. During this pilot, they use the developed protocols with several selected patients who fit the specified patient type.
The results are measured throughout the pilot by questionnaires, and data is collected for use in further development.

Step 4: Evaluation & iteration

Lastly, the results of the pilot are reviewed during an evaluation session with all the stakeholders involved. A randomised controlled trial measures the effectiveness of the new protocol. If the outcome is positive, the model is iterated and improved in co-creation.

The value should be clear to the participants in this pilot, along with the amount of time to be invested, the duration of involvement and the usefulness of the input. This is especially true for the care providers because they are dealing with a limited amount of time, for them, it can help to emphasise the positive impact on the care process which can also benefit them in terms of workload and preventing redundant appointments (Bertakis & Azari, 2011). Also, by informing all participants afterwards about the outcomes and results, you show your appreciation for their participation.

Horizon 3: Further development and scaling-up

The final horizon is about further development of the model and the expansion to new areas. During the expansion there will be focused on the following aspects:

- With the digital design agency or an existing medical app provider, a secure platform will be created with front and back-end developers to realise the WegWijs system.
- The improved model will be applied to more and more patient groups within the hand and wrist care and gradually more disciplines in

this area will be involved.

- This expansion requires continuous iteration to develop and evaluate added functionalities that come with the new stakeholders.
- When the model is successfully implemented in hand and wrist care, it can be scaled up to other areas within the Reinier Haga Orthopaedic Centre.
- A collaboration with the Smart Wrist Project will allow the monitoring of patients. The data collected with the device can be used to optimise the product further. Artificial intelligence can identify patient types to help choose a care path.
- Concluding on an agreement with health insurers since they influence the care offer (Ministerie van Volksgezondheid, Welzijn en Sport, 2016).

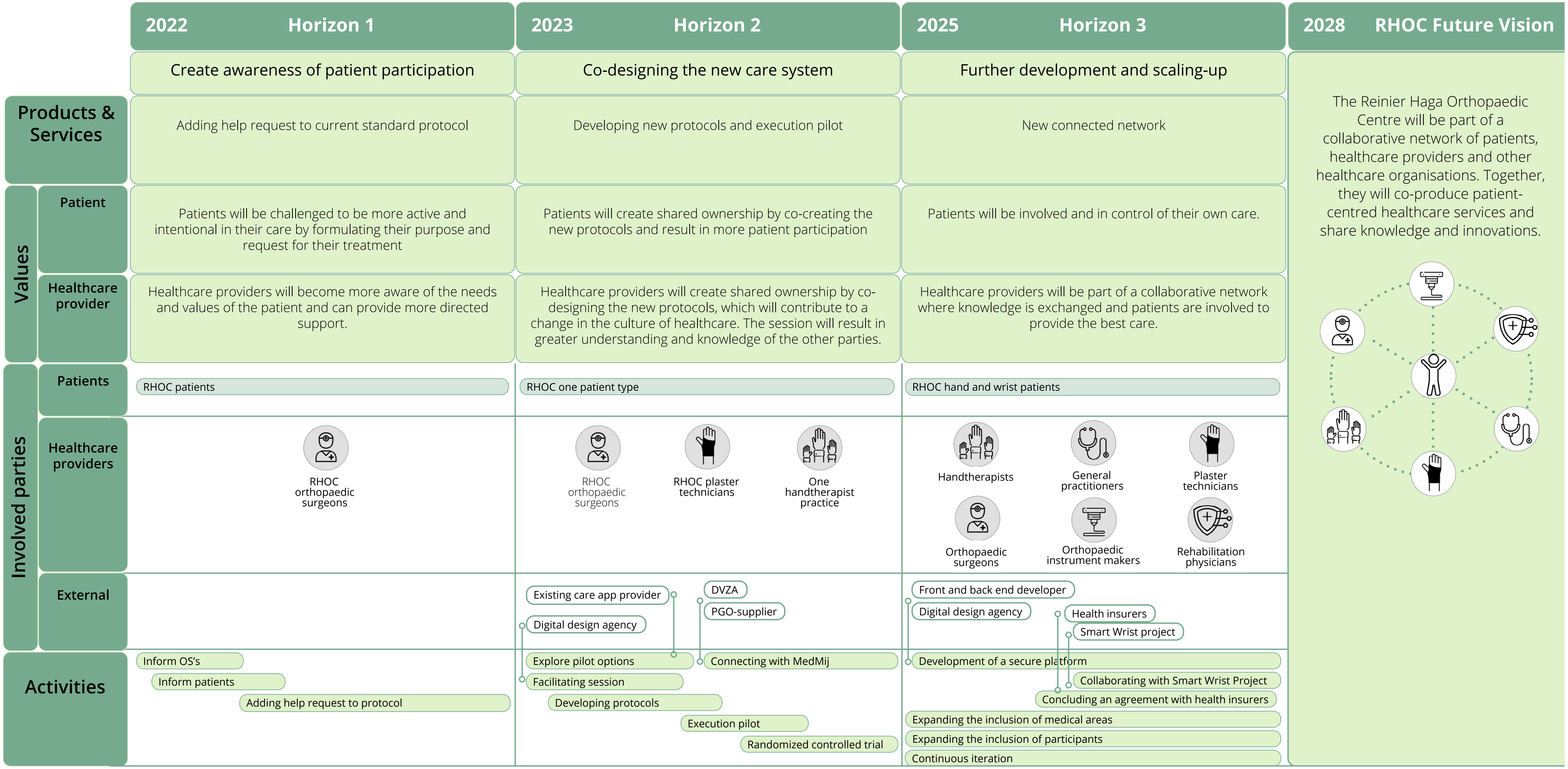


Figure 35. Roadmap for implementation of WegWijs

		2022 Horizon 1	2023 Horizon 2	2025 Horizon 3	2028 RHOC Future Vision
		Create awareness of patient participation	Co-designing the new care system	Further development and scaling-up	The Reinier Haga Orthopaedic Centre will be part of a collaborative network of patients, healthcare providers and other healthcare organisations. Together, they will co-produce patient-centred healthcare services and share knowledge and innovations.
Products & Services		Adding help request to current standard protocol	Developing new protocols and execution pilot	New connected network	
Values	**Patient**	Patients will be challenged to be more active and intentional in their care by formulating their purpose and request for their treatment	Patients will create shared ownership by co-creating the new protocols and result in more patient participation	Patients will be involved and in control of their own care.	
	Healthcare provider	Healthcare providers will become more aware of the needs and values of the patient and can provide more directed support.	Healthcare providers will create shared ownership by co-designing the new protocols, which will contribute to a change in the culture of healthcare. The session will result in greater understanding and knowledge of the other parties.	Healthcare providers will be part of a collaborative network where knowledge is exchanged and patients are involved to provide the best care.	
Involved parties	**Patients**	RHOC patients	RHOC one patient type	RHOC hand and wrist patients	
	Healthcare providers	RHOC orthopaedic surgeons	RHOC orthopaedic surgeons RHOC plaster technicians One handtherapist practice	Handtherapists General practitioners Plaster technicians Orthopaedic surgeons Orthopaedic instrument makers Rehabilitation physicians	
	External		Existing care app provider DVZA PGO-supplier Digital design agency	Front and back end developer Digital design agency Health insurers Smart Wrist project	
Activities		Inform OS's Inform patients Adding help request to protocol	Explore pilot options Connecting with MedMij Facilitating session Developing protocols Execution pilot Randomized controlled trial	Development of a secure platform Collaborating with Smart Wrist Project Concluding an agreement with health insurers Expanding the inclusion of medical areas Expanding the inclusion of participants Continuous iteration	

Chapter 7

Design Evaluation

This chapter embodies the last chapter of this thesis and evaluates the outcome of this project. First, a final validation of the concept is carried out with the stakeholders. This will test the accomplishment of the desired concept goal, and it looks at whether any adjustments need to be made that could be included in the recommendations. The discussion then turns to how all the information generated fits together and explains how WegWijs fits into the future healthcare context. Furthermore, the impact and value for the stakeholders are emphasised. Finally, the limitations of the research are discussed, and recommendations for the RHOC and further development and realisation of this concept.

7.1 Validation with stakeholders

Validation is carried out to test the extent to which the project goal has been achieved. For this purpose, a review is made of the assignment (Chapter 1) and the formulated design brief (Chapter 4) to formulate the research aim and questions.

Set-up

Aim

The goal of the user validation is to test the extent to which it has succeeded in creating a patient-centred orthopaedic hand and wrist care network.
Research questions:
Does it contribute to the degree of patient participation?
Does it contribute to the degree of cooperation and involvement of the whole network?

Participants

Four stakeholders are included in this validation, two of which are patients. The patients are both current patients at the RHOC with hand and wrist problems. One of them was already included during the first round of interviews conducted in this project. The criteria were the same as before; patients who are under treatment for their hand or wrist problems and have experience in going through multiple steps with multiple care disciplines during this treatment process.

The other two stakeholders are an orthopaedic instrument maker and a rheumatologist. Both have participated in earlier phases of this project, and their role is explained in Chapter 2.3.

Method

The interviews are conducted either online using Zoom or in person. First, a general explanation of the concept is given, a description of the co-creation of the treatment plan and the features that the system entails, using Figures 27-30. Next, the storyboard and the persona “Franka” is introduced, using Figures 32 and 33. The storyboard is split into two steps per slide, and the participant is read through it. In between is asked if there are things unclear or if there are questions. Afterwards, the interview questions are asked.

These questions differ for the healthcare providers and the patients. Specific aspects about the role of the patient and the role of the healthcare provider will need to be tested to see if this is changed in this new concept. These are based on the problems identified in the user research (Chapter 3).
For the patient, these points of interest are active participation, control over their care and involvement in the care process.
For the healthcare provider: Aware of the value of the active role of patients, actively involving the patient, holistic care; less “eigen eilandjes”, and cooperation between the parties.

