IMPROVING COLLABORATION IN THE WORK-DIRECTED CARE FOR KNEE-REPLACEMENT PATIENTS

Facilitating collaboration between the occupational physician and orthopaedic surgeon in the return-to-work guidance of knee-replacement patients, by design.

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IMPROVING COLLABORATION IN THE WORK-DIRECTED CARE FOR KNEE-REPLACEMENT PATIENTS

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EXECUTIVE SUMMARY

Studies have found that after a total knee replacement surgery, 30% of the patients do not return to work. With the increasing pensionable age, the amount of working people needing TKP surgery will increase with 300%. Therefore, this project focusses on improving the guidance of TKP patients back to work after surgery.

Furthermore, previous studies have found that many of the issues concerning return-to-work are related to the patient's attitude towards their work and the (social) work environment. These issues are related to the work of the occupational physician and his guidance in the care process. Therefore, this project focusses on the collaboration between the occupational physician and the orthopaedic surgeon. The orthopaedic surgeon supports the patient mostly before surgery and checks up on his rehabilitation afterwards. The orthopaedic surgeon is the expert on this specific injury and its effects on the patient's physical state. The occupational physician provides a bridge between the patient's medical state and his work environment. He is the expert on the patient's specific work environment and activities and provides return-to-work guidance mostly after surgery.

Earlier research has also uncovered issues concerning the practical side of this collaboration, such as;

- A lack of money, and thus time,being available for work-directed care by the orthopaedic surgeon.
- A small time frame in which the occupational physician can help the patient manage his expectations and influence the rehabilitation plan to ensure transition back to work.
- Poor visibility of the occupational physician for other care providers.
- A lack of communication between the occupational physician and orthopaedic surgeon.
- A lack of specialised knowledge with the occupational physician.
- Too little value given to the advice of the occupational physician.

This research also revealed distrust in the patients towards the occupational physician resulting in exclusion (Doorn, Maan & Schuijer, 2016). Due to these issues, the orthopaedic surgeon and other clinical staff often take over the occupational physician's role of setting expectations for return to work.

Some hospitals in the Netherlands have set up specialised care for the return-to-work guidance of their patients. Based on these examples, the following opportunities have been defined:

- A care provider with specialised knowledge should be involved in establishing the reintegration plan together with the occupational physician.
- A bridge is needed to translate between the interests and needs of the clinical staff and the occupational physician.

No previous studies have focussed on identifying facilitators and barriers in the interaction in the current collaboration between the occupational physician, orthopaedic surgeon and patient. Therefore, the focus of this project has been on comparing the experiences of the occupational physician, patient and orthopaedic surgeon during their collaboration in the work-directed care of TKP patients.

During the first field study, the experiences of the orthopaedic surgeon and occupational physician on their current collaboration were compared.

Because of the limited effect of work on the treatment of the orthopaedic surgeon, the orthopaedic surgeon and occupational physician are almost never in direct contact. Often, the patient is the carrier of information. Therefore, the occupational physician and orthopaedic surgeon base their treatment on the patient's experience of his injury. Direct contact only happens when:

- The occupational physician initiates it.
- Problems in the client's rehabilitation influence his return-to-work.
- The client's return-to-work causes problems in the recovery process.

At these times, the occupational physician and orthopaedic surgeon both experience their contact as inefficient and impersonal. The feeling of inefficiency results from the orthopaedic surgeon not receiving benefits from it for his own practice and the

occupational physician not always receiving the information he needs or not receiving it in time to be usable in his process.
The impersonal feeling is mainly caused by the indirect contact and results in the physicians feeling less involved and unconnected to each other's processes.

The importance of the work integration is recognised by the orthopaedic surgeon as work helps patients experience their rehabilitation more positive. Therefore, cooperation in work-directed care should be included in the standard process of the orthopaedic surgeon.

During the second field study, the experiences of TKP patients of their care and guidance by the occupational physician and orthopaedic surgeon have been explored.

Most TKP patients are generally very happy with the guidance the receive in their rehabilitation due to the personal and committed involvement of the physiotherapist. When the occupational physician was involved in the return-to-work guidance, patients generally appreciated the help in managing expectations. Patients who did not receive guidance of the occupational physician experienced more insecurity. With the orthopaedic surgeon, not all patients felt like they had a good connection and could communicate well.

Furthermore, due to the current limited collaboration, gaps exist in the care providers' knowledge of the patient's character and his personal situation. This causes the patient to receive contradictory advice, which does not always suit his personal situation. Also, some patients are insufficiently informed, leaving them feeling insecure and uncertain of his allowances and abilities. Contact with patients in similar situations made the patients feel more supported and understood, as well as that this provided them with clearer expectations and motivated them.

These insights have led to the formulation of criteria for the improvement of the collaboration between the occupational physician and orthopaedic surgeon. The most important of these are:

- The contact between the care providers and patient needs to be regulated in one platform
- The care providers should focus on their areas of expertise
- The care providers should be alerted when their expertise could benefit the patient's progress outside of the standard meeting between care providers and patient
- To patient should receive additional guidance in forming fitting expectations
- The patient should be provided a better understanding of his current state and progress.

Based on these outcomes the focus of the tool has been set. The goal for which the tool is developed is:

The solution should facilitate an ***INVOLVED, TIME-EFFICIENT COMMUNICATION*** *between the* ***OCCUPATIONAL PHYSICIAN AND ORTHOPAEDIC SURGEON*** *in the work-directed guidance of working knee-prosthesis patients* ***BEFORE AND AFTER SURGERY.***

This communication should be based on their ***INDIVIDUAL AREAS OF EXPERTISE*** *while focusing on* ***COMMON GOALS*** *to improve their current* ***PATIENT-CENTRED*** *care processes, while ensuring a fit in their current* ***WORKFLOW.***

Based on this focus, three idea directions have been developed:

- Flying start, to facilitate the indirect information exchange between the care providers during their separate meetings with the client and set up their own expertise-based plan for the patient's care.
- MyTeam, to involve all care providers from beginning to end in a patient-centric team and make all information available for all care providers.
- Out of Office, to allow the care providers to provide the patient with guidance when this is needed, outside of standard meetings.

These directions have been evaluated together with knee-prosthesis patients to develop them further into concepts. Based on this evaluation and criteria from the field studies, the MyTeam concept has been chosen to develop further.

The main focus of this concept is:
Allowing both the care providers and the patient to form fitting expectations based on information and insight in the complete work-directed care process.

The concept allows for the care providers to look up each other's findings, which have a direct effect on their own plans and guidance of the patient. The concept also allows for direct contacting and stimulates a more personal communication, as the care providers are involved in patient-centric teams.

For the occupational physician extra guidance is provided. This is done by showing the average process of rehabilitation for patients with similar work and pointers are given for the different stages in the patient's work reintegration process.

The orthopaedic surgeon typically plays a small role in the patient's rehabilitation process after surgery. Therefore the orthopaedic surgeon only uses this system just after a meeting with the patient, to fill out the results of the meeting or when the system alerts him, as his expertise is needed to support the other care providers and the patient.

The patient is provided with an overview of all information concerning his rehabilitation to work in one place, translated into clear goals and statements directly usable in his everyday life, as well as insight in both the average process of rehabilitation and the experiences of other patients similar to him, based on their personal characteristics and the kind of work they do.

To assess this concept, an evaluation study has been done using an interactive prototype. The focus of the evaluation was on:

- The fit of the tool in the current work processes of the orthopaedic surgeon and occupational physician.
- The perceived effectiveness of MyTeam in the collaboration between care providers in work-directed care.
- The elements of the tool that support the collaboration.
- The interaction qualities stimulated by MyTeam.

Based on this evaluation the following aspect of MyTeam have been identified to be improved upon:

- The rehabilitation timeline and the screen on which the patient invites his physicians should be improved fix the usability issues found.
- The users' experience of the interaction with the system should be made more expertise-based and time-efficient and less controlled.
- A filter must be developed for the observations of care providers that could possibly develop into complications.
- The occupational physician would like more feedback of the orthopaedic surgeon on his reintegration plan and expectations.
- A threshold needs to exist for asking the orthopaedic surgeon questions, for both the patient and other care providers.

Based on these findings a redesign has been made.

In order to implement the MyTeam system in the current context of work-directed care, the following points need to be considered:

- The time spent on this system should become part of the standard care for both the occupational physician and the orthopaedic surgeon, therefore it should become part of the Diagnostic Treatment Combination for working TKP patients.
- On short-term, the most important functional elements of MyTeam can be integrated in the existing EPD system.
- MyTeam should be checked for the implications for privacy and professional secrecy.

CONTENTS

INTRODUCTION

BACKGROUND

Every year around 20,000 TKP surgeries are performed in the Netherlands. TKP stands for Total Knee Prosthesis, which means that the complete knee joint of a patient is replaced with an artificial prosthesis joint. Of all TKP patients 30 % are of working age and expected to go back to work after or during medical treatment following their surgery (Singh, Anjum, Ramaskandhan, Siddique, 2014). However, one third of the TKP patients of working age does not return to work after their surgery (Kievit, van Geenen, Kuijer, Pahlplatz, Blankevoort, Schafroth, 2014).

The number of people of working age needing these surgeries will grow with an expected 300% before 2030, due to a growing amount of people with obesity, and therefore faster wearing joints, and the increasing pensionable age (Otten, van Roermund, Picavet, 2010).

It has long been thought that participating in work has a negative influence on the recovery of an injury or illness, due to the high workload, long working hours and physically and socially demanding work environment (Ieder(in) et al., 2015). However, recent studies show that early return to work is not associated with increased risk for recurrence and the fear for re-injury is therefore not well-founded (Staal, Rainville, Fritz, Van Mechelen, & Pransky, 2005). Not returning to work (soon) after injury could increase the damaging physical, mental and social effects of musculoskeletal impairment and the chances of long term sick leave (Waddell & Burton, 2006). Also. work could even benefit the recovery period as it improves the patient's quality of life and high quality of life is associated with higher resilience and self-esteem (Waddell & Burton, 2006). For patients, working is a way of being useful and therefore giving meaning to their life (Ieder(in) et al. 2015). Thus it is important to use work-directed care to guide more patients to return-to-work (faster) after surgery.

The likeliness of patients return-to-work soon after or during recovery of an injury depends on multiple physical, social and psychological factors:

- The complexity of the injury, patients with one or more co-morbidities generally stay at home for a longer period of time, especially when their recovery is more difficult than expected (Krause, Frank, Dasinger, Sullivan, & Sinclair, 2001).
- Being overweight (BMI> 30,0) (Kuijer et al., 2016)
- Being a woman; this is expected to be related to their position as not being the main earner in most families and their physical recovery being less fast and often not as well as their male counterparts (Kuijer et al., 2016).
- The physically demanding nature of the work. Especially patients blaming their knee problems on their work are less likely to return to work (Kuijer, Pahlplatz, Schafroth, Blankevoort, van Geenen, Frings-Dresen, Kievit, 2016)
- Social support system; patients need to feel understood and can control their own work schedule (Krause et al., 2001). Also, friends and family can help motivate the patient's behaviour.
- Self-efficacy; the strength of the patient's beliefs in his or her ability to reach a certain goal or complete a certain task (Franche & Krause, 2003).
- Self-employment; due to the 'Wet verbetering Poortwachter' employers are obligated to make alternative work arrangements if a disabled employee is not able to function at his or her former level and pay for salary of the employee for at least two years after disablement. Self-employed people therefore have more motivation to go back to work (Doorn, Maan, Schuijer, 2016).

Depending on the duration of the sick leave different factors become more important in predicting the patient's return to work.

PROJECT FOCUS

Many of the issues concerning return-to-work are related to the patient's attitude towards their work and the (social) work environment. These issues are within the realm of expertise of the occupational physician. The occupational physicians does not guide the patients physical recovery, but focusses on the patient's recovery towards work and medical issues within the wider context of a person's

psycho-social and work-related framework. This makes the occupational physician central in the communication between the patient, his employer and other care providers.

However, in the current care process, the occupational physician is only minimally involved and rarely consulted by other care providers. Therefore, this project focusses on improving the collaboration between the occupational physician, orthopaedic surgeon and the patient, undergoing TKP surgery, in order to positively influence return-to-work guidance in integrated care.

PROJECT CONTEXT

Coronel Instituut

This project is carried out for the 'Coronel Instituut voor Arbeid & Gezondheid', a research department within the AMC, which focusses on research in the area of work and health, that aims to improve the work-directed care after a TKP and adapt it to suit the needs of the patients.

Industrial Design Engineering

During this project, a design-thinking approach will be used, based on the Design for Interaction sub-discipline of Industrial Design Engineering. This sub-discipline focusses on the interaction between people or people and products. As such, this project focusses on the interaction between the patient, consulting medical professionals and the occupational physician with their underlying emotions and motivations.

In the "Care for our health" research area of the faculty of Industrial Design Engineering, the main goal is to improve the quality of care in the whole chain. Also this area aims to provide insights on how design can positively influence and improve the healthcare system to fit with the changes of the society. This project focusses on improving the quality of care in order to increase the number of patients, who return-to-work after an orthopaedic surgery, by design. Thereby more employees will be able to work until pensionable age.

GLOSSARY

TKP	- Total Knee Prosthesis
KP	- Knee Prosthesis
OS	- Orthopaedic Surgeon
OP	- Occupational Physician
RTW	- Return-To-Work

CHAPTER 1: LITERATURE

INTRODUCTION

In order to understand the context of this project, a literature study has been done. It focuses on the care system surrounding the Return-To-Work (RTW) guidance of Total Knee Prosthesis (TKP) patients and the collaboration between the orthopaedic surgeon and occupational physician. Furthermore, the study looks into factors influencing the patient's experience and other collaborations between departments inside the hospital and outside of it. This information will be used to formulate new opportunities and problems to provide guidance for this project.

Based on this literature study, expectations are formed for the outcomes and provide guidance for the field research. Furthermore, by writing down expectations, new information from the interviews will be more noticable and the results can focus on these new insights. The search for papers has been done by web-based research platforms. Search terms included: orthopaedic care, return to work, work-directed care, integrated care, occupational health, occupational legislation, patient experience, TKP process, influential factors.

This study revolves around the following topics and research questions:

- **What is the current care procedure for TKP patients?**
- **In what way is the occupational physician involved in the current care process for patients of working age with osteoarthritis in the knee, who undergo knee-replacement surgery?**
- **What factors have been identified to influence the experience of TKP patients of their current work-directed care?**
- **What elements of existing collaborations seem beneficial to the current collaboration between the orthopaedic surgeon and occupational physician?**
- **What opportunities and aspects for improvement could be identified based on this literature study?**

1.1 THE TOTAL KNEE PROSTHESIS

TKP stands for Total Knee Prosthesis. In this procedure the orthopaedic surgeon replaces the parts of the patient's cartilage that are worn with components made from metal, polyethylene or (most recently ceramics. These materials are also referred to as biocompatible materials. These components are attached to the bone using a glue-like mixture called 'cement' (see figure 1).

Figure 1: A TKP made out of different materials

Different kinds of prostheses exist. Which prosthesis the patient is provided with, depends on the location of the arthrosis and the state of wear of the joint. Usually, this decision is made before surgery, but it is not uncommon that the orthopaedic surgeon decides to use a different type of prosthesis during surgery.
A knee prosthesis also comes in many different size. Before surgery an x-ray is used to determine what size should fit.

A TKP is placed when all three parts of the knee joint are worn, usually due to arthrosis; the left or right femorotibial joints and the patellofemoral joint. The damaged parts of the femur and tibia are replaced with metal compartment. The metal compartment on the tibia is covered with a polyethylene component, which functions as the actual joint by being fixed or moving relative to the metal plate underneath.