Questions are formulated to identify to which extent this has changed in this new concept and thus can help answer the research questions.

For the validation test with the stakeholders, a pilot was carried out to check whether the test approach, explanation of the concept and the interview questions asked were sufficient and clear.

Results

Appendix E shows the clustered results from the validation test.

Patients

Active participation

The patients said that by setting their treatment goal, they could actively participate and have a say in determining the treatment plan in a way they do not experience in the current process.
They also saw in this concept a changed relationship with the healthcare provider compared to how they experience this in the current situation. It was felt that the conversation with the care provider would become more equal as the doctor discussed the treatment options. As a result, the doctor is no longer able to simply dictate the treatment to be carried out, as the patient now knows the treatment options. Therefore the patient may be able to participate more actively in this decision.
It was mentioned that it requires contribution from both sides. The doctor will need to take responsibility for providing the patient with information, and it is still desired to receive medical advice on the best treatment option.

The opportunity to ask questions also contributed to the amount of participation the patients felt they had. One patient mentioned perceiving the current process as a closed box from which you are unable to see what is going on. By being able to ask questions and have insight into the notes of past appointments, the communication becomes more open and the patient also feels that they have more of a say.

“The degree of participation is really different, I did not feel that I had a say in it [their current treatment], and I do have that in this concept.”

Control in care

The patients indicated that having knowledge of the treatment process and the different possibilities enables them to take more control of their treatment. This could provide them insight into where they currently are in the process, and what they are working towards achieving. Knowing what to expect and in what direction they work, enables them to intervene when necessary. Also, clarity on the goal was mentioned to contribute to having more control in deciding when the desired goal is accomplished or not. Currently, they think the process steps are too uncertain and unclear on what will happen for them to intervene.

“If you know where you stand, you will be able to intervene more quickly if needed.”

Involvement/ ownership in the care process

One patient said that the treatment goal made the treatment plan personal, which contributed to making the patient feel responsible and involved. Goals are very dependent on the person and also change with age. It was mentioned that the fact that you decide on the goal you are working towards also contributes to making you feel more responsible for achieving it. It was indicated that the overview also contributes to this as it provides a better picture of what needs to happen and what has happened, which makes you feel more involved. The possibility of reading the caregivers' reports could also contribute to this; it creates the feeling of being more involved in the entire treatment.

"Thinking about your goals upfront; a responsibility that I have not yet felt in the current treatment"

Healthcare providers

Awareness of the value of the active role of patients

The rheumatologist indicated that if the patient takes more control, it can result in fewer duplicate steps in the care process. This is also because it brings the entire treatment more into line with the wishes and expectations of the patient. The orthopaedic instrument maker also indicated that more influence from the patient can have a positive outcome on the treatment. Currently, the doctor is usually the one who decides what should be done, and in this concept, this goal is formed together with the patient.

Understanding the responsibilities of each healthcare provider also provides clarity to the patient about who to turn to, which gives the patient control. Moreover, the patient cannot make decisions on his own because he has no medical knowledge. On the other hand, the healthcare provider cannot do so either, because he does not know the patient's personal goals. Therefore, decisions must be made collectively. By empowering the patient, through clarity, they can also address their needs more clearly.

Active involvement of the patient

One of the healthcare providers said that the concept shifts the responsibilities from the healthcare provider more towards the patient, and it becomes more equal. However, it requires communication skills from the doctor to actively involve the patient. It was pointed out that there are also compliant patients who do not actively engage.

Both healthcare providers indicated that this concept will contribute to the active involvement of the patient. As an example, the orthopaedic instrument maker mentioned that when healthcare providers call each other to consult, this is now often done behind the scenes. However, with the app, the patient can view this in the notes and thus become more involved in their care.

Holistic care; less "eigen eilandjes"

The rheumatologist said that the overview provides insight into what each healthcare provider contributes to the bigger picture for the patient. The orthopaedic instrument maker also indicated that this can help with a future-oriented approach to the treatment and anticipate the further steps in the treatment plan. For example, a referral can be requested earlier or an operation can be taken into account. This also makes the process more efficient.

Cooperation between the parties

It was said that by seeing the overall picture, cooperation is enhanced. At present, the information from the various care providers often does not match. A goal set by the doctor with the patient must also be passed on to the next care provider in the chain. The rheumatologist sees that this concept improves this and can make the treatment more efficient. She also mentioned the connection between the first and second lines, which is very complicated at the moment, but which WegWijs can help with.

The orthopaedic instrument maker mentioned that this concept would enable them to provide the doctor with feedback. In addition, a clear goal and treatment vision can help to consult with a doctor. In his view, the app enables short lines of communication between the various parties. It shows who the other healthcare providers are, making contacting them easy.

Input for further development

Both care providers had some additions to the current concept:

- In addition to coordinating the goal of each step, the form should also be discussed. For example, a patient could also make a video call from time to time instead of coming to an appointment on location.
- It was also suggested to visualise the goal of the patient in the step-by-step plan, and maybe also a new goal for each phase in the process.
- Furthermore, it was emphasised that the need for shared decision-making differs per patient. Some patients take more control of this, while others want to lean on the doctor's advice. Not every patient can handle the responsibility, which can have negative consequences in coping with their condition.
- In addition, it is necessary to end with a decision, so if the patient cannot make it, the doctor will have to decide. In doing so, the patient's wishes will need to be taken into account.
- Give the assistant a role in this concept. They answer questions and sometimes make notes during the consultation. They are also available more often than the doctor.
- More information can cause more reactions from the patient and thus overwhelm the caregivers. This can be prevented by discussing this properly during the treatment.
- When drawing up the treatment plan, let the patient propose the time of the appointment at each step. Send this proposal to the doctor (or assistant) who can confirm this appointment in the app, make a new proposal or call.

Discussion validation

The validation showed that, according to the patients, WegWijs achieves active participation, a say in care and involvement/ownership in the care process. Furthermore, the healthcare providers indicate that the concept can contribute to awareness of the value of the active role of the patient, active involvement of the patient, holistic care; less "eigen eilandjes", and cooperation between the parties.

This would mean that the intended goal is achieved with WegWijs. However, this validation does not provide evidence of the outcomes in practice. This validation is hypothetical and based on what people expect to happen when it is carried out. This may not, however, correspond to the actual implementation. This will have to be further tested in the pilot.

Finally, suggestions were made about the concept's possible additions or points of attention. These points can be included in the further development of the concept, whereby it should be investigated how implementable they are. The suggestion about giving the patient more control in making the appointment corresponds to a finding from the user research in Chapter 3. This finding showed that patients currently lack control over access to care and experience this as inconvenient. Moreover, access to healthcare is an important indicator of the quality of care experienced by patients (Mohammed et al. 2014).

In addition, the healthcare provider must be guided in acquiring communication skills for consulting with the patient. After all, a lot is asked of them, which entails a great deal of responsibility. The approach needed may be different for each patient. In addition, sufficient information is essential for the patient to be able to make a good decision. The patient may sometimes be more focused on the short-term than the long-term effects, which is why this should be a point of attention for the doctors. Good communication and shared decision-making are also two important indicators of patients' perceived quality of care (Mohammed et al. 2014), so investing in them can improve the patients' satisfaction with their care.

7.2 Discussion

In the discussion, the results of the project are discussed and placed in the context of healthcare. The concept is compared with the established goal, and the desireability, feasibility and viabilty are discussed.

This thesis aims to create an orthopaedic hand and wrist healthcare network. The design vision was to create a collaborative care network with a horizontal structure where patients and providers work together as equals to contribute to the same quality care goal, resulting in an aligned vision and shared responsibility. It has been learned from the literature that for a patient-centred network to work, the following aspects must be present: protocols and infrastructures that enable and guide multi-actor collaboration (Fjeldstad et al., 2020) and clear guidelines to allow patient participation (den Breejen et al., 2014). These are currently missing.

At present, the Dutch healthcare system lacks interdisciplinary guidelines, protocols and an exchange system that enables the sharing of information. Currently, various hospitals and healthcare organisations use different systems that cannot communicate with each other (Valentijn & Arends, 2019). As a result, there are barriers to effective cooperation between the first and second lines of care.

WegWijs creates these protocols and offers an infrastructure that guides the collaboration between multiple actors by providing a way to share and connect information. For WegWijs, the new protocols are created in co-creation during sessions with various healthcare providers and patients. This serves multiple purposes. New protocols are developed, while at the same time, shared ownership is created, and the care disciplines get to know each other. This contributes to stakeholder commitment to this new way of working, creating new routines, and initiating organisational change needed to adopt this patient-centred approach and collaboration between healthcare providers (Håkansson Eklund et al., 2019; Rennink, 2019). This contributes to the viability of this concept. The plan for developing and implementing WegWijs was discussed with someone from the RHOC to design a feasible strategy.

Better cooperation has been found to lead to more efficient and better care. Research has also shown that this saves costs and reduces the number of treatments and complications (Ypinga, 2018). This is particularly important in a future where the increasing demand for care is leading to a shortage of care providers and increasing care costs (Rijksinstituut voor Volksgezondheid en Milieu, 2018a).

Furthermore, patients demand more control over their care (Betts et al., 2020). Patient participation in co-creating their care by valuing their competencies positively impacts their perceived quality of care (Moretta Tartaglione et al., 2018). Patients that actively participate in their care are more confident in being understood and taken seriously; they will ask less for extra care and medical examinations as they are more trusting toward their health provider. From the healthcare provider's perspective, more consultation with the patient leads to more knowledge about the patient and a better diagnosis. This, too, leads to a decrease in the number of visits to healthcare providers, the number of medical examinations and referrals to speciality care, which results in a significant decline in health charges (Bertakis & Azari, 2011).