In some cases a polyethylene compartment is also placed on the back of the knee cap (see figure 2).

Figure 2: x-ray of TKP without kneecap replacement (left) and with kneecap replacement (right)

Based on the state of the ligaments, the surgeon can decide between placing a non-constrained prosthesis or a semi-constrained prosthesis, which is more stable. When the patient has an important deviation in the knee axis and bad knee ligaments, the surgeon can choose to use a hinge joint, which is also called a constrained prosthesis (see figure 3). With a constrained prosthesis, the two joint parts are connected with a hinge instead of being unattached. To place this prosthesis, a hole is made in the bone to fit part of the prosthesis inside the bone.

A constrained prosthesis is also often used In revision surgery, when the first prosthesis is replaced with a new one because it was damaged, worn out or something went wrong with the placement of the first prosthesis. (Van den Driessche, 2008)

Figure 3: From left to right: A constrained, semi-constrained and non-constrained prosthesis

1.2 THE CURRENT MEDICAL CARE PROCESS OF TKP PATIENTS

This chapter focusses on the medical care of TKP patients. The occupational physician is typically not part of this process, as he focusses on the psycho-social factors of a patients rehabilitation directed to work instead of the patient's medical-technical treatment or recovery. The guidance of the occupational physician is discussed in the next chapter.

The main cause for needing to undergo a knee prosthesis surgery, is arthrosis. Arthrosis is wearing of the joints. When this presents in the knee, it can present in three different ways (Stichting patiëntenbelangen orthopaedie, 2013):

1. Wearing of the cartilage, which exposes the underlying bone. This is the most common in middle-aged patients.
2. An inflammatory reaction that destroys the cartilage, Rheumatoid Arthritis. When this presents itself, usually both knees are affected. Rheumatoid arthritis occurs in patients of all ages.
3. After a fracture or injury of the joint. This can present itself even years after the fact.

The typical medical care for a patient with knee-arthrosis who will eventually undergo prosthesis surgery, is described in the following sub-chapters (see figure 4).

THE GENERAL PRACTITIONER

The first point of contact with the care system is typically the general practitioner. When first meeting with the patient, the general practitioner performs a screening:

- Enter the patient in the system
- Inventise the complaints
- Screen for seriousness of the complaint
- Informs and advises the patient's care.

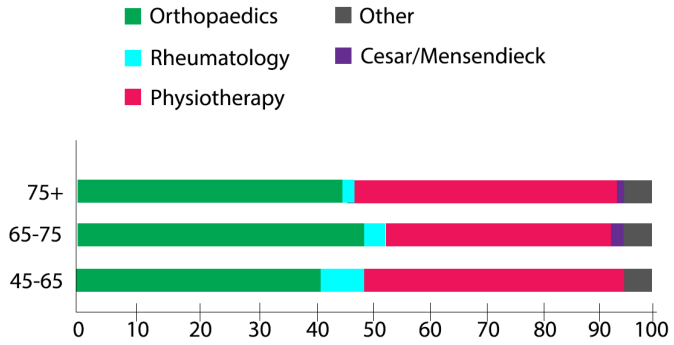


Figure 5: Redirection of patients by the general practitioner in percentages

Before he redirects a patient to a more specialised care provider, usually takes up quite a long time depending on the severity of the complaints.
Every year 1 in 7 arthritis patients is redirected to orthopedics, rheumatology, physiotherapy, Cesar/ Mensendieck or other specialists (figure 5).

Until they get redirected, patients are prescribed with painkillers and undergo regular checks to keep track of the progression of the arthritis. Which painkiller the general practitioner prescribes, depends on the side effects and how both the arthritis and the medication effect the patient's daily activities, such as his work (De Fysiotherapeut, 2016).

With most patients with arthritis that visit the general practitioner, it presents itself in the knee (40%), second is the hip (25%) (Jabaaij, 2015).

PHYSIOTHERAPY

When a patient gets redirected to physiotherapy, the patient meets with the therapist to discuss in what

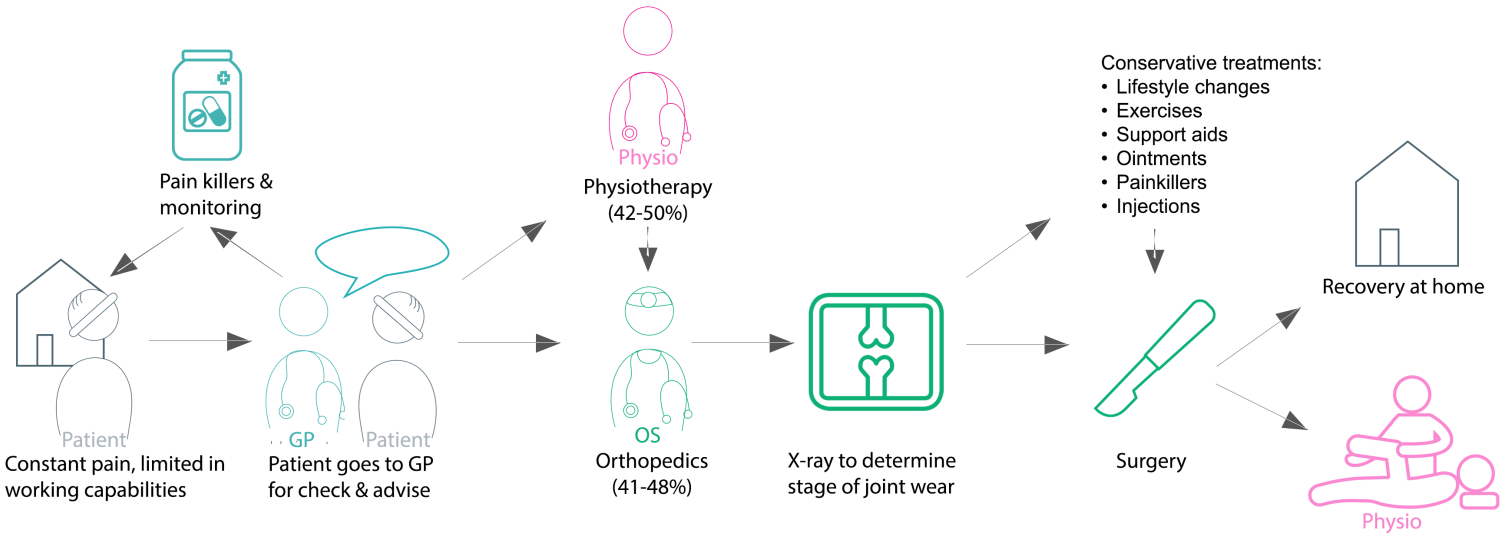


Figure 4: Typical care process of a patient with arthritis of the knee who will undergo prosthesis surgery

way the arthritis hinders him in daily activities. Based on this, the physiotherapist provides the patient with an exercise plan. The goal of this plan is to reduce the complaints and be able to get back to the patient's normal level of activity as soon as possible (Promovendus, 2014).

In the Netherlands patients can also visit the physiotherapist on their own initiative, due to the law 'Direct Toegankelijke Fysotherapie'. With these patients the physiotherapist does the screening process, which is normally done mostly by the general practitioner (De Fysiotherapeut, 2016).

ORTHOPAEDICS - CONSERVATIVE TREATMENT

The patients either are redirected to the orthopaedic clinic by the general practitioner or by the physiotherapist. The orthopaedic clinic provides the more complex care, which causes a longer period of recovery before patients can return to their daily activities (Promovendus, 2014).

During the first visit with the orthopaedic surgeon, x-ray images are made of the knee in order to establish the progression of the wear in the joint. Also, a blood test and MRI-scan are done for diagnosis. Depending on the progression of the wear, several conservative treatment options are available in the orthopaedic clinic (Stichting patiëntenbelangen orthopaedie, 2013):

- Lifestyle advise to adjust habits and avoid activities that would make the complaints worse
- Mobility and flexibility exercises with a physiotherapist
- Aids to relieve the complaint, such as a cane, brace or orthopaedic shoes
- Painkillers
- Corticosteroid injections
- Water exercises
- Ointments or bandaging

When these treatment options are no longer sufficient or the arthritis has already progressed too far, the patient is prepared for surgery.

ORTHOPAEDICS - SURGERY

Different kinds of surgery can be performed:

- Keyhole surgery, the surgeon looks inside the joint and if needed removes any loose fragments of cartilage or mends damaged parts of cartilage. The typical waiting time for this surgery is 7 weeks.
- Cartilage transplantation, during this surgery the damaged cartilage is replaced with healthy cartilage. This surgery is however only possible when the cartilage loss is limited. This is usually done during a keyhole surgery, so the waiting time is 7 weeks.
- Alignment, when the lower and upper leg are not properly aligned, the surgeon perform surgery to realign them to the joint.
- Knee prosthesis placement, the damaged parts of the joint are replaced by a partial or complete knee prosthesis. The typical waiting time for this surgery is 9 weeks.

Of these options the keyhole surgery and knee prosthesis placement are most common to be performed. For keyhole surgery a patient typically stays in the hospital for one day. For a knee prosthesis placement surgery, the typical duration of hospitalisation is two to three days (Stichting patiëntenbelangen orthopaedie, 2013).

REHABILITATION

After surgery, most patients are able to return home quite fast, within the day. Other patients need to remain in the hospital for longer or start rehabilitation in a care hotel. The duration of hospitalisation is dependent on (Dr. Westerink, 2016):

- The patient's living situation
- The intensity of the after-care
- The possibilities of support in the patient's social environment
- The patient's mental attitude

The patient can also be provided with in-home caretakers (Knieoperatie.nl, 2016).

Furthermore, the patient is directed back to the physiotherapist for functional recovery. The following information needed for the physiotherapist to provide fitting care for the patient:

- The surgery techniques used
- The placement and length of the wound
- Other pathology, such as other damage of the joint or passive instability
- The results of additional tests
- The use of medication
- The use of (walking) aids
- The allowances in terms of load and flexibility

Especially patients who had complaints during a longer period before their surgery, or who have lost muscle mass, or who are afraid of movement, or have a relevant other injury or need to reintegrate as fast a possible, are provided with intensive treatment by the physiotherapist (De Fysiotherapeut, 2016).

In the beginning, the physiotherapist treats the patient every (other) day to strengthen the knee joint and keep the joint mobile. Later on, the intensity of the treatment by the physiotherapist decreases, until the patient no longer needs the guidance (Knieoperatie.nl, 2016).

1.3 THE GUIDANCE OF THE OCCUPATIONAL PHYSICIAN IN THE TKP CARE PROCESS

The occupational physician helps patients overcoming limitations that involve their expectations and attitude towards recovery to ensure a smooth RTW, both short term and long term.
As such, the occupational physician is involved in setting expectations for after the orthopaedic procedures and planning, discussing, implementing and evaluating a work reintegration plan with the patient and his employer (see figure 6) (Pacifica Orthopedics, 2010). In this process the occupational physician should have a very central role connecting the patient, his work and his care providers, this is however not typically the case.

Most patients are sent to the occupational physician, instead of going out of their own volition (Doorn,Maan & Schuijer,2016). Due to 'De Wet van de Poortwachter' all employees are legally bound to contact the occupational physician within six weeks after first reported sick leave. A scheme on the timing and activities that are required according to this law is shown in appendix A. These activities are only in part the responsibility of the occupational physician, as the patient and

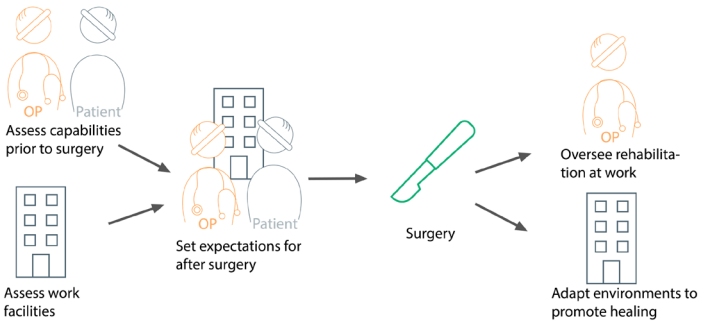


Figure 7: The current process of the occupational physician for TKP patients to ensure RTW

employer are also bound by it. The employer needs to assist in evaluations, designing a plan of action, reporting the employee's sick leave and supporting the reintegration in general. The employee has to actively participate in the evaluation, promote his own rehabilitation and work integration, even if this is not in his original work or with the original employer (Risico's in beeld, 2017).

In the typical process for the work-directed guidance of TKP patients (see figure 7), the occupational physician does not have a

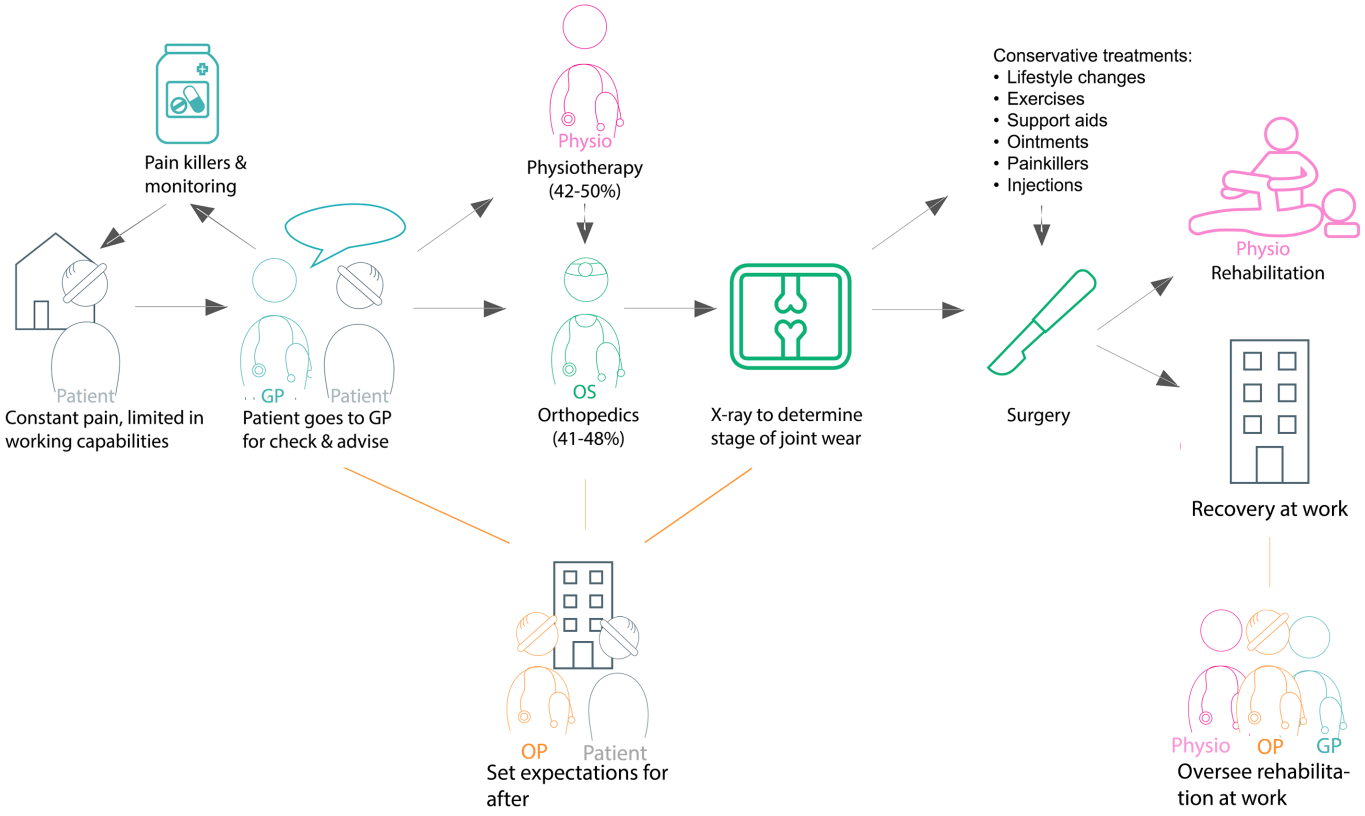


Figure 6: The ideal involvement of the occupational physician in the process of surgical treatment for a TKP patien

significant role. The most important activity for the occupational physician is the problem analysis 6 weeks after the employer reports the employee's sick leave. At this moment the patient has typically already been in contact with an orthopaedic surgeon, so the treatment plan has already been (partially) established. The occupational physician only has a very short window of time in which he can still help the patient manage his expectations and influence the rehabilitation plan to ensure transition back to work (Doorn, Maan, Schuijer, 2016).

A systematic review by Hoefsmit, Houkes & Nijhuis (2012) found that, interventions within the first six weeks of disablement significantly support successful work participation. These interventions include work adaptations, graded activity and cognitive behavioural training. Thereby, these first six weeks play a big role in easing the transition back to work, by letting the patient already experience the work they will be doing after surgery and learn what to expect during rehabilitation.

However, it should be noted that in some cases early intervention of the occupational physician could have the opposite effect, as it can make patients feel pressured to return-to-work before they are ready or create even greater distrust between the patient and occupational physician. Therefore, some patients need more time to recover before they are able to return to work (Wevers, Van Genabeek, Steenbeek & Buijs, 2010).

During rehabilitation the occupational physician will help the patient reintegrate into work fitting with his abilities after sick leave. In the case of a TKP patient, the occupational physician has to adjust to the possibly permanent more limited abilities of the patient. Therefore, the occupational physician can choose to either help the patient reintegrate back into his own work, 'eerste spoor reïntegratie', or into different work at the same employer, 'tweede spoor reïntegratie, or into different work with a different employer, 'derde spoor reïntegratie' (Menea, 2013).

PREVIOUSLY IDENTIFIED POINTS OF IMPROVEMENT IN THE COLLABORATION BETWEEN THE OCCUPATIONAL PHYSICIAN AND ORTHOPAEDIC SURGEON

According to the research of Doorn, Maan & Schuijer (2016), occupational physicians are currently minimally involved in patient care, because of;

- The occupational physician's poor visibility due to the occupational physician being outside of the hospital
- Lack of communication, which is probably also partially due to the visibility
- The occupational physician's lack of specialised knowledge, which causes orthopaedic surgeons to value their advice less.
- Exclusion of the occupational physician by the patient, due to distrust in the occupational physician as he is under contract with the employer, but not with the employee.

Due to the current limited involvement of the occupational physician, the orthopaedic surgeon and other clinical staff take over the occupational physician's role of setting expectations for return to work.

1.4 FACTORS INFLUENCING THE EXPERIENCE OF TKP PATIENTS DURING REHABILITATION

In order to improve the collaboration between the orthopaedic surgeon and occupational physician to provide a more effective guidance in the care process of TKP patients, the factors in the care process that influence the experience of patients need to be known as well.

PHYSICAL LIMITATIONS

When patients have had a complex injury, low general health or complications during surgery, they typically have more trouble in return-to-work and generally stay home longer (Krause, Frank, Dasinger, Sullivan & Sinclair, 2001). Especially people, whose work is dependent on their physical abilities, will take a longer time to recover, if they are able to sufficiently recover to RTW (Leinonen et al., 2011).

After TKP surgery, certain functions improve, such as; walking on level terrain, driving and standing, but others do not or barely improve such as; kneeling and crouching. Thus, in a research by A.J. Kievit et al. (2014) 30 % of all TKP patients have inadequate abilities to continue with the same work as they did before the surgery and 20% was unhappy with their new working abilities (Elzakker, 2014).

DURATION OF SICK LEAVE

It is expected that the longer it takes for a patient to sufficiently recover from their injury and a patient is unable to return-to-work, the more negative associations and experiences the patient will have surrounding their care process and guidance during this process. For patients, working is a way of being useful and therefore giving meaning to their life (Ieder(in) et al. 2015).

SUPPORT SYSTEMS

With these patients who stay at home longer, the influence of social and psychological factors, and therefore their social support system, becomes more significant as well (Franche & Krause, 2003).

COPING

Another factor in how the patients have experienced the guidance during their return to work is their personal coping. The patient's coping is amongst others dependent on:

- Fear of re-injury or pain, this increases rehabilitation time as the patient's flexibility and physical capacity increase slower, because the patient will be very careful in performing the exercises provided by for example the physiotherapist (Van Vlisteren et al. 2005).
- Blaming their injuries on their work, this will make them less motivated to return to their work, as they are either afraid of re-injury (Van Doorn, Maan, Schuijer, 2016).
- The strength of the patient's beliefs in his or her ability to reach a certain goal or complete a certain task. This factor varies greatly among patients and has been proven to be a strong predictor for the level of workparticipation after surgery (Franche & Krause, 2003; Schultz, Stowell, Feuerstein, & Gatchel, 2007; Maillette, Coutu, Gaudreault, 2017).
- Furthermore, the influence of others on their own experience is an aspect that determines the patients' experiences surrounding their surgery (Gautreau, Aquino-Russell, Gould, Forsythe, 2016). Therefore, the patient's family and social environment can be both facilitating or limiting their care (Hofstede et al., 2016).
- The patient's expectations after surgery is one of the main factors influencing of the patient's motivation and therefore the speed of his recovery. (Bardgett, Lally, Malviya, Kleim, Deehan, 2015; Maillette, Coutu, Gaudreault, 2017).

1.5 EXAMPLES OF WORK-DIRECTED COLLABORATIONS WITHIN HOSPITALS

Collaborations in other hospitals with medical professionals outside of the hospital are looked into for possible opportunities.

In the UMCG Centre for Rehabilitation one of their three core priorities for revalidation is Work and Participation. During this rehabilitation program, patients are encouraged to return to work as early as possible and gradually expand their work activities. A work consultant cooperates with the patient to set rehabilitation goals related to work and establishes a treatment plan. They constantly evaluate and adjust this plan to provide the patient with optimal care and ensure his desired return-to-work (UMCG Centrum voor Rehabilitatie, 2016). In order to align activities at work with the rehabilitation plan, the work consultant works together with the patient, occupational physician and employer (only with the patient's permission) during the rehabilitation (UMCG Centrum voor Revalidatie – 2, 2016).

Within the AMC, the outpatient clinic 'Mens en Arbeid' (PMA in short) has been established. This clinic provides a collaboration between the Dutch Centre for Occupational Diseases (NCvB in short) and clinical departments within the hospital. Occupational physicians work with specialists inside the hospital from several departments to establish a problem analysis and multidisciplinary treatment plan. If needed they can choose to involve a occupational hygienist, psychologist, social worker, physiotherapist or motion scientist. (De Groene, Pal, 2009)

Within the Erasmus MC in Rotterdam, the Center for Work-related Airway-, Skin- and Allergic Diseases is established (CALHAR in short). This center advises employees on whether their work is suited for them, whether adaptations are needed at the workplace and how the patient can prevent the disease caused by their work. This is all based on the patient's diagnosis and information provided by his occupational physician. This collaboration ensures more specific knowledge is applied to establishing a rehabilitation and treatment plan for at work. (Gerth van Wijk et al., 2016)

Also in collaboration with the Erasmus MC, an initiative called EmCare has been founded. EMcare provides multidisciplinary outpatient diagnostics for complaints related to the orthopaedic domain. Also it provides mediation for determining the right treatment plan and makes sure an employee is quickly redirected to a suitable care provider. also, EMcare assists the occupational physician with load-related advise. By combining these activities in one center, EMcare bridges the gap between the clinical care and the occupational physician outside of the hospital (Ergatis, 2017).

Based on these examples of collaborations with clinical staff towards work-directed care, the following opportunities can be identified:

- A care provider with specialised knowledge should be involved in establishing the reintegration plan together with the occupational physician.
- A bridge is needed to translate between the interests and needs of the clinical staff and the occupational physician.
- This bridging element would preferably be established inside the hospital, to facilitate communication with the clinical staff.

1.6 CONCLUSION

In the current care process for working TKP patients, surgery is usually the final option, which is only used when all other possibile treatments are no longer sufficient to keep working. Before patients are redirected to the orthopaedic surgeon, the general practitioner and physiotherapist have already been involved in the care process. Usually the patient's sich leave starts during treatment by the orthopaedic surgeon. Therefore, this is also the moment when the occupational physician becomes involved. However, the communication between the orthopaedic surgeon and occupational physician is in the current care process very limited.
In order to improve this collaboration, based on this literature study, the following opportunities can be identified in different stages in the care process.

Before surgery, when the patient is provided with information about his treatment and forms his expectations. During this stage, the occupational physician is now often not yet involved.

- The orthopaedic surgeon should discuss with the occupational physician to include work in his lifestyle advise after diagnosis.
- The occupational physician should be involved in establishing the patient's treatment plan and the planning of the surgery, so he can discuss the timing with the employer.
- A direct conversation should be facilitated between the occupational physician and physiotherapist, so the physiotherapist's exercise plan can include activities the patient would need for work.

The basic recovery phase, when the patient regains his most basic physical functions. In this phase the patient notices whether his expectations fit with the pain and the reality of his limited function.

- The occupational physician and orthopaedic surgeon should both support the patient with expertise-based information on the typical progression of his rehabilitation.
- The orthopaedic surgeon and other care providers involved before the surgery should assess which patients could have a longer period of functional recovery due to; losing muscle mass, relevant other injuries, longer sick leave and who need to integrate as fast as possible.
- The physiotherapist should share information about the patient's recovery with the occupational physician, as soon as he regards the patient as sufficiently recovered to start return-to-work.
- The occupational physician and other care providers should be in contact, to assess whether a patient is mentally ready to start return-to-work, next to being physically able.
- The occupational physician needs to be informed by the orthopaedicsurgeon on the care process before surgery and the medical details of the surgery, use of medication and allowances in load and flexibility, so the occupational physician can set goals for the reintegration period.

The start of the patients' return-to-work, as this is the moment when the patient is confronted with his speed of recovery fitting with patients' expectations and his limited function compared to before. surgery.

- Patients should view the occupational physician s as more open, approachable and trustworthy, so feel more inclined to discuss issues when they arrise outside of the set timing of the meetings.
- Care providers should be encouraged to be more actively involved throughout the whole rehabilitation phase, so patients can approach them when their expertise needed.

CHAPTER 2: CURRENT COLLABORATION BETWEEN THE OP AND OS

INTRODUCTION

The analysis phase of this project consists of two studies to gain insight in the interaction between the occupational physician, orthopaedic surgeon and the patient in practice. The results of these studies will lead to criteria for feasible solutions.

Next to opportunities and problems, the literature study also revealed a clear gap in the knowledge of work-directed care for TKP patients: No studies have compared the experiences of both the orthopaedic surgeon and occupational physician.

Therefore, the first study in this chapter focusses on the needs of the occupational physician and orthopaedic surgeon in different phases during the work-directed guidance of a TKP patient and compares their experiences in their current collaboration.

This research was done by performing qualitative interviews with 10 orthopaedic surgeons and 10 occupational physicians. The research results in stakeholder maps, a patient journey map and information flows, based on which opportunities and problems for improving the collaboration between the occupational physician and orthopaedic surgeon in the work-directed care of TKP patients are formulated.

2.1 RESEARCH SET-UP

INTRODUCTION

The goal of this research is:
"To identify the opportunities and problems in the current collaboration between the orthopaedic surgeon and occupational physician, based on their experiences of the current work-directed care for working patients with knee osteoarthrosis."

In order to fulfil this goal, the main research questions for this research are;

1. In what way is the occupational physician involved in the current care process for patients of working age with osteoarthritis in the knee, who undergo knee-replacement surgery?
2. How do the occupational physician and orthopaedic surgeon experience their collaboration in care for working patients with osteoarthrosis in the knee?
3. How could the current collaboration to guide return-to-work between the occupational physician and orthopaedic surgeon in the integrated care process be improved?

METHOD

This study was done by conducting individual interviews with occupational physicians and orthopaedic surgeons.

Table 1: Demographics of participating occupational physicians

-Sex	Male	5
	Female	5
Amount of TKP patients per year	1	1
	2-3	7
	>4	2
Years of experience	<5	1
	5-10	3
	>10	6

Table 2: Demographics of participating orthopaedic surgeons

Sex	Male	10
	Female	0
Amount of working TKP patients per year	<10	1
	10-30	3
	>30	6
Years of experience	<5	1
	5-10	2
	10-20	2
	>20	5

Participants

This research was done by performing interviews with 10 occupational physicians (see table 1) and 10 orthopaedic surgeons from (see table 2). Participants were recruited from different hospitals and occupational services, with the maximum of two occupational physicians or orthopaedic surgeons within one institution.

Recruitment

The orthopaedic surgeons were invited to participate based on their specialization in knee surgery, and existing connections to the Coronel Institute. The occupational physicians were selected based on their special interest in the guidance of TKP patients, during an additional education session.

The participants were recruited using an email with attached an information letter, see appendix C, explaining the purpose of the study and the questions that would be asked during the interview. The set-up of the introduction of the research can be found in appendix B.

Set-up

The interviews were performed in person or over the phone. The demographics included; sex, age, years of experience in practice, current occupational service/orthopaedic clinic, amount of TKA patients of working age guided per year.

The following four pre-selected questions were asked during the interviews:

- Describe your current way of working with a patient with knee osteoarthritis, who will undergo orthopaedic surgery and wants to return to work afterwards?
- Can you describe a recent patient for whom guidance to return-to-work before and after the surgery went very well? Or a recent patient for whom this did not go well?
- How would you describe the collaboration with the orthopaedic surgeon/ occupational physician based on the previous two examples?
- Based on the current care process, how would you ideally cooperate with the orthopaedic surgeon/ occupational

physician in order to successfully guide the patient to return-to-work?

These questions were used to introduce the different topics of the research questions during the interview. During the interview follow-up questions were asked to explore further into the participants' answers for their underlying motivations, experiences and reasoning.

All interviews were recorded using a phone operated voice recorder. During the interviews, notes were made in short catchphrases that served as guidance for determining the coding used during the analysis.

Analysis

The analysis was done by transcribing the interviews to statement cards (Stappers & Saunders, 2013). Next the cards are coded based on their paraphrasing. This lead to identifying key themes and sub-themes within these.

MATERIALS

An empty patient journey map (see figure 8) will be used as an 'object stimulus'; conversation starter and to help with clarification (Törrönen, 2002). In the top row of this journey map the pre-identified phases of the patient's care are shown. In the left column several pre-identified stakeholders in the process of the occupational physician and orthopaedic surgeon are shown. More stakeholders and phases can be added to this map during the interviews. In the raster between phases and stakeholders, the actions, thoughts and experiences of the stakeholders in the different phases can be noted, as well as when different stakeholders work together or communicate.

To grant permission for recording the participants, they were given an Informed Consent, see appendix D, when the interviews were done in person or verbally when the interview was done over the phone. The participants were also asked whether they would like to receive the results of the study.

The layout of the statement cards, used for analysis of the interviews, can be seen in appendix E. On these the participant's original quotes are paraphrased to their implicated statements.

PILOT

The first two interviews served as pilot interviews, to tune the method. The results of the analysis of the method during these pilot interviews can be found in appendix F. No major changes were needed, so the pilot interviews have also been analysed for the results of this study.