Currently, there is no solution yet to facilitate patient-centred networked healthcare. Existing solutions are presently aimed at enabling networked cooperation between professionals (ParkinsonNet) or at patient-centred care by involving and informing patients (Patient Journey App). However, the latter fails to activate patients in managing their care, which is linked to a lack of personalised information provision, lack of contact with healthcare providers and generalised protocols (Willems et al., 2021). A product that enables both a network and involves and activates the patient is missing, which is where WegWijs provides a solution.

The validation showed that the participants expect that WegWijs can ensure active and involved patients, as well as more cooperation and involvement of the care providers in the entire patient treatment process. Importantly, all patients and healthcare professionals who participated in this project have indicated that they find both aspects desirable. They are currently experiencing problems in the care process because of its lack; therefore, they see the need and added value of WegWijs. Moreover, the concept is based on and further developed with input from the stakeholders. In this way, a concept was created that meets their needs. It should be kept in mind that this is not conclusive evidence of the actual results when implementing this concept. But it does demonstrate its desirability.

With the digitalisation trend, more digital solutions and opportunities are emerging (Spijkman, n.d.). The WegWijs system, a digital solution that the users on various devices can use, fits in well. It remains a concern that this may exclude people without access to digital resources. However, the WegWijs digital system is not a replacement for physical care, but a complement to improve the care experience and quality of care. Using the internet is the most convenient way to keep the treatment plan up-to-date and the information aligned. This creates a network structure containing hierarchy and brokerage, which are important features for quality-related performance (Rangachari, 2008).
Additionally, even when the patient's access to the WegWijs system is excluded, the consultation and the co-creation of the treatment remain. This also contributes to greater patient involvement, although to a lesser extent. Furthermore, the healthcare providers stay in contact with each other, which also positively affects the treatment. WegWijs, therefore also offers value to people who are not digitally literate. Moreover, patients have the right to give other people access to their medical records (Medisch dossier, n.d.), which means they could ask others for assistance using WegWijs.

This solution encompasses a factor of patient empowerment. Patient empowerment is desired, but it also carries risks when it is not properly implemented. The patient needs the right knowledge from the healthcare providers to make a good decision. It also differs per patient to what extent they need and want guidance. The division of responsibility between patient and caregiver is therefore different for each patient, which requires skills from the healthcare provider. The literature illustrates that trust and effective communication are vital elements in a patient-centred approach and contribute to better management and patient satisfaction (Chandra et al., 2018). To accomplish this, it may be advisable to offer training to healthcare providers to achieve these communication skills.

As mentioned above, patient participation can lead to fewer care appointments and cost savings. However, implementing a patient-centred approach will require monetary investment, such as the proposed training. In addition, the additional consultation and shared decision-making with the patient will result in longer appointments. This forms a risk when implementing the concept because the positive effects of patient participation will not be visible immediately. At the same time, it already requires extra time and effort from the healthcare providers. Therefore, the positive aspects should be emphasised. Furthermore, starting with one patient group is advisable, as illustrated in the implementation strategy in Chapter 6, and slowly expanding. Otherwise, this approach is not feasible.

7.3 Limitations and recommendations

In the limitations, a critical look is taken at the research done. Subsequently, recommendations are made for the further development and implementation of WegWijs.

Limitations

This project entails limitations regarding the sampling of participants. This was due to the dependence upon healthcare providers to make contact with people who could be approached for the study. As a result, their judgement plays a role in selecting participants and is therefore not entirely objective. Besides, the care providers involved were contacts of an orthopaedic surgeon, and in general, he had good communication with these people. Therefore, people with whom this contact was completely lacking were not included in this study.

In addition, the care providers willing to participate are often already more actively engaged in innovation. Given their limited time, their interest in the subject must be sufficiently high to allow them to invest in it, leading to selection bias. The people working in healthcare who are not so keen on change are not reached as a consequence, even though they are part of the group.

Furthermore, a total of eighteen people are involved throughout this project. These include healthcare providers from seven disciplines and nine patients. This has provided rich and varied input, which has been valuable in developing the concept. However, the number of participants is not that large, so the results do not represent all care providers and patients in hand and wrist care. For example, no patients who are against patient participation have been spoken to, while there are probably people who think that the doctor's input is the only one that counts. It was desirable to involve more participants during the study. However, this was not achievable due to the healthcare providers' busy schedules and the limited time available for this project.

The study was carried out based on a conceptual design only. This means its use cannot be tested, and the results following the use in practice may differ from the current outcome. Moreover, the study only covers the situation of the RHOC, so it is unclear to what extent the recommendations can be extended to other areas.

Recommendations

The concept will need further development for implementation. An implementation strategy has been drawn up. However, the realisation of this concept can not be predicted as it will need to be developed in consultation with patients and healthcare providers, and thus is dependent on their needs and the pilot results. What people like when they use the system and what things they can or cannot do themselves must be investigated further; it is impossible to answer these questions for them. Currently, the concept has been tested using a design based on how people expect to find it when they use it. This does not necessarily correspond to practice and will therefore need to be further investigated in the pilot.

Furthermore, networked healthcare and adopting a patient-centred approach requires a change from the individual healthcare providers. They need skills in collaboration and knowledge sharing as well as receptiveness to input from others (Rennink, 2019). Moreover, communication and shared decision-making are two important indicators of patients' perception of quality care (Mohammed et al. 2014).
Therefore, this needs to be developed and addressed. One suggestion is to have patients fill in questionnaires before and after the consultation. These questionnaires can ask about their expectations beforehand and afterwards about the extent to which this corresponds with the result, the extent to which there was shared decision-making and how satisfied they are with the information provided. These can be introduced before the pilot to establish a baseline. They can then be introduced during and after the pilot so that this remains a point of attention and they can continue to improve their treatment. Furthermore, additional training or workshops may be advisable for the patient-centred treatment approach and communication.

A current barrier to sharing knowledge and information is the different systems that hospitals and organisations use for electronic patient records (EPD) (Valentijn & Arends, 2019). Implementing a new system is a challenge in this already fragmented system usage. Perhaps it is possible to link WegWijs to the existing systems to make communication possible. However, this needs to be examined further to make the adaptation of a new system possible.

In addition, there are opportunities to collect data through WegWijs. To do this, privacy legislation and AVG must be considered, and permission must be sought. Data collected by the system can be used for more research into hand and wrist care and the available treatments. The user research showed that currently, there is a lack of scientific evidence and NHG guidelines for the general practitioners concerning the hand and wrist area. Data can provide a valuable source of information and help improve the treatment offered and the knowledge of the doctors. The treatment paths of the patients could even be optimised through artificial intelligence, which could link specific diagnoses and characteristics to a particular treatment plan.

However, this concept revolves around the cooperation and relationship between stakeholders, so automation of this process with artificial intelligence is not desirable. A combination in which the system advises the doctor, but still leaves room for the patient's input, could be an option. But the goal and the positive effects of cooperation and engagement should not be overlooked.

This research is a good starting point to realise patient-centred network care in the field of orthopaedic hand and wrist, focusing on the RHOC. The implementation requires additional research, and the realisation needs to be done carefully and involves many challenges. However, the continuation of this project is of great importance, as there is still much room for improvement in the Dutch healthcare system.

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Appendices

Table of contents

Appendix A | Orthopaedic hand and wrist speciality

Appendix A1 | Anatomy of the hand and wrist

The anatomy of the hand and wrist is quite complex, which is because this area is composed of a mixture of joints and bones, muscles, blood vessels, tendons, nerves and ligaments that work together to support a wide range of motion. There are 29 bones in the hand and wrist with joints that allow movement. Ligaments are tissues that hold joints together. Most of the muscles that move the hand and wrist are in the forearm, only a few small ones are in the hand. Tendons are connected to the muscles and run through the wrist in each finger. Three main nerves supply the hand and wrist (median, ulnar and radial nerves) and receive the signals from the brain to control muscles and create movement (Basic Hand and Wrist Anatomy | Hand Institute of Charleston, 2020)

The wrist is formed by eight carpal bones grouped in two rows, as can be seen in Figure A1. The carpal bones are connected by ligaments, which strengthen the joints between the carpal bones. For normal wrist function, there must be two smooth curves (Figure A1, A) and the distance between the scaphoid lunate must be less than 3 millimetres (Figure A1, B) (Abraham & Scott, 2010). Due to an incident, these ligaments can tear or stretch, which will cause a misalignment in the position of the bones. Too much space will be created between two bones and in time this will cause wear and tear of the wrist (also called arthrosis), which causes progressive pain, swelling and reduced mobility (Xpert Clinic, 2014).