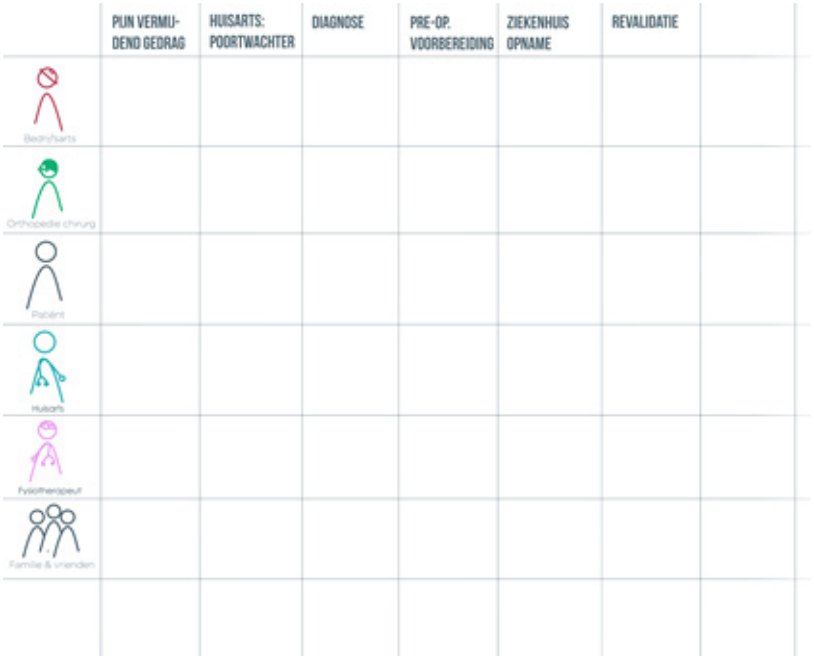


Figure 8: Journey Map

2.2 RESULTS

The results described in this chapter are based on the statements made in Table 4- 18 in appendix G.

This research focusses on the needs of the occupational physician and orthopaedic surgeon in different phases during the work-directed guidance of the care process of a TKP patient and their current collaboration. Therefore, the results of the interviews are grouped into 5 main themes;

- The typical process of the guidance of the OP and OS for TKP patients
- The influence of work on the OS's treatment
- Information provision of the OP and OS to the TKP patient
- Factors influencing the patient's recovery
- The current collaboration between the orthopaedic surgeon and occupational physician

THE TYPICAL PROCESS OF THE GUIDANCE OF THE OP AND OS FOR TKP PATIENTS

This first theme discusses the current standard care of TKP patients by the occupational physician and the orthopaedic surgeon. This care has been visualised into a journey map, in terms of activities, experiences and the issues occuring (see figure 9).

Pre-surgery

Before surgery, the orthopaedic surgeon sees the patient only short periods of time, approximately 10 minutes per visit, before surgery. At the orthopaedic department, they only see each other just before or just after surgery. During the first contact with the orthopaedic surgeon, tests are performed, the results are discussed and possible treatment options are layed out. Also, the patient is asked why he decides to visit the orthopaedic surgeon now, not earlier or later. The patient is often redirected to a physiotherapist.

The occupational physician meets the client before the surgery, when they can no longer work because of their knee problems. At this moment they are often already involved in the process at the orthopaedic clinic, or they are on the waiting list for receiving TKP surgery.

OP 1: "It really depends. You can see someone before placing the prosthesis, in that case they are on sick-leave and the knee is so bad that the specialist eventually decides; 'We have to put a new knee in there.'"

During the first meeting with the occupational physician a problem analysis is made, including the nature of the client's work and his current abilities and restrictions. This meeting also focusses on managing expectations.

Post-surgery

The first weeks after surgery are the base recovery in which the patient should do nothing but recover.

Some occupational physicians only meet their clients after surgery, or even after the first phase

of recovery when they become more mobile. The first visit with the occupational physician is typically 6 to 8 weeks after surgery. After this first meeting, the OP and patient meet sufficient times to suit the 'Wet Verbetering Poortwachter', which is every 4 to 6 weeks, depending on meetings between the client and the other caregivers and the course of the client's recovery. Seeing the patient in person is important for the occupational physician to adjust his integration plan. When the client is not mobile enough yet, contact over the phone can suffice. However, when the client is not mobile enough to start working or no other work is available, the occupational physician does not need to see the client at all yet.

OP 2: "If they cannot travel, they cannot work."

OP 3: "Sometimes I estimate, a person has too much pain and has an appointment with the orthopaedic surgeon soon, than seeing him does not make much sense."

During this first meeting, they discuss the client's recovery in terms of function, allowed loads and activities and his experiences of rehabilitation. Sometimes, the occupational physician performs a small physical examination. They also discuss work reintegration and mobility, as the occupational physician's first concern is that the client needs to be able to reach work.

OP 2: "You have to be creative in thinking of solutions to get a client mobile. They can travel with public transport or maybe carpool with a colleague"

OP 4: "The complaint is less important in deciding the treatment, but especially the restrictions someone has, that is important: to see what the options are for other kinds of work before the operation and especially afterwards."

With the orthopaedic surgeon the first meeting post-surgery is typically 6 to 8 weeks after surgery. During the first meeting, the orthopaedic surgeon checks the prosthesis and the knee's function according to a standard check list. Often patients have questions related to sports or they ask about when they will be able to work again. Some orthopaedic surgeons provide patients with a walking aid for the first phase of recovery.

OS 1: "Then our role is more in checking the prosthesis and the guidance and no longer the patient and his environment."

After this first meeting, the patient and orthopaedic surgeon typically meet 3 months after surgery and 1 year after surgery.

When the patient asks for more contact, when they experience troubles in their rehabilitation process or when the employer wants them to work again before the client says he is able, they meet both the occupational physician and the orthopaedic surgeon more often.

The speed of recovery differs per patient. For the occupational physician, the rehabilitation period end when the patient has fully returned to work. For the orthopaedic surgeon, the rehabilitation pariod ends when he has fully recovered his function without left-over pain.

Both the orthopaedic surgeon and the occupational physician recognize that the prosthesis first needs to be completely healed before the client can start working again. Therefore, depending on the patient's recovery and the physical nature of his work, the patient can typically start working between 8 weeks and 4 months to a year after surgery.

In the first phase of recovery physiotherapy takes up a lot of time and energy, so this should be considered. Recovery is done in steps, towards more demanding activities for longer periods of time and with higher speed or frequency. According to the orthopaedic surgeon, pain and function decide when a patient can do more or should be held back. When the patient cannot go back to his own work, replacement work should be found together with the UWV, which can take up to 2 years.

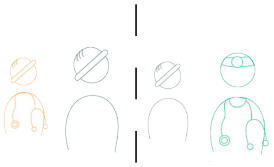
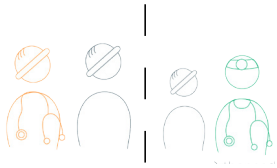
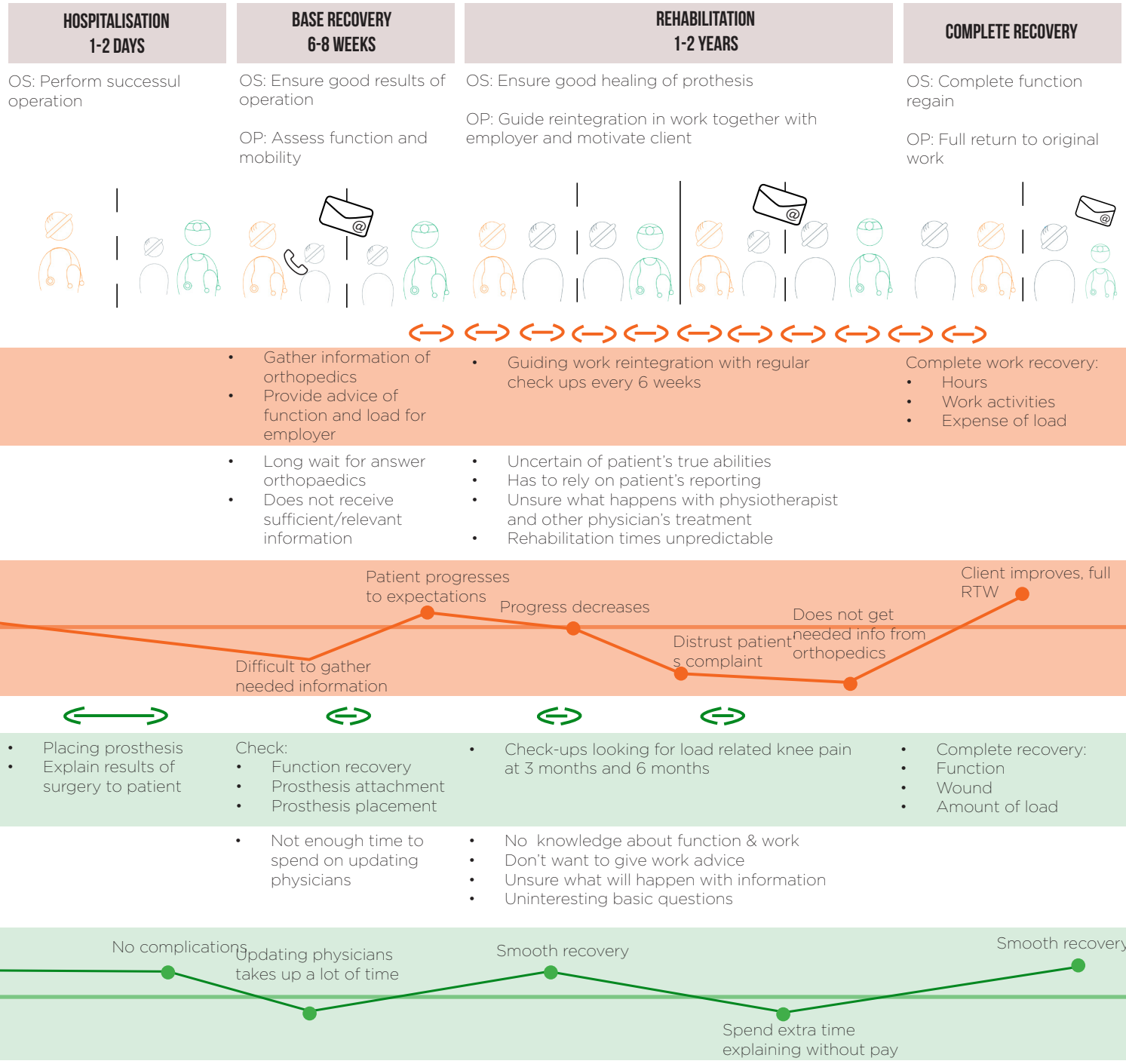
STAGES	FIRST CARE CONTACT	DIAGNOSIS	CONSERVATIVE TREATMENT	PRE-SURGERY GUIDANCE >2 MONTHS
Goals	OS: Get scope of symptoms and patient's problems	OS: Establish treatment plan OP: Understand scope and establish plan	OS: Manage pain for as long as possible OP: Manage expectations & find new work	OS: Manage expectations OP: Readjust expectations of client and employer & find replacing work
Interaction				
OCCUPATIONAL PHYSICIAN				
Involvement				
Doing		• Check function • List work activities • Establish reintegration plan	• Expectation management client & employer	• Expectation management client & employer • Find replacing work
Problems		• Limited knowledge of injury and next steps in treatment	• Unsure of what a patient will be able to do after surgery and how fast	• Hard to motivate patients to keep working until surgery • Hard to find other work
Feeling		Meeting client before surgery Have to find other work Employer helps find new work activities		
ORTHOPEDICS				
Involvement				
Doing		• Lay out options • Anamnesis • Joint-decision-making	• Administer conservative pain killers • Monitoring joint wear.	• Expectation management for after surgery • Explain surgery
Problems		• Very little time to convey all information • Not all patients understand options	• Patients have hard time deciding treatments • Don't want to go into surgery too young	• Expectation management depends on level activity • Hard to know patient's character
Feeling		A lot of options, also long term Conservative treatment seems to work Treatment no longer works Expect problems to be over after surgery		

Figure 9 Care journey of occupational physician & orthopaedic surgeon



Stakeholders involved in the process

An overview of all stakeholders involved in the integrated care can be seen in the stakeholder maps in figure 10, from the point of view of the occupational physician, and 11, from the point of view of the orthopaedic surgeon.

However, many of these stakeholders only play smaller roles in the integrated care process surrounding the occupational physician and the orthopaedic surgeon or are only involved in some cases. The most important two stakeholders, as mentioned in the interviews are the physiotherapist and the employer. The employer works with the occupational physician to find suitable work for the client after surgery, or even before surgery if needed and needs to help facilitate reintegration. Also, the employer can put pressure on the patient's recovery, which puts the client in a difficult position. Therefore, managing the employer's expectations and facilitating good contact

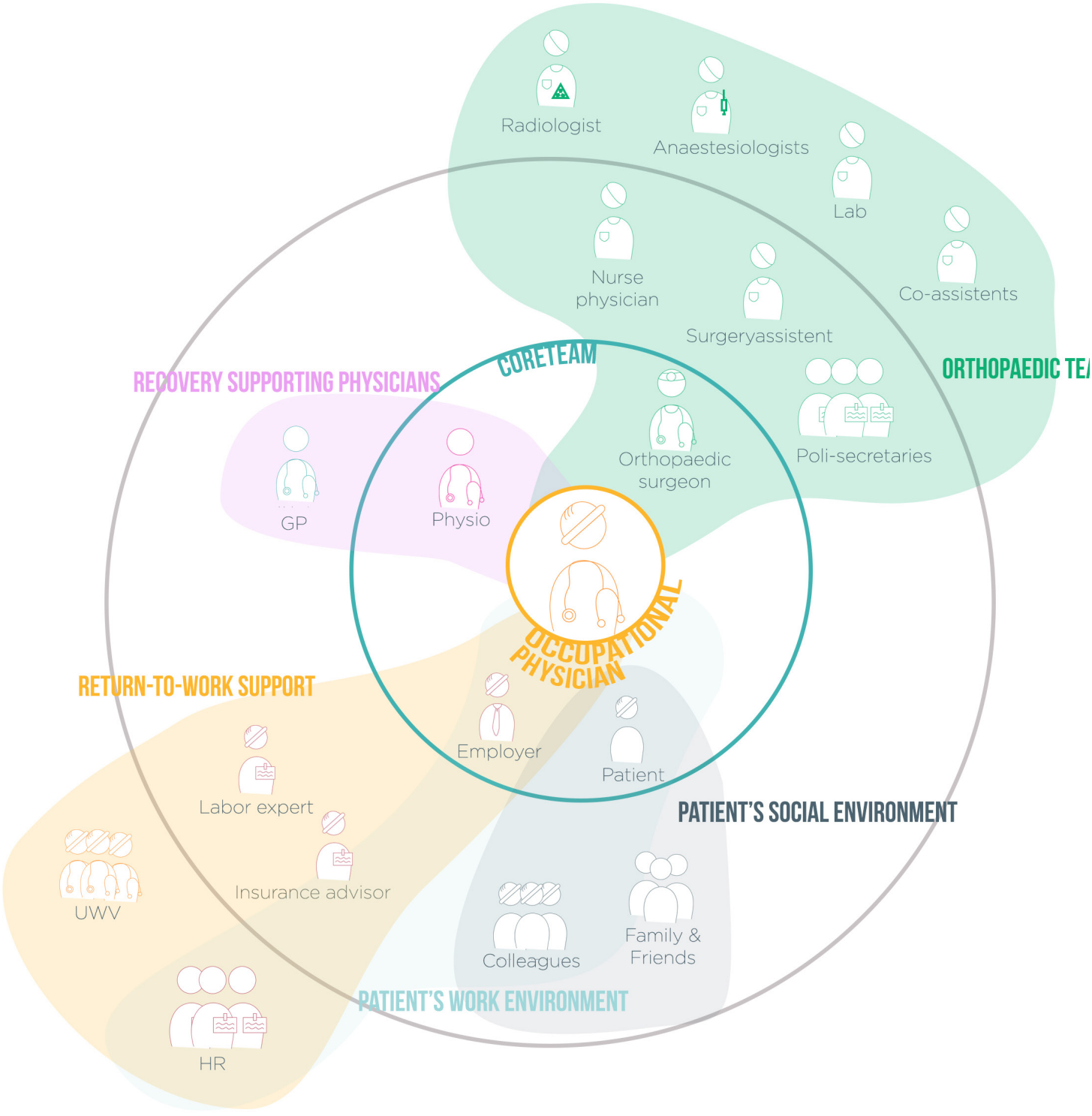


Figure 10 Stakeholders in the process of the occupational physician

between employer and client are important parts of the occupational physician's role in the process.