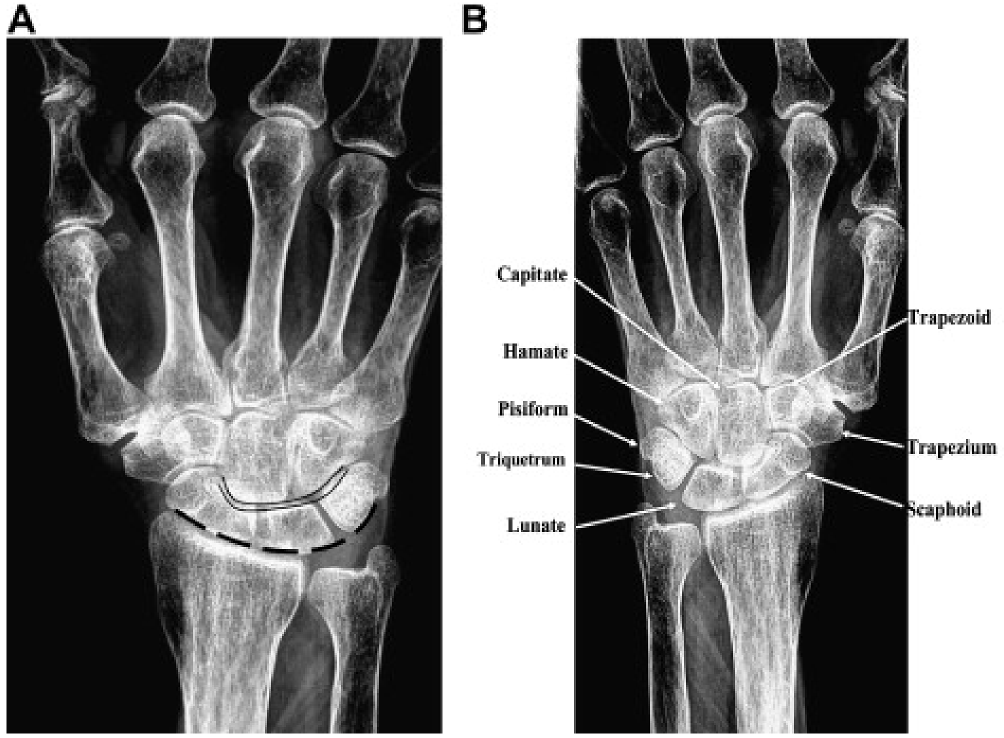
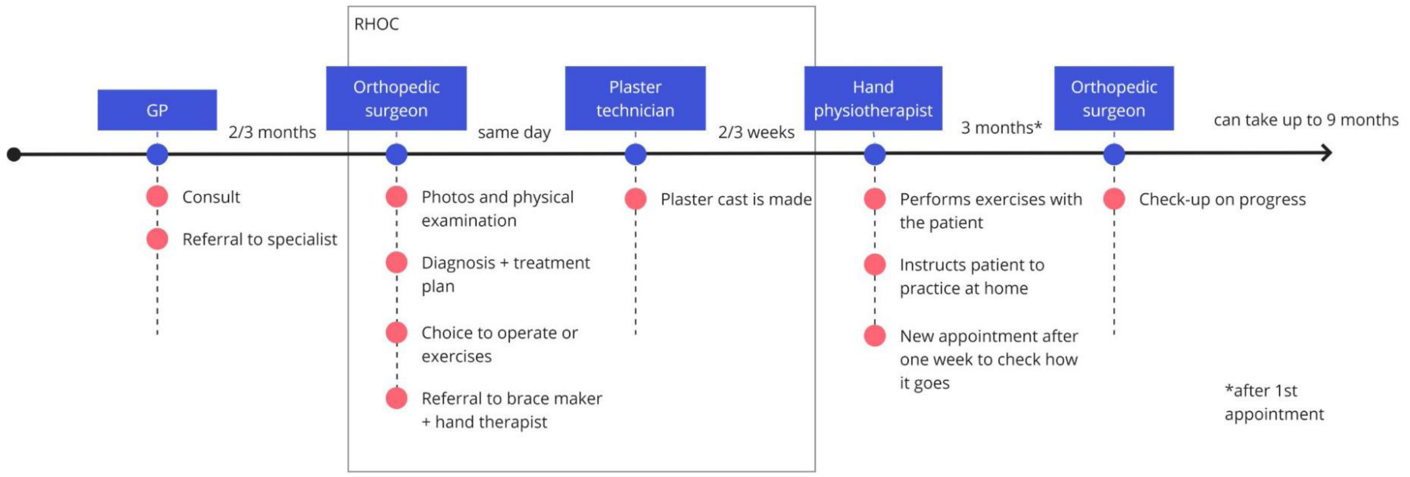


Figure A1. Wrist bones (Abraham & Scott, 2010)

Appendix A2 | Simplified overview of the hand and wrist care process

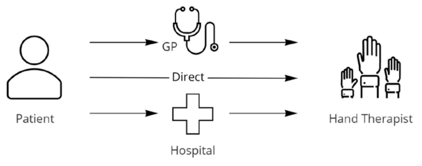


Appendix B | Results interviews healthcare providers

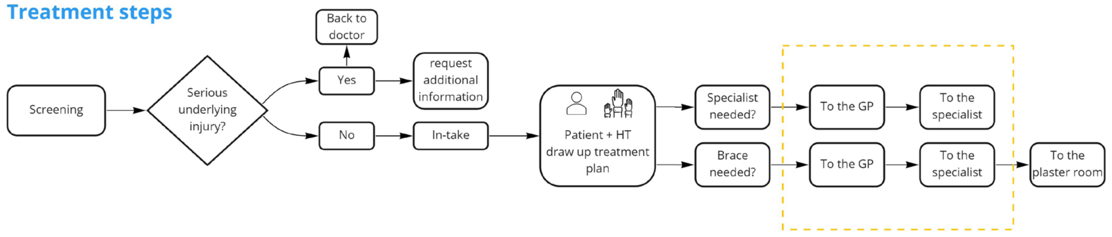
Appendix B1 | Treatment steps and collaboration stakeholders

Hand Therapist

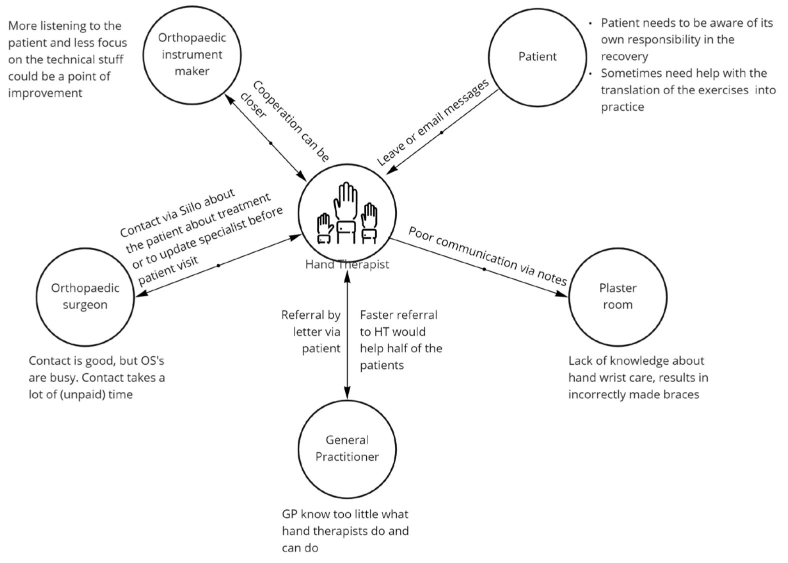
3 paths to the Hand therapist



Treatment steps

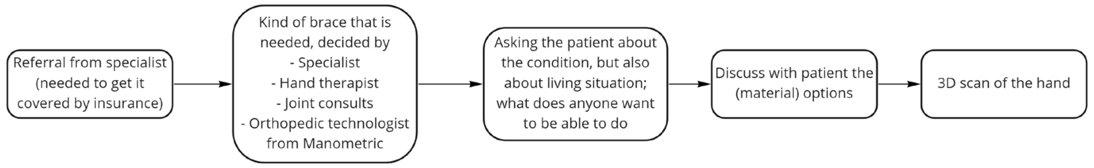


Collaboration & communication between stakeholders

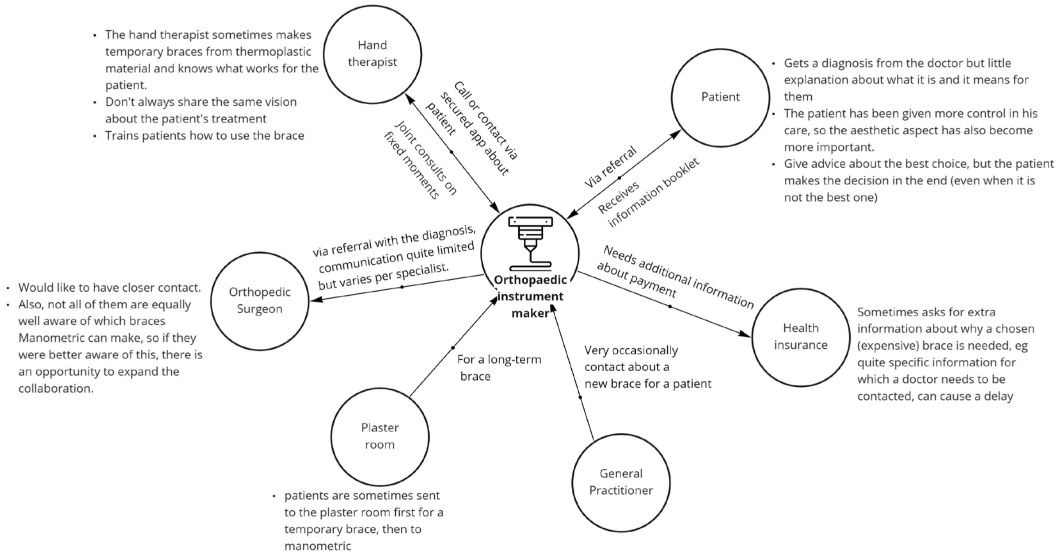


Orthopaedic instrument maker

Treatment steps



Collaboration & communication between stakeholders



- The hand therapist sometimes makes temporary braces from thermoplastic material and knows what works for the patient.
- Don't always share the same vision about the patient's treatment
- Trains patients how to use the brace

- Gets a diagnosis from the doctor but little explanation about what it is and it means for them
- The patient has been given more control in his care, so the aesthetic aspect has also become more important.
- Give advice about the best choice, but the patient makes the decision in the end (even when it is not the best one)

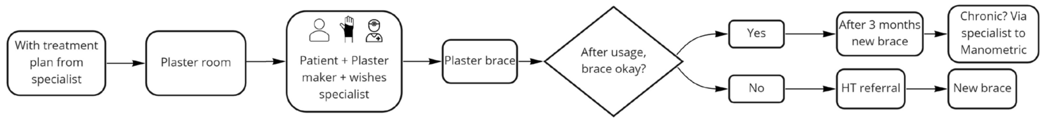
- Would like to have closer contact.
- Also, not all of them are equally well aware of which braces Manometric can make, so if they were better aware of this, there is an opportunity to expand the collaboration.