The physiotherapist sees the patient most often and therefore is most up-to-date with the state of his recovery and gets to know the patient's character best. Therefore, both the orthopaedic surgeon and the occupational physician are in regular contact with the physiotherapist.

OP 4: "I would first contact the physiotherapist, because he of course sees the client very often and he also sees how the exercises are performed."

OP 5: "Depending whether someone can find a way to work it out with his employer, I leave more space to build slowly, or I say; 'Well, it might be wise to keep a better eye on it.'"

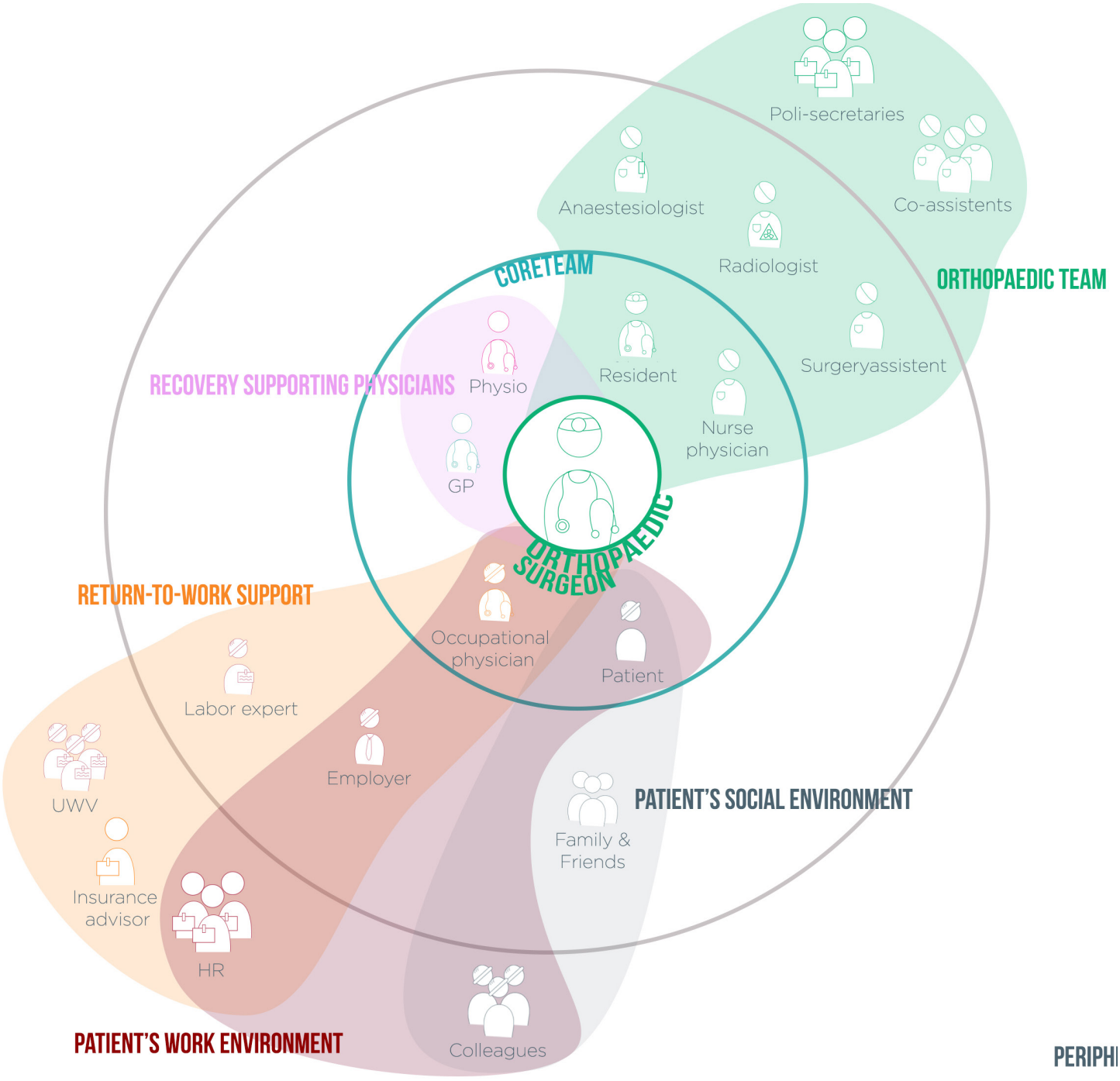


Figure 11 Stakeholders in the care of the patient

INFORMATION PROVISION OF THE OP AND OS TO THE TKP PATIENT

Before the surgery mostly the orthopaedic surgeon provides the patient with information concerning the pain and function of the patient after surgery and the effect of these factors on their daily activities, including work.

Some orthopaedic surgeons make use of standard material so all patients are informed the same way, while others adjust their information based on for example the nature of the patient's work.

OS 2: "We have a network, that has physiotherapists and orthopaedic surgeons and we all use the same website. That website is used to discuss things, it has movies as well, those can be used to make sure everyone knows what to expect."

The patient is encouraged to share the provided information with both the occupational physician and their employer.

Also, when the occupational physician thinks that the client has not been sufficiently informed by the orthopaedic surgeon, they provide them with extra information on the general process.

The orthopaedic surgeon only discusses work with patients when they bring it up or when they have physically demanding jobs, but it is not a standard part of their meetings.

OS 3: "We do the questionnaire using the PROMs but those don't include work-related questions."

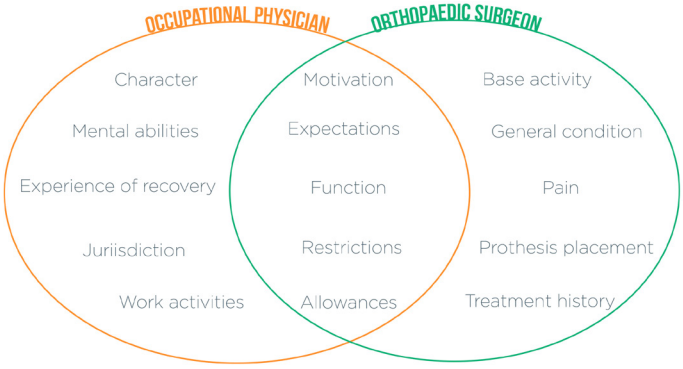


Figure 12: Focus areas occupational physician and orthopaedic surgeon in the care process and information provision towards the patient.

The orthopaedic surgeon feels he lacks knowledge he needs to base his advice on regarding the patient's abilities post-surgery, thus they base it mostly on their experiences. The occupational physician bases his advice mostly on the information provided by others, his medical training and estimations based on the patients' abilities outside of work.

OS 1: "They are our advises, but whether they are really true we don't know either. There is no evidence for them, no research. But just like that there are a lot of questions we don't know the answers to from a scientific point of view."

The orthopaedic surgeon usually does know what work a patient does and how return to work is coming along. After the first phase of recovery, the orthopaedic surgeon typically expects patients to be able to return to work without problems. When the orthopaedic surgeon researches work, the patient receives additional information and more attention is paid to the subject. The occupational physician prefers when the orthopaedic surgeon does not talk about work with clients. Receiving advice from different sources can be confusing and the advice of the orthopaedic surgeon is often valued over the advice of the occupational physician. Furthermore, in the Netherlands the orthopaedic surgeon is not allowed to provide work-related advice, therefore the occupational physician feels that often the orthopaedic surgeon denies having provided work advice or claims the client must have misinterpreted.

OP 6: "I would prefer they do not utter real work-related statements, because that is also difficult for the patient, when they integrate and the surgeon says; 'You shouldn't.' Then they don't know what to do."

The focus of the information provision by the two physicians in the patient's care is shown in figure 12.

THE INFLUENCE OF WORK ON THE ORTHOPAEDIC SURGEON'S TREATMENT

Normally, making decisions for the patient's treatment is done by the orthopaedic surgeon together with the patient. The patient has to be ready for the prosthesis both mentally and physically. Thus, the orthopaedic surgeon and patient meet several times to discuss the treatment and options before the decision is made to place the prosthesis. The orthopaedic surgeon aims to make sure working patients understand the possible effects of the prosthesis on their work abilities.

OS 4: "I always have a kind of social conversation and also part of that is; 'What work do you do?' and than I try to get more feeling for it; 'Because that work requires walking, sitting and driving?' "

OS 5: "When I want that information, I would prefer having it in the earliest possible stage, when I make my treatment decisions."

The orthopaedic surgeon prefers to wait as long as possible with placing the prosthesis, when a patient is working, preferably until retirement. The orthopaedic surgeon would feel like he takes away the patient's livelihood by placing a prosthesis before this is necessary. Especially when the patient has physically demanding work which could be hard to perform with a prosthesis.

At what moment the conservative treatments are no longer sufficient depends on the patient's experience of his pain and hindrance in daily activities, such as work. Working patients are encouraged to discuss the timing of their surgery with their employers.

However, some patients do not want conservative treatment as they do not trust the treatments, have a general dislike of medicine or have heard negative stories of friends and family.

OS 3: ".. no trust in it, some kind of revulsion towards taking medicine, those are the most important, I think. Or others tell them it does not work."

The treatment itself cannot differ between working and non-working patients, except for working patients receiving a half-prosthesis more often than non-working patients.

OS 5: "We don't have special protheses. A normal one can bend up to 120 degrees, we don't have a prosthesis that can bend up to 160 degrees."

FACTORS INFLUENCING THE PATIENT'S RECOVERY

Both the occupational physician and orthopaedic surgeon recognise that the speed of recovery is highly dependent on the patient's character, motivation, expectations, their physical state, the support at work, the demanding nature of their work and outside factors.

When a patient is afraid of movement after surgery, they can be too careful in training their function. Clients with more than average fear-of-movement need to be guided more according to the orthopaedic surgeon by managing their expectations and extra motivation.

OS 4: "There are patients that naturally see more hurdles ahead than the average patient and make problems out of everything, they are more scared."

Some patients also blame work for their knee problems and therefore be less willing to return to work. They then say their knee is still painful or problematic when this does not fit reality.

Additionally, some patients do not actively ask for enough help in their recovery.

Some patients need to be motivated by the orthopaedic surgeon and occupational physician, but some need to be held back. This depends on their work and character. Therefore, the occupational physician changes the way he guides patients depending on their motivation and abilities. The occupational physician always tries to motivate a client to work, even when the client says they should not yet. The occupational physician reminds his clients of their legal obligations towards their employer, when he feels clients are unwilling to work.

The occupational physician recognises that despite high motivation, some clients still have trouble returning to work. When clients are naturally extremely motivated to return to work

OP 2: "It depends a little on the kind of work someone does, what it is about. Some people can very easily estimate; I can do a little more. Some really need to be guided; now you need to do a little less."

and not afraid of the pain, both the orthopaedic surgeon and occupational physician see patients working through their pain, which does not benefit their recovery.

Both the occupational physician and orthopaedic surgeon recognize, that proper expectations speed up recovery by influencing the patient's motivation and can even make the client assume a less expectant attitude towards recovery.

OP 6: "Patients' expectations are at least a third of the total"..."Their expectations, how they see themselves, it says a lot about people."

Most expectation management is done before surgery, the orthopaedic surgeon usually only does additional management, when the guidance before surgery was insufficient. Most patients recover as expected, but the expectations of the patients differ depending on how active they were before surgery and in their general lifestyle.

OS 1: "For someone of 50 a prosthesis can be insufficient, as they have more active lifes and therefore different expectations of such a knee prosthesis."

As it plays a big role, both the orthopaedic surgeon and occupational physician think of expectation management as central to their guidance. However, the orthopaedic surgeon believes that many patients do not know what to expect surrounding work after surgery.

OP 2: "For a lot of patients things remain unclear, they are so overwhelmed with the operation,that they do not know what they can expect and how fast they can work again."

When patients have multiple issues or when they are not very fit, their physical state before surgery can be limiting to recovery. Therefore, training both before and after surgery can be a big benefit to recovery. When a patient however experienced a lot of pain before their surgery, the decreased post-surgery pain gives a patient a huge boost to increase recovery speed.

OS 6: "When the arthritis was really bad and they had a lot of pain before the surgery and only a little pain afterwards, those people are more easily satisfied."

Furthermore, the recovery is influenced by factors at the workplace. Some employers offer insufficient support or push the patients over their limits. Also, the client's work in general can be too demanding. Not all employers can offer shorter working days, which makes building up activities in time very hard. Plus, in some workplaces, no other work can be offered which is less demanding and therefore more suitable to the patient's temporary limited function. Having suitably work can increase the speed of recovery as only training is often not sufficient to fully recover a patient's function. It also changes the patient's experience of his recovery for the better.

OP 7: "Work makes the wait less long, not really of course, in practice. But it makes it seem less long as it distracts clients."

The nature of the client's work is a big factor in recovery as well. First, because with patients with demanding work, knee problems are more influential on their work abilities which causes them to decide to undergo prosthesis surgery sooner. Furthermore, after surgery, a patient needs to be recovered more before they can return to work when their work is more physically demanding. A lot of patients do find ways to work by loading their knee in a different way when work would normally be very difficult. Some patients can however not return to work at all after surgery, as a prosthesis is not always a sufficient replacement for a real knee, when the work is too demanding. They would have to be schooled for other work, which lengthens the recovery process, but this as well is not always possible. Because of these factors the occupational physician adjusts his guidance to the nature of a client's work and the orthopaedic surgeon feels not enough attention is paid to the effect of a prosthesis on the patient's ability to work.

OP 8: "Often they haven't been schooled sufficiently to do that. In that case, they need to be re-schooled, but they often cannot match the needed level."

Patient's with less demanding work can often return very fast and easily, sometimes with small adjustments to the workplace. Physically non-demanding work typically does not influence the recovery, in these cases the occupational physician feels that work does not need to be discussed with the orthopaedic surgeon. The orthopaedic surgeon would therefore recommend a prosthesis for people with more static work, as the absence of pain helps them focus on their work. People with desk jobs however do experience more mental difficulties and therefore need to be guided by the occupational physician in this.

OS: 3 "People who work behind a desk and have already reached their sixties, I would tell; 'You should definitely do it.' Because in that case they have less pain afterwards, they are more productive and need to take a lot less sick-leave."

The process can also limit rehabilitation when the occupational physician is involved too late or the physicians do not collaborate sufficiently. The occupational physician believes that the quality of the surgery can largely differ and therefore be limiting to recovery if this quality is insufficient. Treating the patient both physically and mentally can support their recovery better according to the occupational physician.

OS 4: "The way the doctors talk to each other should be streamlined, because they actually do not talk to each other enough as they do to us, this hinders the patient's treatment."

Outside factors can play a big role as well. The patient can for example be insufficiently insured and therefore not receive enough physiotherapy. Some patients have families that demotivate them or do not have sufficient social support to help their recovery.

OP 8: "What I do know is that madame is always accompanied by her daughter in law who says;'But that is really impossible.' Yes, if you keep saying that, in the end you will believe it."

THE CURRENT COLLABORATION BETWEEN THE ORTHOPAEDIC SURGEON AND OCCUPATIONAL PHYSICIAN

Typically, the occupational physician and orthopaedic surgeon are in contact when the client experiences trouble in rehabilitation, or when the occupational physician has left-over questions about the orthopaedic surgeon's treatment. Sometimes, the occupational physician and orthopaedic surgeon also want to discuss the treatment plan together or to build a protocol or understand the standard process. When rehabilitation progresses normally both the occupational physician and orthopaedic surgeon feel that the occupational physician should not need assistance of the orthopaedic surgeon in their guidance.

Most of the time, the occupational physician needs to take initiative in making contact, for the orthopaedic surgeon this contact is not part of the standard process and he has not enough paid time per client to spend on contacting the occupational physician for every client.

Furthermore, the orthopaedic surgeon does not see added benefit in contact with the occupational physician for his own practice. The orthopaedic surgeon only initiates contact, when they suspect the treatment of the occupational physician is insufficient or when the patient asks them to. The occupational physician rarely contacts the orthopaedic surgeon before surgery or shortly after, as the orthopaedic surgeon does not have new information yet at these points.

Most contact is indirect over email or in letters. This is far from optimal according to the occupational physician because of it being too slow and a lot of misunderstandings, making information useless.

OP 9: "...I had to wait for a very long time for information and I thought; 'This information is not relevant at all anymore'."

OP 3: "What is a prognosis to me, is not necessarily a prognosis for a specialist; 'What is the prognosis?' 'The prognosis is good.' Yes, I understand he will not die.."

Some orthopaedic surgeons however, are also regularly contacted over the phone or in person. Often, also the patient is the carrier of information, which for most occupational physician and orthopaedic surgeon is sufficient. However, the orthopaedic surgeon believes the patient should preferably not be the carrier of information. Some patients provide wrongful information because of misunderstanding or being unmotivated to return to work. When they feel the reason for hindered rehabilitation is unclear or he does not trust the information of the patient surrounding his pain experience, the occupational physician and orthopaedic surgeon also contact each other.

OS 5: "But not every patient is of course as honest and sometimes there are secondary motivations behind remaining on sick-leave for longer. Than more information from the occupational physician could help."

The occupational physician typically asks the orthopaedic surgeon about; the diagnosis, prognosis, results of surgery, points of attention, the decided rehabilitation treatment and future meetings with the patient. With this the orthopaedic surgeon would provide the occupational physician with information about the patient's abilities and allowed movements.

OP 6: "What I want to know is; what he did and what movements are allowed and than I translate that into what he can do and whether he can do his job or not."

For the occupational physician the information he needs from the orthopaedic surgeon depends on the patient's work. Part of the questions the occupational physician asks the orthopaedic surgeon are also directly work-related to help them decide what advice to give the client. However, the orthopaedic surgeon does not want to answer these questions as this is not their specialty.

The answer the occupational physician receives depends largely on the orthopaedic surgeon and the questions asked by the occupational physician. Some orthopaedic surgeons prefer to

send a standard letter made for the GP, unless specific questions are asked. The occupational physician recognises that sometimes they ask the same questions twice for the sake of their client's file, but this annoys the orthopaedic surgeon, who sometimes therefore does not answer the questions anymore.

OP 9: "It really depends on the specialist, if you have a very annoying specialist... Than you just get copies of the GP's letter and you have to filter the information you need out of it by yourself."

OS 3: "But when the occupational physician asks a specific questions, he gets a specific answer. When he just asks; 'What did you do?', than he gets a copy of the GP's letter."

The occupational physician rarely updates the orthopaedic surgeon surrounding the patient's rehabilitation at work, as he feels the orthopaedic surgeon is not interested. The orthopaedic surgeon however says, they would like to receive feedback. The occupational physician could provide more insight in the patient's character and help manage expectations if needed. Also feedback from the occupational physician could help in signalling problems early on and be used to improve the treatment plan, especially when the patient experiences pain at work depending on the load.

OS 4: "...and when people are back to work again with a prosthesis and very clearly still have load-dependent knee pain over a year after the operation. than you would advise them to initiate contact earlier."

OP: "I never send any feedback, as the orthopaedic surgeon is jut not interested."

The current communication and information exchange during the pre-surgery and rehabilitation phase are shown in figure 13 and figure 14.

Figure 13 Communication overview of pre-surgery phase

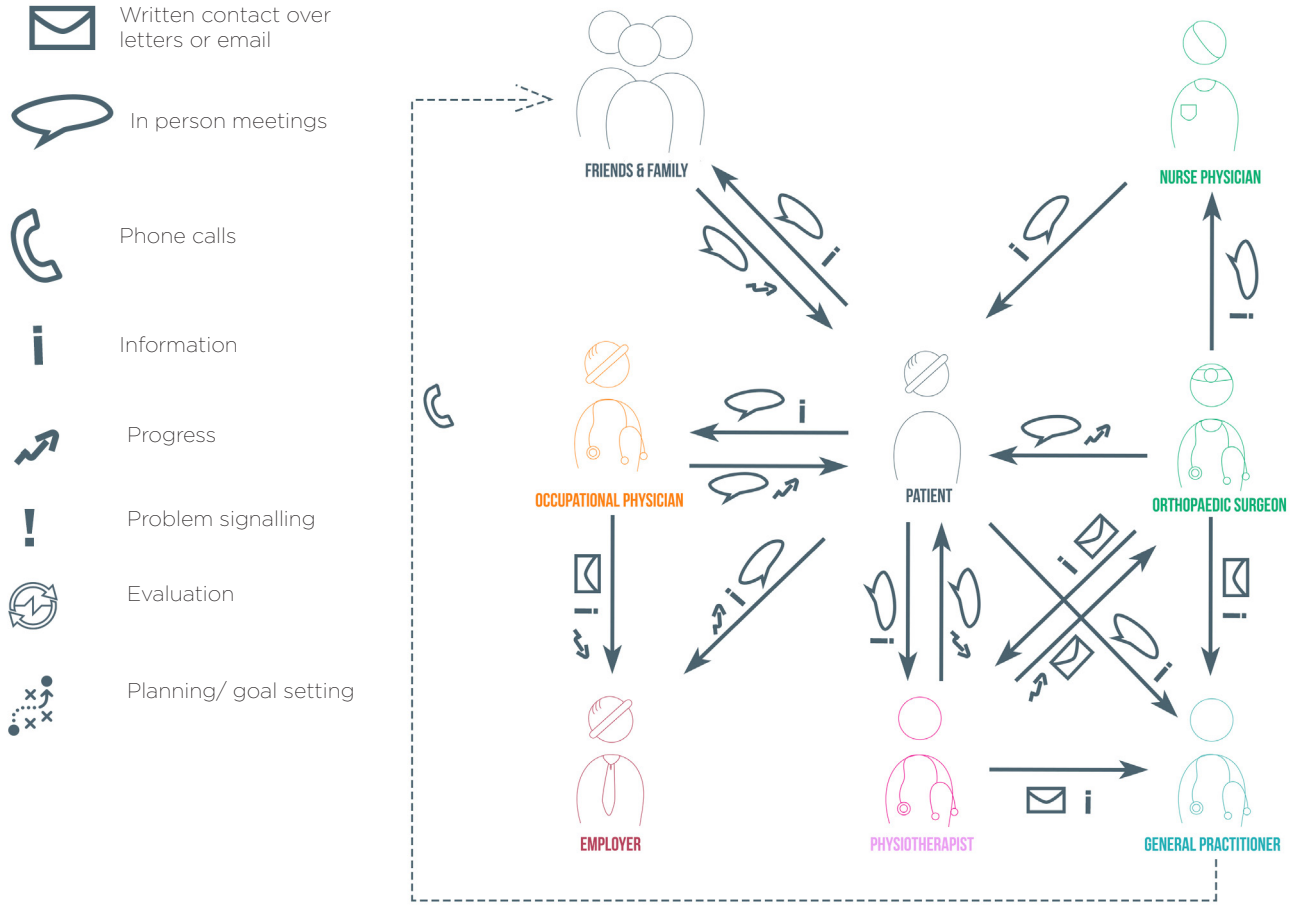
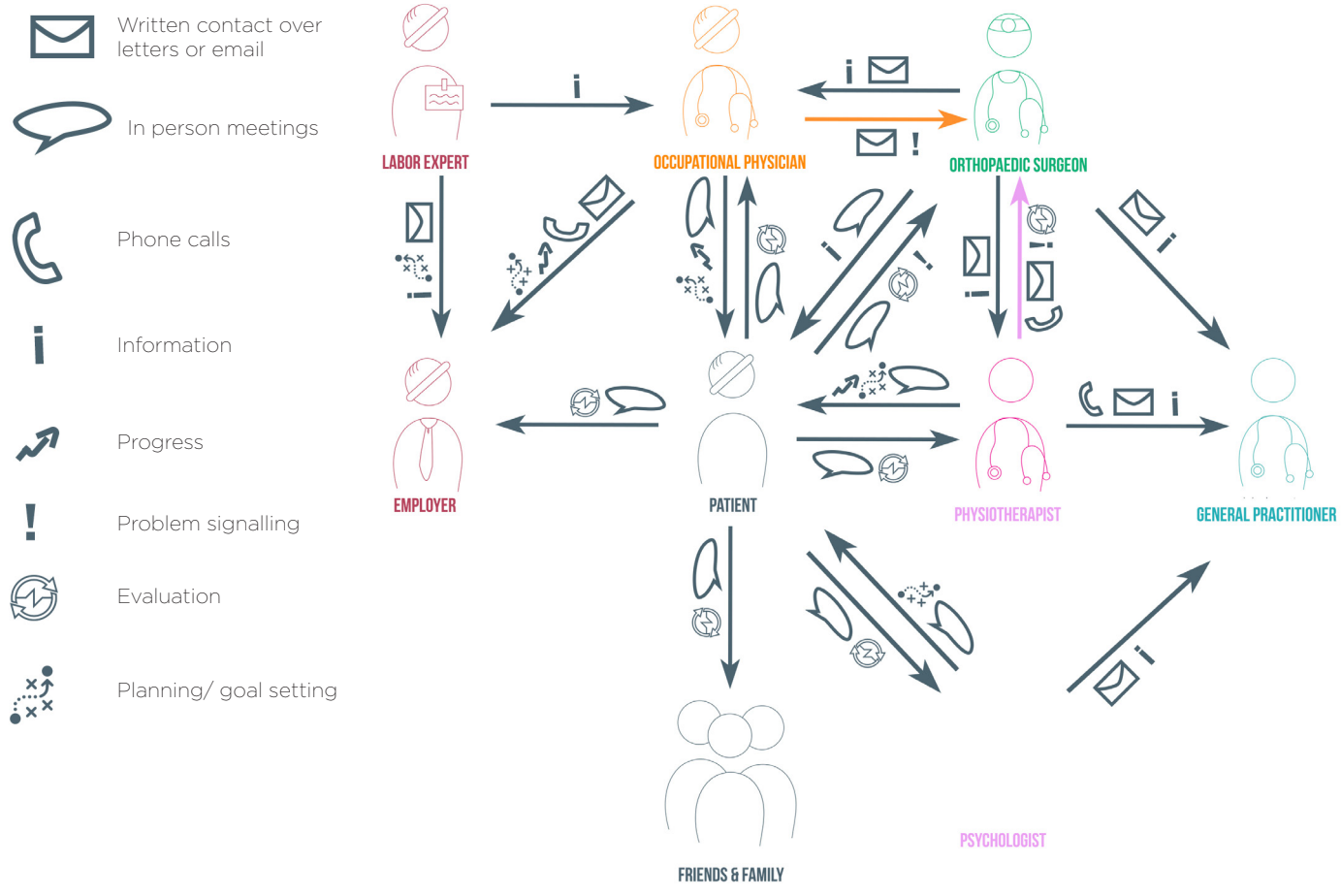


Figure 14 Communication overview of rehabilitation phase



2.3 DISCUSSION

Based on the results of this study, the biggest positive influencers on the patient's care can be identified as:

- High motivation to fast recovery, this leads to patients training well. In the study of Franche & Krause (2003), this factor is described as self-efficacy. The occupational physician thus always tries to motivate a client to work, even when the client says they should not yet.
- Fitting expectations speed up recovery by increasing the patient's motivation and make them assume a less expectant attitude towards recovery, the expectations of the patients differ depending on how active they were before surgery and in their general lifestyle.
- When a patient however experienced a lot of pain before their surgery, the decreased post-surgery pain gives a patient a huge boost to increase recovery speed.
- Being able to work in a way that suits the patient's abilities after surgery, changes the patient's experience of his recovery for the better and having suitably work can increase the speed of recovery as only training is often not sufficient to fully recover a patient's function, this factor is also recognized in the study of Krause et al. (2001).
- Treating the patient both physically and mentally can support their recovery.

Based on the results of this study, the biggest negative influencers on the patient's care can be identified as:

- Fear-of-movement after surgery can lead patients to being too careful in training their function, this factor was also found in the study by Doorn, Maan & Schuijer (2016).
- Some patients also blame work for their knee problems and therefore be less willing to return to work, as is also found in the study by Kuijer et al. (2016).
- Some patients do not actively ask for enough help during rehabilitation.
- When clients are naturally extremely motivated to return to work and not afraid of the pain, they tend to overload their knee.
- Many patients do not know what to expect surrounding work after surgery.
- When patients have multiple issues or when they are not very fit, their physical state before surgery can be limiting to recovery, this factor is also recognized in the study of Franche & Krause (2003).
- Insufficient support at the workplace, not all employers can offer shorter working days, which makes building up activities in time very hard, which is in line with the outcomes of the study of Krause et al. (2001).
- Employers pushing the patients over to work before they are able or allowed.
- Patients with physically demanding work need to be recovered more before they can return to work or cannot return to work at all after surgery, as a prosthesis is not always a sufficient replacement for a real knee, this factor is also recognized in the study by Groot et al. (2016). They found that the odds for full RTW within 11 weeks were 5.4 times greater for patients with less knee-demanding work than for patients with more knee-demanding work.
- For some patients, the occupational physician is involved too late, which makes finding other work and properly managing expectations more difficult
- When the physicians do not collaborate sufficiently, they can contradict each other which confuses the patient or their treatments can be a bad fit for the patient, due to factors unknown to them, but known to the other physicians. This was also one of the main results of the study by Hofstede et al. (2016). Especially with the occupational physician in the study by Doorn, Maan & Schuijer (2016), it was found this could be due to the occupational physician's poor visibility for both the treating physicians and the patient and work-cnetred care nog being compensated.
- When the patient is insufficiently insured, they do not receive enough physiotherapy.
- Some patients' have families that demotivate them or do not have sufficient social support to help their recovery, a factor also found in the study of Hofstede et al. (2016).
- When complications occurred during the surgery, this can be limiting to recovery.

IMPLICATIONS FOR DESIGN

Based on the information exchange in the meetings with the occupational physician and

the patient and the orthopaedic surgeon and the patient, the two most interesting phases in their relative processes are the rehabilitation phase and pre-surgery phase. During these phases the physicians both influence the patient's experiences and motivation with the information they provide and need each other's input to ensure fitting care. A more detailed overview of these phases, can be seen in figure 16, for the pre-surgery phase, and figure 15, for the rehabilitation phase.