Sometimes asks for extra information about why a chosen (expensive) brace is needed, eg quite specific information for which a doctor needs to be contacted, can cause a delay

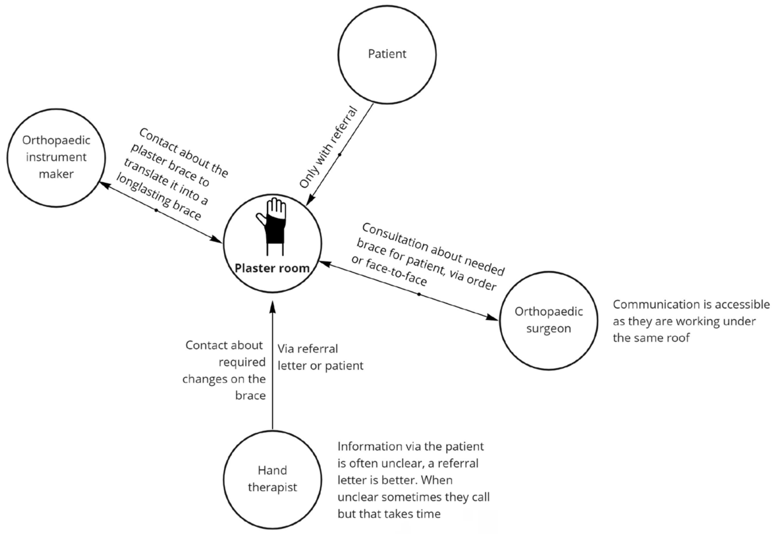
- patients are sometimes sent to the plaster room first for a temporary brace, then to manometric

Plaster Technician

Treatment steps



Collaboration & communication between stakeholders

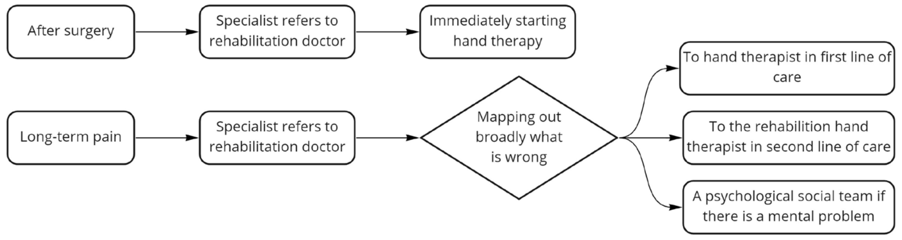


Communication is accessible as they are working under the same roof

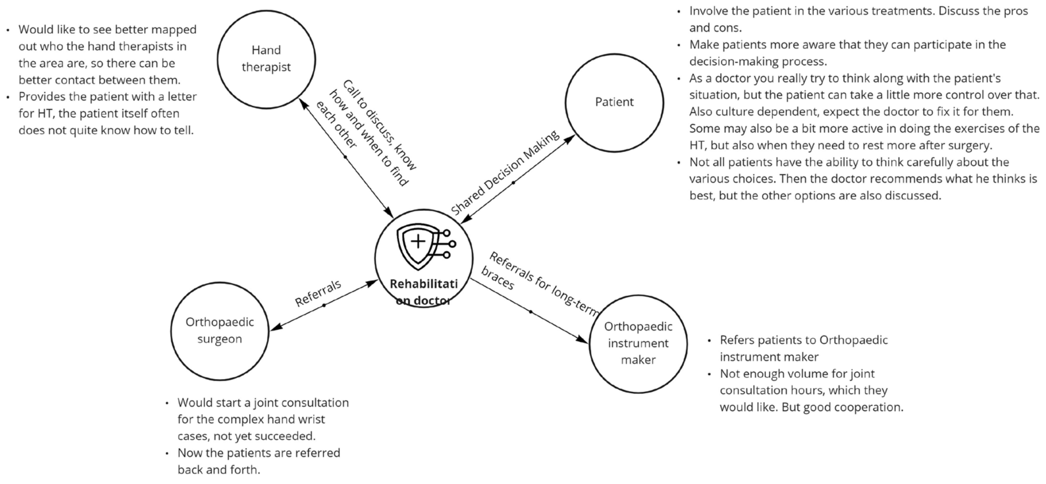
Information via the patient is often unclear, a referral letter is better. When unclear sometimes they call but that takes time

Rehabilitation physician

Treatment steps



Collaboration & communication between stakeholders



- Would like to see better mapped out who the hand therapists in the area are, so there can be better contact between them.
- Provides the patient with a letter for HT, the patient itself often does not quite know how to tell.

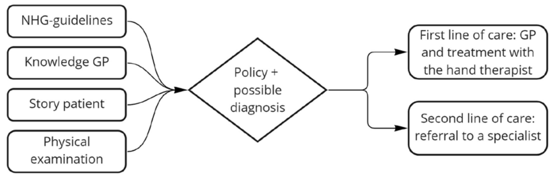
- Involve the patient in the various treatments. Discuss the pros and cons.
- Make patients more aware that they can participate in the decision-making process.
- As a doctor you really try to think along with the patient's situation, but the patient can take a little more control over that. Also culture dependent, expect the doctor to fix it for them. Some may also be a bit more active in doing the exercises of the HT, but also when they need to rest more after surgery.
- Not all patients have the ability to think carefully about the various choices. Then the doctor recommends what he thinks is best, but the other options are also discussed.

- Would start a joint consultation for the complex hand wrist cases, not yet succeeded.
- Now the patients are referred back and forth.

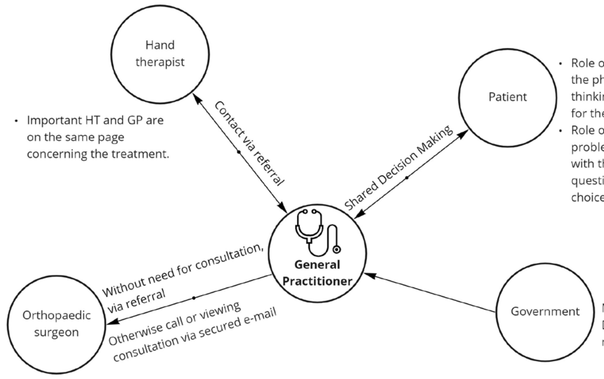
- Refers patients to Orthopaedic instrument maker
- Not enough volume for joint consultation hours, which they would like. But good cooperation.

General Practitioner

Treatment steps



Collaboration & communication between stakeholders



- Important HT and GP are on the same page concerning the treatment.

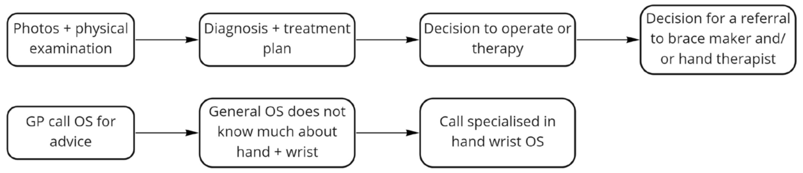
- Role of the GP: to inform. Explain well based on the physical examination what diagnosis he is thinking of, and what the options and choices are for the patient.
- Role of the patient: being able to translate his problem well → interaction with HA, that helps with this by listening carefully and asking questions. Ultimately, the patient makes the choice

Makes the law and regulations. Doesn't look at quality, but at money

- Contact when there is doubt about the treatment of the patient and the need for a referral

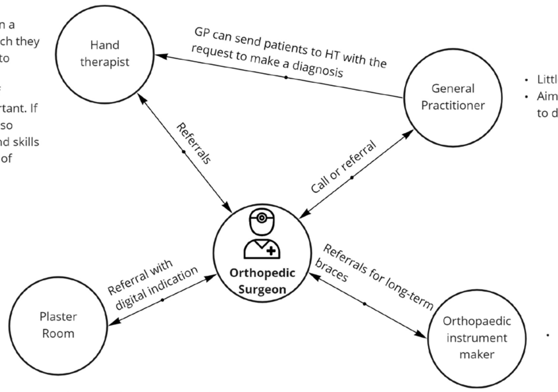
Orthopaedic Surgeon

Treatment steps



Collaboration & communication between stakeholders

- Hand therapists are often given a central role in the network, which they are usually unable to fulfil due to limited knowledge.
- Good contact with a number of regulars. Good contact is important. If you know the therapists, you also know about their knowledge and skills for, for example, a certain type of treatment.

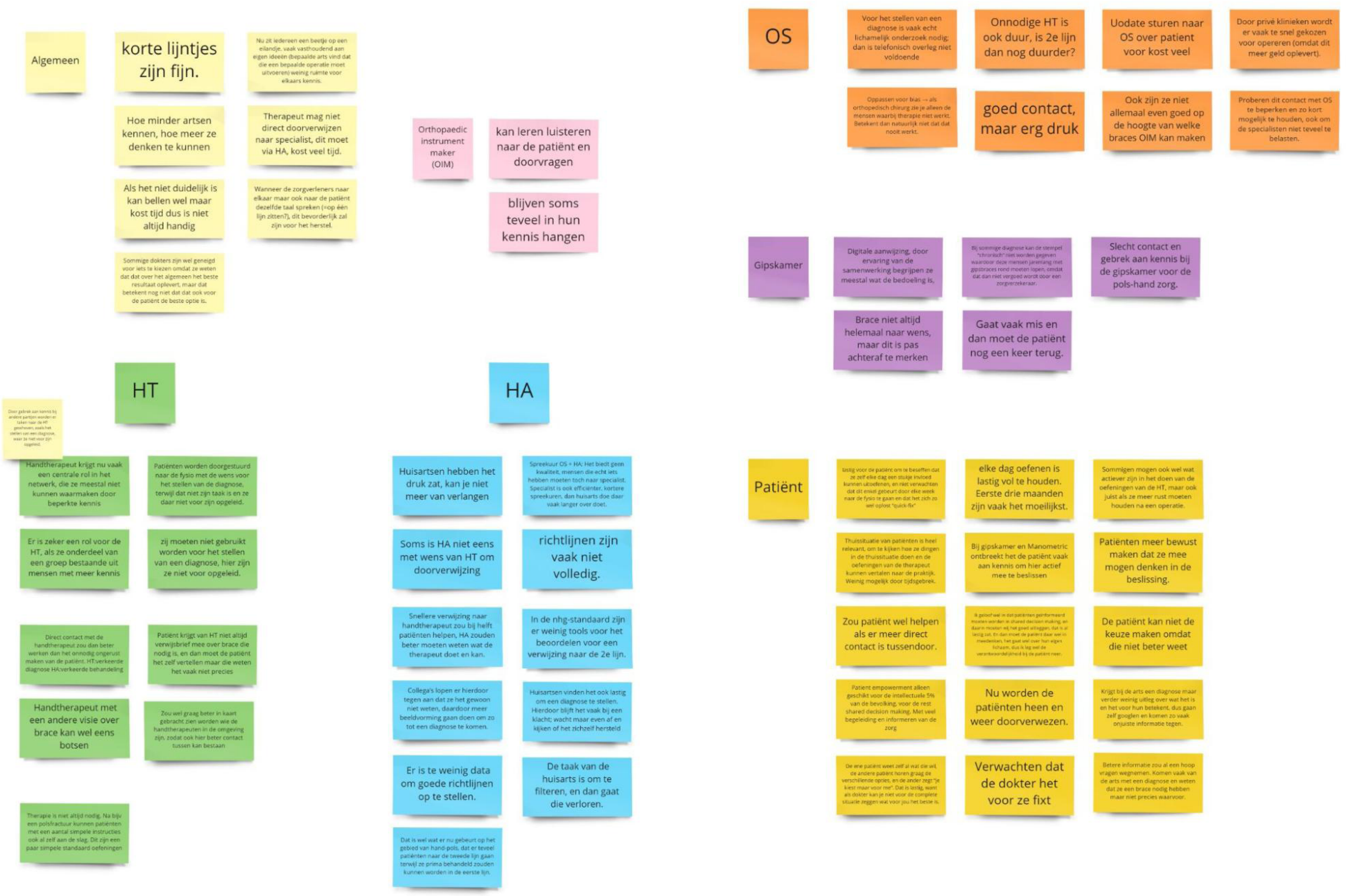


- Little knowledge about hand and wrist
- Aim for more contact: to be able to call to discuss a treatment plan.

- Occasionally have the patient come back to see if the brace is good and how it was made for this patient, including the finish. They do hold joint office hours

- Cooperation with the plaster room is good and necessary.
- Very intensive contact due to the (literal) short distance, correcting each other.

Appendix B2 |Clustered insights per discipline of concern



Algemeen

korte lijntjes zijn fijn.

Nu zit iedereen een beetje op een eilandje, vaak vasthoudend aan eigen ideeën (bepaalde arts vind dat die een bepaalde operatie moet uitvoeren) weinig ruimte voor elkaars kennis.

Hoe minder artsen kennen, hoe meer ze denken te kunnen

Therapeut mag niet direct doorverwijzen naar specialist, dit moet via HA, kost veel tijd.

Als het niet duidelijk is kan bellen wel maar kost tijd dus is niet altijd handig

Wanneer de zorgverleners naar elkaar maar ook naar de patiënt dezelfde taal spreken (=op één lijn zitten?), dit bevorderlijk zal zijn voor het herstel.

Sommige dokters zijn wel geneigd voor iets te kiezen omdat ze weten dat dat over het algemeen het beste resultaat oplevert, maar dat betekent nog niet dat dat ook voor de patiënt de beste optie is.

Orthopaedic instrument maker (OIM)

kan leren luisteren naar de patiënt en doorvragen

blijven soms teveel in hun kennis hangen

HT

Door gebrek aan kennis bij andere partijen worden er taken naar de HT geschoven, zoals het stellen van een diagnose, waar ze niet voor zijn opgeleid.

Handtherapeut krijgt nu vaak een centrale rol in het netwerk, die ze meestal niet kunnen waarmaken door beperkte kennis

Patiënten worden doorgestuurd naar de fysio met de wens voor het stellen van de diagnose, terwijl dat niet zijn taak is en ze daar niet voor zijn opgeleid.

Er is zeker een rol voor de HT, als ze onderdeel van een groep bestaande uit mensen met meer kennis

zij moeten niet gebruikt worden voor het stellen van een diagnose, hier zijn ze niet voor opgeleid.

Direct contact met de handtherapeut zou dan beter werken dan het onnodig ongerust maken van de patiënt. HT:verkeerde diagnose HA:verkeerde behandeling

Patiënt krijgt van HT niet altijd verwijsbrief mee over brace die nodig is, en dan moet de patiënt het zelf vertellen maar die weten het vaak niet precies

Handtherapeut met een andere visie over brace kan wel eens botsen

Zou wel graag beter in kaart gebracht zien worden wie de handtherapeuten in de omgeving zijn, zodat ook hier beter contact tussen kan bestaan

Therapie is niet altijd nodig. Na bijv een polsfractuur kunnen patiënten met een aantal simpele instructies ook al zelf aan de slag. Dit zijn een paar simpele standaard oefeningen

HA

Huisartsen hebben het druk zat, kan je niet meer van verlangen

Spreekuur OS + HA: Het biedt geen kwaliteit, mensen die echt iets hebben moeten toch naar specialist. Specialist is ook efficiënter, kortere spreekuren, dan huisarts doe daar vaak langer over doet.

Soms is HA niet eens met wens van HT om doorverwijzing

richtlijnen zijn vaak niet volledig.

Snellere verwijzing naar handtherapeut zou bij helft patiënten helpen, HA zouden beter moeten weten wat de therapeut doet en kan.

In de nhg-standaard zijn er weinig tools voor het beoordelen voor een verwijzing naar de 2e lijn.

Collega's lopen er hierdoor tegen aan dat ze het gewoon niet weten, daardoor meer beeldvorming gaan doen om zo tot een diagnose te komen.

Huisartsen vinden het ook lastig om een diagnose te stellen. Hierdoor blijft het vaak bij een klacht; wacht maar even af en kijken of het zichzelf hersteld

Er is te weinig data om goede richtlijnen op te stellen.

De taak van de huisarts is om te filteren, en dan gaat die verloren.

Dat is wel wat er nu gebeurt op het gebied van hand-pols, dat er teveel patiënten naar de tweede lijn gaan terwijl ze prima behandeld zouden kunnen worden in de eerste lijn.

OS

Voor het stellen van een diagnose is vaak echt lichamelijk onderzoek nodig; dan is telefonisch overleg niet voldoende

Onnodige HT is ook duur, is 2e lijn dan nog duurder?

Uodate sturen naar OS over patient voor kost veel

Door privé klinieken wordt er vaak te snel gekozen voor opereren (omdat dit meer geld oplevert).

Oppassen voor bias → als orthopedisch chirurg zie je alleen de mensen waarbij therapie niet werkt. Betekent dan natuurlijk niet dat dat nooit werkt.

goed contact, maar erg druk

Ook zijn ze niet allemaal even goed op de hoogte van welke braces OIM kan maken

Proberen dit contact met OS te beperken en zo kort mogelijk te houden, ook om de specialisten niet teveel te belasten.

Gipskamer

Digitale aanwijzing, door ervaring van de samenwerking begrijpen ze meestal wat de bedoeling is,

Bij sommige diagnose kan de stempel "chronisch" niet worden gegeven waardoor deze mensen jarenlang met gipsbraces rond moeten lopen, omdat dat dan niet vergoed wordt door een zorgverzekeraar.

Slecht contact en gebrek aan kennis bij de gipskamer voor de pols-hand zorg.

Brace niet altijd helemaal naar wens, maar dit is pas achteraf te merken

Gaat vaak mis en dan moet de patiënt nog een keer terug.

Patiënt

lastig voor de patiënt om te beseffen dat ze zelf elke dag een stukje invloed kunnen uitoefenen, en niet verwachten dat dit enkel gebeurt door elke week naar de fysio te gaan en dat het zich zo wel oplost "quick-fix"

elke dag oefenen is lastig vol te houden. Eerste drie maanden zijn vaak het moeilijkst.

Sommigen mogen ook wel wat actiever zijn in het doen van de oefeningen van de HT, maar ook juist als ze meer rust moeten houden na een operatie.

Thuissituatie van patiënten is heel relevant, om te kijken hoe ze dingen in de thuissituatie doen en de oefeningen van de therapeut kunnen vertalen naar de praktijk. Weinig mogelijk door tijdsgebrek.

Bij gipskamer en Manometric ontbreekt het de patiënt vaak aan kennis om hier actief mee te beslissen

Patiënten meer bewust maken dat ze mee mogen denken in de beslissing.

Zou patiënt wel helpen als er meer direct contact is tussendoor.

Ik geloof wel in dat patiënten geïnformeerd moeten worden in shared decision making, en daarin moeten wij het goed uitleggen, dat is al lastig zat. En dan moet de patiënt daar wel in meedenken, het gaat wel over hun eigen lichaam, dus ik leg wel de verantwoordelijkheid bij de patiënt neer.

De patiënt kan niet de keuze maken omdat die niet beter weet

Patient empowerment alleen geschikt voor de intellectuele 5% van de bevolking, voor de rest shared decision making. Met veel begeleiding en informeren van de zorg

Nu worden de patiënten heen en weer doorverwezen.