In these two stages the processes of the occupational physician and orthopaedic surgeon can compliment each other, with the information they can offer each other; the treatment plan, prognosis, diagnosis and the patient's allowances and abilities concerning loading from the orthopaedic surgeon and the patient's function profile at work and possible complications experienced at work related to loading of the knee from the occupational physician. However, due to the current indirect, slow communication, the patient is often used as information carrier. The patient in this is not impartial and the information is not objectively communicated, leading to miscommunication and missing information. This factor has also been recognised in the study of Doorn, Maan & Schuijer (2016) .

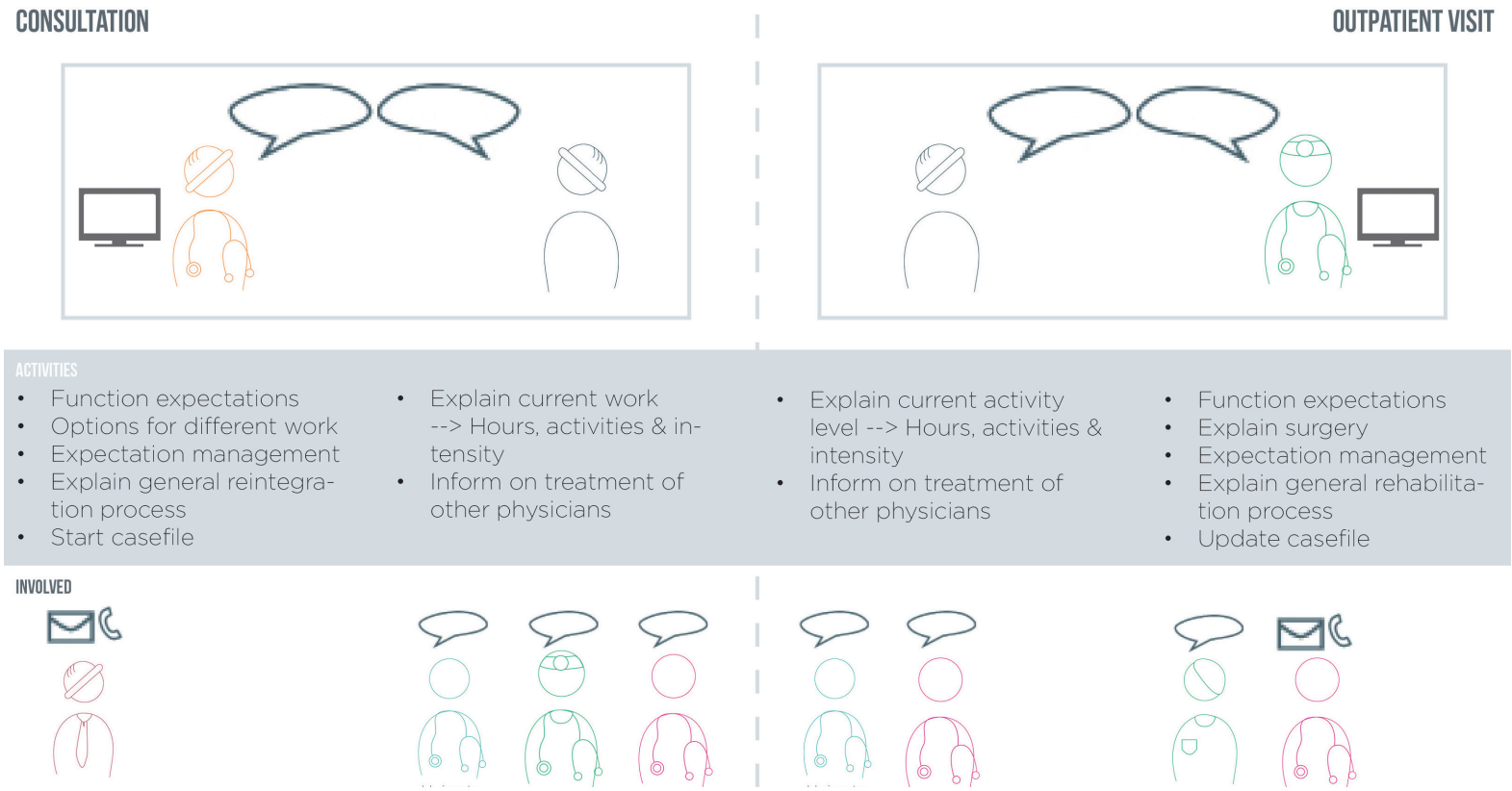
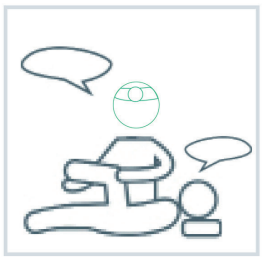


Figure 15 Context of pre-surgery phase

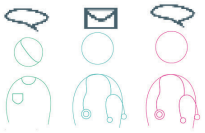
PROTHESIS CHECK



ACTIVITIES

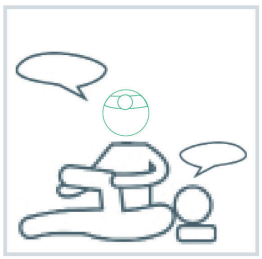
- Check setting prothesis
- Check healing knee tissue
- Advise on allowed activities
- Update pain experience
- Update function recovery

INVOLVED



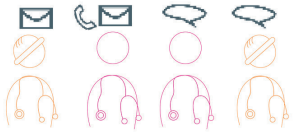
EMOTIONS

LOAD CHECK

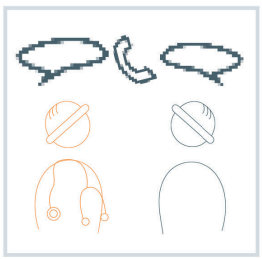


ACTIVITIES

- Check function recovery
- Motivate
- Advice on allowance & abilities
- Update experience load-related pain
- Update activity level



INDICATION



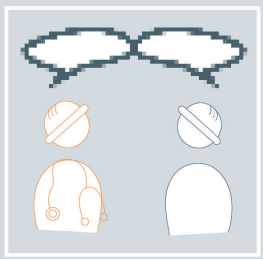
ACTIVITIES

- Share integration plan
- Inform about operation & treatment plan
- Inform on base recovery

INVOLVED

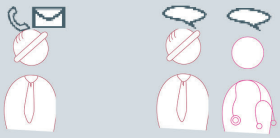
EMOTIONS

WORK START

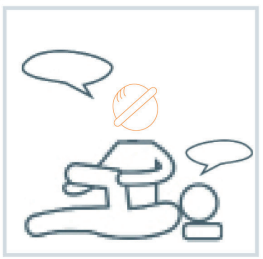


ACTIVITIES

- Guide to suitable work
- Inform employer
- Start work
- Function update

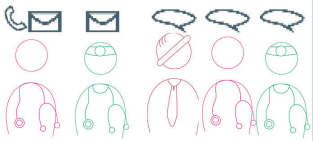


EVALUATION

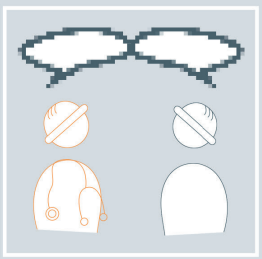


ACTIVITIES

- Motivate
- Physical check if needed
- Get info other physicians
- Workload experience
- Advice physicians
- Update function
- Pain experience



ADJUST REINTEGRATION PLAN



ACTIVITIES

- Define adjustments
- Communicate to employer
- Motivate
- Update workload experience

Figure 16 Context of rehabilitation phase

Also, the different areas of expertise of the occupational physician and orthopaedic surgeon lead to them using a different vocabulary and having different interests and goals concerning the information they provide and need. This leads to the orthopaedic surgeon not considering their current communication as useful for his practice and the occupational physician often receiving information that they cannot use for their intended purposes.

The occupational physicians and orthopaedic surgeons would like to feel more involved in each other's processes and take on the patient's care as a patient-centred team together with the other physicians treating the patient, in which every participant has his own area of expertise. By getting to know each other better and understanding each other's needs, their collaboration would become easier and more enjoyable. This desire for a common way of working in a patient-centric integrated care model, has been recognised before and lead to the development of a multi-disciplinary stepped care strategy (Smink et al., 2011). However, this strategy is mostly based on the different areas of expertise that can be used in different phases in the patient's care, not on the collaboration and communication of the participants in order to improve each other's care.

LIMITATIONS

As this study uses a qualitative approach, it is limited in its ability to generalize to the overall practice, since it can only be generalised to theory (Lincoln, Guba, 1985). However, the occupational physicians and orthopaedic surgeons interviewed are working across the country in numerous different hospitals and occupational health services, thus ensuring more generalizable results that can be used for rich and varied theorisation (Polit, Beck, 2010). these results contribute to our understanding of possibilities for improvement of work-directed care in orthopaedics.

Part of the group of orthopaedic surgeons were contacted using an existing list of contacts of one of the authors. Therefore, these were already more familiar with the topic of guidance in work-directed care. This causes the results surrounding the influence of work on the decision-making process to probably be more prominent than they would be in overall population. The occupational physicians were selected because of their interest in the guidance of TKP patients, which they probably see more often than the average occupational physician. It can be argued that this leads to more practised and thereby optimised guidance. In this study however, their experience ensures a clearer image of the care for TKP patients in practice.

2.4 CONCLUSION

In what way is the occupational physician involved in the current care process for TKP patients of working age?

The occupational physician contacts the orthopaedic surgeon when problems occur or when some factors in the rehabilitation or treatment of the orthopaedic surgeon are unclear. Most contact is indirect over the email or in letters, but contact over the phone does happen when needed. In other cases, the patient is the carrier of information and the occupational physician needs to base his treatment on the patient's experiences and statements. The orthopaedic surgeon contacts the occupational physician when he does not trust the treatment or when he is asked to do so by the patient. The occupational physician and orthopaedic surgeon both have a role in the patient's expectation management and to support and guide the patient's rehabilitation Despite the limited contact, the importance of the work integration is recognised by the orthopaedic surgeon as work helps patients experience their rehabilitation more positive.

How do the occupational physician and orthopaedic surgeon experience their collaboration in the care for working TKP patients?

The current exchange of information is experienced as far from optimal and frustrating according to the occupational physician because of it being too slow and a lot of misunderstandings, making information useless. He is unsure what kind of answer his questions will receive and whether his questions will be answered. Finally, the occupational physician believes the orthopaedic surgeon to be uninterested in his progress, but the orthopaedic surgeon, however, would like to receive feedback.

The orthopaedic surgeon experiences the current interaction as mostly inefficient and time-consuming, as the orthopaedic surgeon does not see added benefit in contact with the occupational physician for his own practice. Sometimes the questions, asked by the occupational physician, are seen as annoying. Also, the orthopaedic surgeon views the current information exchange as circuitous, as the patient should according to them not be the carrier of information, due to providing wrongful or incomplete information.

How could the current collaboration between the occupational physician and orthopaedic surgeon be improved?

The cooperation should be as time-efficient as possible, with the occupational physician included in the standard process and direct contact over the phone as this would facilitate discussion. Being more familiar to each other would make the collaboration easier and more pleasant according to both the occupational physician and orthopaedic surgeon. Also, the physicians want to feel more involved by being included in a patient-centric team. This way the physicians would be able to discuss amongst each other, based on their shared interests and overlapping fields of expertise.

Opportunities

- The orthopaedic surgeon and occupational physician should be provided with common goals that fit with both their fields of interest.
- The occupational physician and orthopaedic surgeon should have a more standardised way of communicating to ensure they speak the same language.
- All information exchanged between the orthopaedic surgeon and occupational physician should be directly usable in their own practice.
- The physicians should better understand each other's processes and be able to influence each other, to ensure they know how to support these processes
- The physicians should discuss amongst each other before advising the patient, to prevent contradictions.
- The interaction should be as time-efficient as possible,.
- The physicians should have a more personal interaction, making them feel more familiar to each other, as this increases their involvement.

CHAPTER 3: PATIENT EXPERIENCE OF WORK-DIRECTED CARE SURROUNDING TKP SURGERY

INTRODUCTION

Within the analysis phase, this second study focusses on the experiences and needs of patients in their work-directed guidance by the occupational physician and orthopaedic surgeon in different stages of the care process surrounding their TKP surgery.

This research was done by performing qualitative interviews with 10 patients. The research resulted in an addition of the patient experience to the journey map, a stakeholdermap and new insights, based on which opportunities and problems are formulated to improve the experience of TKP patients of the collaboration between the occupational physician and orthopaedic surgeon in their work-directed guidance.

3.1 RESEARCH SET-UP

INTRODUCTION

The goal of this research is:
"To explore the experiences of KP patients of working age with their interaction with the occupational physician and orthopaedic surgeon in order to improve the work-directed care process."

This research revolves around the following research questions:

- How do TKP patients experience the current work-directed care provided by the occupational physician and orthopaedic surgeon?
- How could the return-to-work guidance for TKP patients be improved in the current integrated care process?

METHOD

This study has been done by conducting personal interviews with TKP patients.

Participants

For this research, 10 patients have been selected that fit with the following criteria:

- The patients have undergone a knee replacement surgery.
- The surgery has taken place at least 3 months ago up to 18 months ago, as most patients, who return to work, return within this period of time (Kuijer et al., 2016)
- The patients are aged <67 or want to keep working.
- All patients do physically demanding work, as these are the patients who most often have trouble with return-to-work and as they have had less education can often less easily find other less physically demanding jobs. Also, according to the occupational physicians and orthopaedic surgeons interviewed in the former research, these patients often have most difficulty understanding and pass along the information provided by the specialists.
- At least 2/3 of the group should have fully returned to work, be it either their own or a replacement job, and 1/3 of the group should not have fully been returned to work. This distribution ensures an accurate representation of the of patients returning to work in practice (Singh & Lewallen, 2014).

The demographics of the participants for this study can be found in table 3.

Recruitment

The participants were contacted using the contact information of consent forms of previous studies on which participants indicated they would like to be part of new studies as well.

The participants have been invited to the session with an official letter sent over email. When they agreed to participate in the research, they were called to confirm whether they have read and understood the provide information and to explain the participation in the research. When they again agreed to participate a second email was sent with an explanation about the preparation before the interview.

Table 3: participant demographics

Age	40-50	2
	50-60	2
	60-67	6
Sex	Male	4
	Female	6
Level of physically demanding activities at work	Mostly lifting & other more demanding activities	4
	Mostly standing & walking	4
	Mostly seated	2
Occupational physician involved	Yes	6
	No	4
Time since knee prosthesis	3-6 months	0
	6 months- 1 year	3
	Over 1 year	7
RTW	Full	7
	Partially	3

Preparation
In order to prepare the participants for the interview, make sure they are in the right mind set, the participants were provided with a time line on which they filled out the main events in their care process, focused on leaving work and return-to-work. The participants are asked to use red and green dots to pinpoint specific moments in their time line related to work or the occupational physician that were especially positive or negative for them. These moments were used in the actual interview.

The interview
The interview took up 45 minutes. The interview started with the interviewer asking the participant to show the timeline they made and explain the moments, which they highlighted in their timeline as positive or negative in relation to return-to-work;

- What happened
- Who were involved
- How they experienced it
- How this facilitated or hindered their return-to-work.

The assignment was:
'Explain the situations regarding your return-to-work in which you, your occupational physician and/or orthopaedic surgeon were involved, which you experienced in a very positive or very negative way. Explain the situation itself, what happened beforehand and its results.'
After this explanation, the researcher asked the participant questions for clarification, focussing on:

- Facilitators and barriers in their return-to-work in relation to the guidance provided by the occupational physician and orthopaedic surgeon
- Positive and negative elements in the communication between the patient and the occupational physician and orthopaedic surgeon surrounding the patient's return to work.