Krijgt bij de arts een diagnose maar verder weinig uitleg over wat het is en het voor hun betekent, dus gaan zelf googlen en komen zo vaak onjuiste informatie tegen.

De ene patiënt weet zelf al wat die wil, de andere patiënt horen graag de verschillende opties, en de ander zegt "je kiest maar voor me". Dat is lastig, want als dokter kan je niet voor de complete situatie zeggen wat voor jou het beste is.

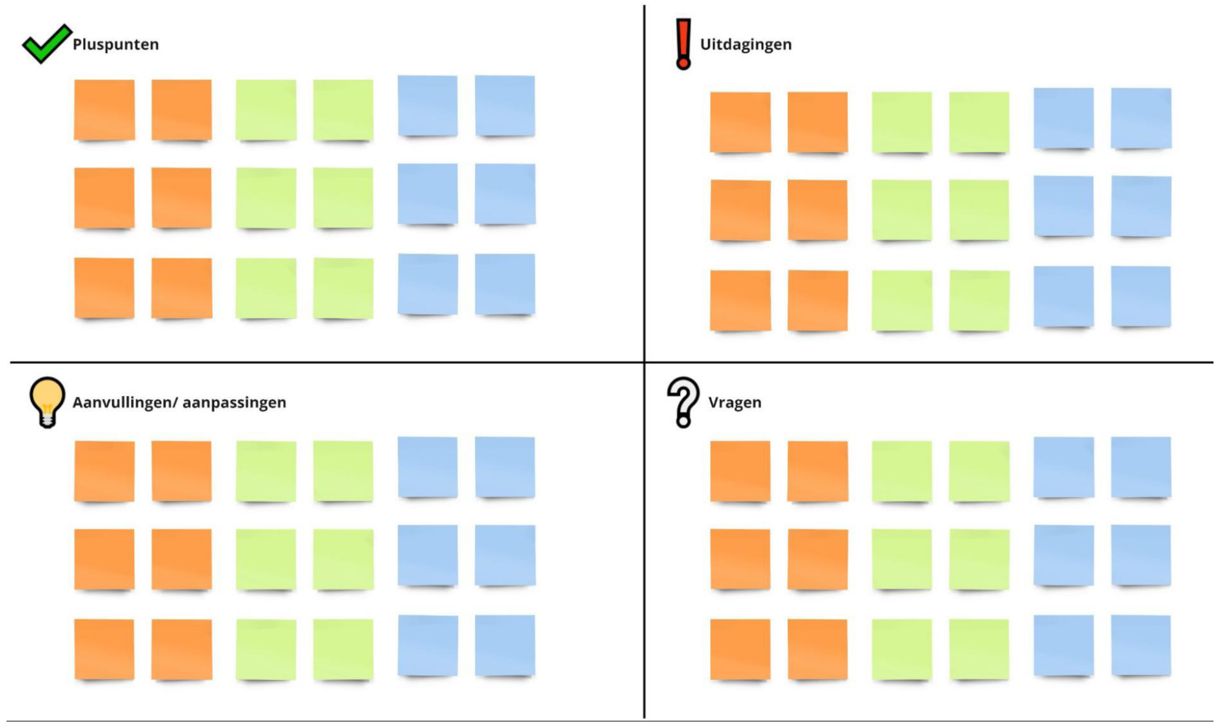
Verwachten dat de dokter het voor ze fixt

Betere informatie zou al een hoop vragen wegnemen. Komen vaak van de arts met een diagnose en weten dat ze een brace nodig hebben maar niet precies waarvoor.

Appendix C | Idea generation

Appendix D | Materials feedback session

Appendix D1 | Miro templates to be filled-in during the sessions




Titel concept:

[vul hier in]

◆ Welke uitdagingen worden hiermee getackeld?

[vul hier in]

◆ Wat maakt het een goed idee?

voor patiënten

voor zorgverleners

◆ Hoe zorgt het voor...

begrip tussen zorgverlener en patiënt?

het verkleinen van de onderlinge afstand?

◆ Wat is het idee?

[vul hier in]

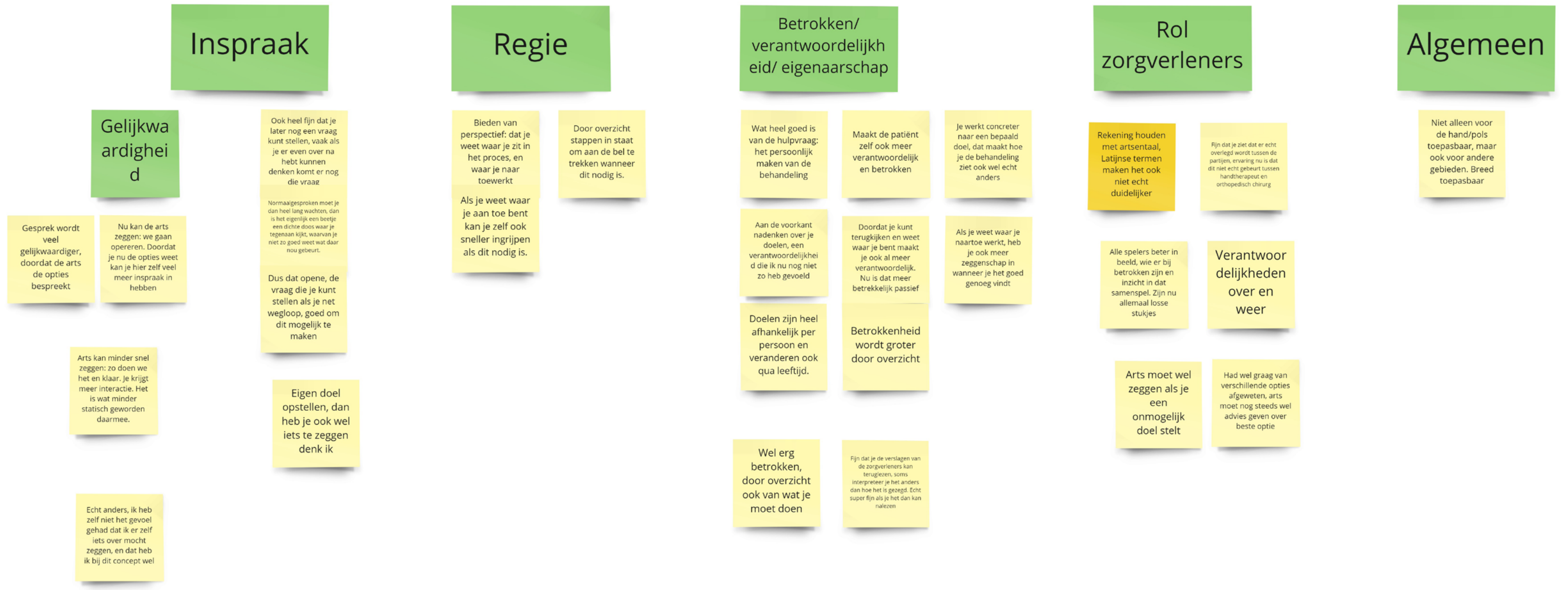
◆ Hoe werkt het idee?

[vul hier in]

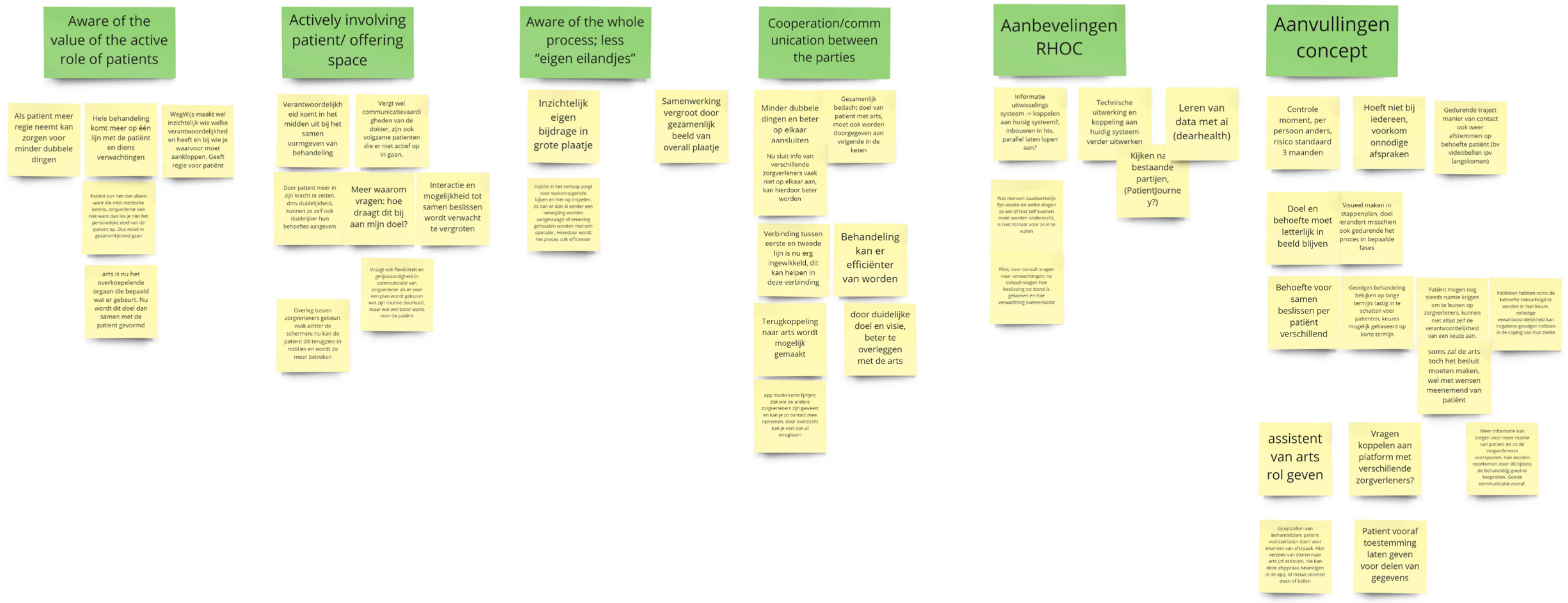
Appendix D2 | Insights feedback session clustered per idea

Appendix E | Clustered insights validation user test

Appendix E1 | Clustered insights validation patients



Appendix E2 | IClustered insights validation healthcare providers



Appendix F | Project brief

A patient-centered orthopedic care network — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 14 - 02 - 2022

end date 15 - 07 - 2022

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The Reinier Haga Orthopedisch Centrum (RHOC) is the largest center for orthopedic care in the Netherlands. The center is an initiative of the Haga Hospital in the Hague, the Reinier de Graaf Hospital in Delft and the LangeLand Hospital in Zoetermeer. Twenty orthopedists from the three hospitals, each with their own specialisation, work here and provide orthopedic care for their patients. RHOC collaborates with general practitioners, physiotherapists, health coaches and home care organisations to provide care around the recovery.

The goal of the RHOC is to offer the best care for their patients' recovery and to "maintain and where possible improve the quality of your life". They work with personal treatment plans, not only taking the complaints into account but also looking at the cause of the problem. However, due to long waiting periods the required care can take a while. The average waiting time for the RHOC is currently 20 days (Wachttijden voor polikliniek orthopedie, 2022). This is going up, because an orthopedic care process consists out of multiple healthcare providers resulting in an increased waiting time that can be at the expense of the patient's recovery.

A lack of interprofessional collaboration between different healthcare providers can result in a lack of efficiency, loss of knowledge and miscommunication. Also, a clear link has been demonstrated between interprofessional miscommunication and a poor patient outcome. Patients often feel lost in the healthcare system and in between different professions and medical opinions (Stewart, 2017).

A new path that is being pursued in the domain of healthcare is the shift from a doctor-centric model to a patient-centric model. Patients will demand more information about health issues and more access to their own health data, which allows them to monitor their own behaviour and health status. This will provide them with more control over their care (Enders et al., 2013). Patient-centred care is about involving the patient in the entire decision making process (Ponte et al, 2003). And treating the patient as a unique individual, seeing them as a person rather than just a patient (Redman, 2004).

In this assignment, I will investigate how the orthopedic care network can be improved and how patient centered care can play a part in a field where multiple healthcare providers are involved. In this question, I will focus on the hand wrist care within the scope of the RHOC. The patient is treated by both the hand physiotherapist and the orthopedic surgeon and they are both involved in the patients' recovery, sometimes in collaboration with healthcare providers that produce wrist braces. This small network will be my starting point for designing a new patient care network. Defining everyone's role, alignment of the vision and the positioning of the RHOC within this network.

space available for images / figures on next page

introduction (continued): space for images

image / figure 1: Network stakeholders

TO PLACE YOUR IMAGE IN THIS AREA:
- SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER
- CLICK AREA TO PLACE IMAGE / FIGURE

PLEASE NOTE:
- IMAGE WILL SCALE TO FIT AUTOMATICALLY
- NATIVE IMAGE RATIO IS 16:10
- IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN

image / figure 2:

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

As stated in the introduction, the current healthcare system does not achieve the efficiency and effectiveness that is needed for optimal care. This is partly due to a lack of collaboration between the different healthcare providers. In figure 1, the involved stakeholders in the hand-wrist care are presented. This is a relatively small care network, but still involves seven different stakeholders all involved in this process, that are needing to figure out a way to collaborate. All parties involved have their own workflow making it a challenge to connect them and make them collaborate. Not only do the stakeholders have different processes, but each individual patient also requires a different organised care plan. A patient-centric model that connects the patient and the healthcare providers can pose a solution, but has its challenges.

Work or time pressure can make doctors go back to a paternalistic approach, dedicating something is often easier and faster (Dunn, 2003). The doctor has the medical expertise, while the patient knows best what they need to fulfil their personal needs. At the same time, the patient is not always right or able to make the right choice (Hilborn, 2006). Furthermore, there are patients that do not wish to actively participate in their care, or are simply not able to do so. (Summer Meranius et al., 2020). Both parties must therefore be aware of their abilities and limitations, the challenge lies in finding the balance to work together as a team.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Develop an orthopedic care network and infrastructure that connects the patient with healthcare providers and connects the services and workflows for optimal patient-centered treatment.

The expected outcome of this project is
1) a design vision of a future network in which this connected system is mapped. It will convey the needs of the stakeholders and the patient, and define their roles to achieve these needs.
2) a strategy in the form of a roadmap in which is explained how this system can be scaled up and implemented in different fields.

Initials & Name V.M. van Tilburg Student number 4468511

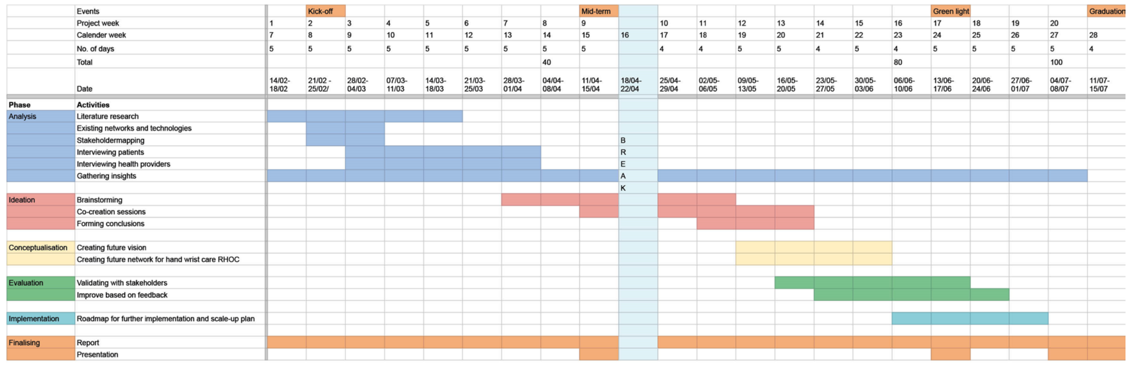
Title of Project A patient-centered orthopedic care network

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 14 - 2 - 2022

15 - 7 - 2022 end date



	Events		Kick-off							Mid-term									Green light				Graduation
	Project week	1	2	3	4	5	6	7	8	9		10	11	12	13	14	15	16	17	18	19	20	
	Calender week	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	No. of days	5	5	5	5	5	5	5	5	5		4	4	5	5	4	5	4	5	5	5	5	4
	Total								40									80				100	
	Date	14/02-18/02	21/02 - 25/02/	28/02-04/03	07/03-11/03	14/03-18/03	21/03-25/03	28/03-01/04	04/04-08/04	11/04-15/04	18/04-22/04	25/04-29/04	02/05-06/05	09/05-13/05	16/05-20/05	23/05-27/05	30/05-03/06	06/06-10/06	13/06-17/06	20/06-24/06	27/06-01/07	04/07-08/07	11/07-15/07
Phase	**Activities**																						
Analysis	Literature research	■	■	■	■	■																	
	Existing networks and technologies		■	■																			
	Stakeholdermapping		■	■							B												
	Interviewing patients			■	■	■	■	■			R												
	Interviewing health providers			■	■	■	■	■			E												
	Gathering insights	■	■	■	■	■	■	■	■	■	A	■	■	■	■	■	■	■	■	■	■	■	
											K												
Ideation	Brainstorming							■	■	■		■	■										
	Co-creation sessions									■		■	■	■	■								
	Forming conclusions												■	■	■								
Conceptualisation	Creating future vision													■	■	■	■						
	Creating future network for hand wrist care RHOC													■	■	■	■						
Evaluation	Validating with stakeholders														■	■	■	■	■				
	Improve based on feedback															■	■	■	■	■			
Implementation	Roadmap for further implementation and scale-up plan																	■	■	■	■		
Finalising	Report	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■
	Presentation									■									■			■	■

In my planning I work full-time on my project, and I scheduled a total of 10 free days.

I will be doing qualitative research to discover the needs of all the stakeholders, by doing interviews with the patients and with the medical providers. Due to the complex nature of this assignment, I want to involve the stakeholders later in the process as well, and organise co-creation sessions in the ideation phase. Then I will use these insights by creating a vision of the future system which I will validate with the stakeholders again. And finally, create a roadmap of the implementation and scale-up plan of this system.

Initials & Name V.M. van Tilburg Student number 4468511

Title of Project A patient-centered orthopedic care network

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... Stick to no more than five ambitions.

Initially, the area of this project really appealed to me; I like to work on social projects. During my internship I worked on multiple projects for municipalities, I did my bachelor end thesis at the Hersenstichting (Brain Foundation) and in DSP last year I worked on a project for the Red Cross. I tend to choose for these kind of projects since these give me the feeling of contributing to something real. This applies to the field of healthcare as well. Healthcare is a large area where many things can still be improved, real changes can still take place.

Last year, I did a project with the Red Cross in Mozambique, this was a large-scale project with many different parties and had the extra challenge that it took place in a completely different situation. It was challenging to discover where the real problem lies and where you can really make a difference, bringing all insights together and still being able to come up with a clear end result. I hope to do the same during this project. Working with multiple stakeholders is something I would like to get more experience with. I hope during this projects to discover what my skills are in this area, and use new techniques such as co-creation sessions.

In my projects I like to design from the user's point of view. I find it interesting to understand people's motivations and I want to design something that fits their needs. During this project I strive to further develop my user research skills and interviewing techniques.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.