Next the participant was asked to think of aspects of their work-directed guidance, that were very good or could be improved in order to have the ideal guidance for them in their specific case.

Analysis
The conversations and generated materials during the interviews have been recorded. During the interview, the facilitator will also note down interesting insights in short catchphrases which will serve as guidance during the analysis.

The conversations during the session were analysed using statement cards (Sanders & Stappers, 2013), to discover patterns or clusters.

The insights gathered in the analysis session have been combined with the insights from the interviews in the former research to complete the care journey.

MATERIALS

The invitation letter, containing information about the content of the session can be seen appendix H.

The package sent to the participants consisted of an invitation letter, appendix I, and a A3 timeline background, see appendix J. The package was sent to the participants a week before their interview date. These materials have been labelled for future reference with the number of the participant.

The participants provided their permission for recording the interviews, using the permission sheet in appendix K. The recordings were made using a phone operated voice recorder.

PILOT

The first interview served as pilot interview, to tune the method. The results of the analysis of the method during these pilot interviews can be found in appendix L. No major changes were needed, so the pilot interviews have also been analysed for the results of this study.

3.2 RESULTS

The following results are based on the statements in appendix M.

The results have been focussed on the experiences and needs of patients in their work-directed guidance by the occupational physician and orthopaedic surgeon in different phases of the care process surrounding their TKP surgery. Therefore, 6 main themes have been identified:

- Experience of the guidance by different stakeholders during rehabilitation
- Information provision
- Patient expectations
- Motivation
- RTW facilitators and barriers
- Satisfaction with the outcome of RTW

EXPERIENCE OF THE GUIDANCE BY DIFFERENT STAKEHOLDERS DURING REHABILITATION

In general the patients were very happy with the guidance they received during rehabilitation, especially when they felt they had a two-way connection with their care providers. Especially with the physiotherapist and the occupational physicians patients appreciated their personal approach and how committed and involved they were.

Pa 1: "Personal guidance is good. Every time they ask how you are doing and whether you had a reaction to a specific exercise."

Furthermore, honesty and clarity were very important factors in the patients' positive experience. They felt like they could trust on the physicians' expertise. Especially the orthopaedic surgeon had to be direct and explain everything in a very clear way.

Pa 2: "That it just makes you feel like you are heard and they also give... when you don't understand.. than; Can you also do it in Dutch?"

Pa 3: "The therapist, his knowledge and his guidance; questions and more questions, that was very good."

Also important was that the physicians were open for suggestions and were willing to try all available options to improve the patients' quality of life.

Pa 4: "He said; I don't expect it to work, but ok, I want to help you."

Patients were especially satisfied about their guidance when their physicians were people they already knew or had been in contact with for a longer time before deciding to undergo surgery

Pa 2: "I rehabilitated at the same place as in 2010, because it felt good there and I had good references with it'...'I just liked that."

However, some patients also had some less pleasant experiences, especially when physicians did not agree with each other or

gave the patients advises that contradicted with advise of other physicians.

Pa 4: "It was all very contradictory, like more movement, less movement, in the end, what was good?"

How much guidance patients felt they needed depended on whether or not they experienced complications, they felt they needed guidance in RTW, they experienced tension at work, they needed mental support and whether they had previous experiences with rehabilitation.

For most patients the physiotherapist was the most important source of guidance. As they helped keep the patient motivated and patients' felt the exercises really helped their recovery. Also as their guidance was typically very intense, it provided the patients with discipline, which they especially needed in the beginning of rehabilitation as they did not work and had no real routine anymore.

Pa 5: "I liked the discipline it provided, you got homework exercises and you had to do them, I need that."

Guidance by the orthopaedic surgeon

The orthopaedic surgeon was also important for the patients, as they felt he was the most knowledgeable on the subject of their surgery and the expected progress of their rehabilitation. However, even though most patients said the orthopaedic surgeon should therefore be especially clear, direct and professional, they also sometimes missed a personal connection with him because they tended to be less communicative than the other physicians.

Pa 3: "And the surgeon, he is probably a good guy, but I thought he was a very bad communicator."

Also the orthopaedic surgeon said to be always available for questions when problems occur, but when the patient had questions he often refused to answer them, did not take into account the patient's personal situation or character, or redirected them to the physiotherapist.

However, for other patients the orthopaedic surgeon really took the time to explain and answer all their questions.

Pa 2: "They just took the time for you, even if I was inside for an hour, it really did not matter."

Pa 6: "That was a pity of course, because I actually had a lot of questions but with everything I asked, he said; just discuss it with your physio."

Pa 4: "I would have preferred answers to my questions and I just did not get it, I wrote them down on paper and took them with me."

Some patients had a hard time interpreting the orthopaedic surgeon's answers.

Pa 7 : "Then I think; what should I do with an answer like that. I can explain that in a lot of different ways, right?"

After a month after surgery the orthopaedic surgeon usually played no more role in the rehabilitation process.

Guidance by the occupational physician

The opinions on the occupational physician were more mixed and not all patients were guided by an occupational physician in their RTW.

The patients who did receive guidance by the occupational physician tended to be happy with it as the occupational physician was usually not pushy to make the patient return before he was ready, but promoted gradual recovery.

Pa 3: "I think it was good, you usually want to go to work, you want to keep going, especially when work is busy."

Pa 5: "It is not like he pressured me, that is not the feeling I got, to go back to work."

Also the occupational physician typically already had experience with guiding patients in similar situations, which made the patients feel more secure in the rehabilitation process.

Pa 5: "He said; I have guided a lot of people who work as a carpenter who have had knee surgery, so it should not be a problem'…'For me that gave a sense of; Ok, in that case I am up for it."

Also the occupational physician typically let the patient decide when and at what moments he needed to be in touch, depending on problems he encountered or his personal progress.

However, some patients were less satisfied with the guidance of the occupational physician, to the point that they would rather direct their RTW by themselves.

Pa 2: "I never like them, that's why I think like; just leave it to me to find out for myself."

Pa 3: "I would never ask an occupational physician, what would you advise."

Patients who were less satisfied blamed this on the occupational physician not really listening to their problems or personal situation and not taking them seriously.

Pa 2: "Because those guys just don't take you seriously."

Pa 6: "They judge you, while they don't actually know you and it is all in paper'…'They don't know whether the work is there or whether you are able. I really dislike that."

Also, a patient who was in touch with the UWV described that the occupational physicians often disagreed and did not listen to the advise of her other physicians. Also they tried to push her back to work before she was recovered. Another patient had this same experience with his previous occupational physician, who tried to get him to work at a temporary desk job, even though he had never done this kind of work and his company had no need for someone doing desk jobs.

Pa 5: "Because office work, you can just do that. So then the UWV approved me, but the occupational physician only let me start with three times two hours per week just in my own work."

People who had not and never before been guided by the occupational physician were typically unsure of what the guidance of the occupational physician would have added to the process.

Finally a small role in the process was filled by the general practitioner, who most patients only met with before surgery. When patients did meet with him afterwards as well, the general practitioner typically provided them with mental support and asked about their personal experiences. Therefore, patients experienced this contact as very supportive. Before surgery however, the general practitioner could cause more confusion as he did not tend to agree with the advises of the orthopaedic surgeon or just agreed with anything the patient said instead of providing his own professional opinion.

The RTW was most often either discussed with the physiotherapist or directly with the employer. The occupational physician was only contacted when the patient experienced difficulties.

Pa 7: "One time I discussed with the physiotherapist like; When should I get back to work and what kind of work can I do?"

Together with the occupational physician patients also reflected on their RTW to make plans for the next steps and discussed what activities the patients mostly had to watch out for.

When the patient discussed work with both the orthopaedic surgeon and the occupational physician they sometimes offered different advises, which made the patient doubt which advise to follow up on or feel like the occupational physician did not know what he was talking about.

Pa 1: "In my experience the occupational physician always wants you to go back to work before the orthopaedic surgeon does. So than I would not see a point in them collaborating."

In figure 17, an overview of the stakeholders involved in the care process from the perspective of the patient is shown.

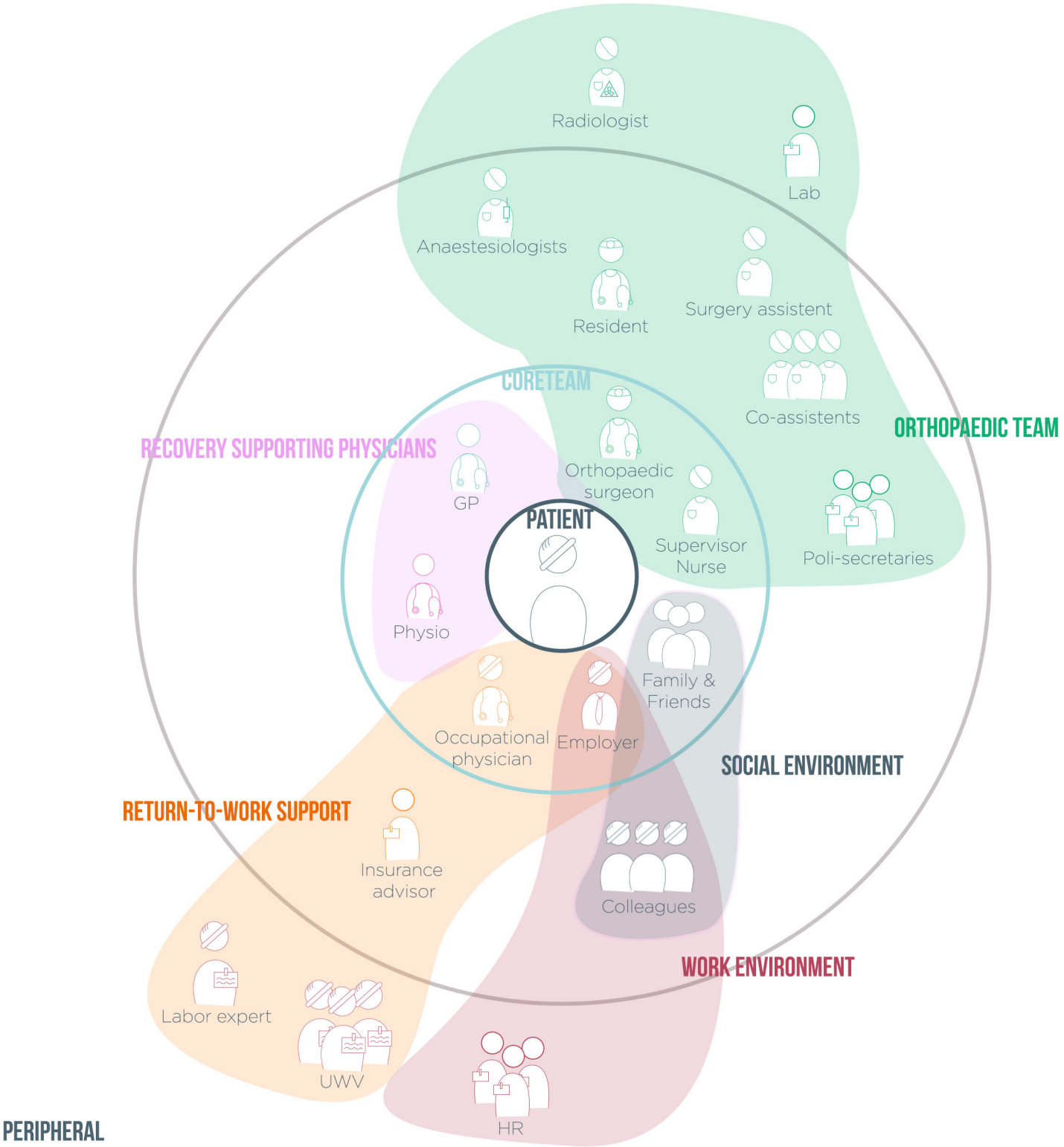


Figure 17: Stakeholders in the patient's TKP care journey, from the point of view of the patient

INFORMATION PROVISION

Most patients attended an information meeting at the hospital before surgery. This meeting was experienced as very nice and interesting, however it only focused on what to expect of the hospitalisation and the surgery itself, nothing was mentioned about the rehabilitation process.

Pa 1: "It was all fine, what you could expect, but it was all short-term, of the surgery and just after the surgery until you were let out of the hospital."

Because of the lack of information about the rehabilitation outside of the hospital, patients felt they were insufficiently prepared for the changes they needed to make and the things they needed to take care of in the home environment.

Pa 5: "After the operation we had to make all these adjustments and if we had known that beforehand, we would have done all of that beforehand."

The patients did all know that after surgery they would need to move as fast as possible and be careful not to start working too early when they did demanding work, or start from home.

However, a lot of patients felt like they were left with a lot of unanswered questions concerning what they were allowed to do after surgery and what activities they should avoid. Also they felt they would not know how they were doing compared to the average. This made them feel insecure and created doubt.

Pa 8: "...What is good for you and I never really received an answer to that. So, for me everything has actually always been very doubtful."

Pa 7: "When are you doing it well and when aren't you? In that case you could say, go with your feeling, but when...?"

Not having their questions answered, made some patients feel like the physicians did not have the answers either.

To solve this issue, in the St. Anna hospital patients were provided with an app that explains the average rehabilitation process.

Pa 6: "They had this app'...'of a week before and two weeks after the surgery, what you were allowed to do. That was nice."

Also some patients mentioned that they only heard about the process in the ideal situation, so they were unsure which problems were normal and which were not. However, patients who did have that extra information beforehand still had difficulty coming to terms with the complications they faced.

Pa 4: "It still irks me, you know. You know that it is possible, and you did make that decision by yourself, but yeah..."

Some orthopaedic surgeons also managed to solve this problem by explaining to the patient that the rehabilitation process is very personal and different every time.

Pa 9: "The orthopaedic surgeon also said; every knee is different, every surgery is different and every patient goes through it in a different way."

However, when the physicians treating other patients provide them with different advises for the same issues this could lead to confusion among the patients. If other patients experience a lot of issues, talking to them could finally also cause fear or doubt.

Pa 9: "I have to say, I heard from people about operations and than you also talk about what did your doctor advise?'...'That really differs enormously."

PATIENT EXPECTATIONS

Patients all expected that they would be able to be fully functional again after surgery, so when this did not come true, coming to terms with their complications and limitations was especially hard for them.

Pa 1: "I had expected to be able to do everything again after surgery, but that is not the case at all, I can't anymore."

Pa 4: "Everyone undergoing surgery thinks; afterwards, I will be done with all of it and be able to go forward again."

To assist the patients, physicians tended to provide them with general guidelines, but when these did not come true, patients felt disgruntled.

Pa 4: "She always said that; a year. But we are now long past that."

Furthermore, patients with previous experiences tended to find their way through the process more easily, as they knew what to expect.

Pa 9: "I knew beforehand that it would be slow, I had expected that."

Pa 7: "You have to load them, whether you want it or not, it is painful, knee surgery is just painful. So I had to go through it."

It also helped them overcome issues, that other patients who went through surgery for the first time did experience, like regulating their level of activity.

Pa 7: "From the time I was 33 I had to find out like; what are the signals of me going too far?"

Other patients however mentioned that their previous experiences made them more scared and therefore made their rehabilitation more difficult or they had trouble adjusting to the knew pace of rehabilitation, especially if they now experienced more issues.

When you have a second knee surgery, it only scares you more, that makes recovering only more difficult.

Finally the patients' expectations were very much dependent on their level of activity before the surgery and therefore the goals they had set for themselves for the recovery.

Pa 9: "There are also people who say; I never really did sports, so why would I want to in the end?"…"They have other goals."

Pa 6: "The older you get, I don't have to be able to do everything anymore. My age tells me to just take it slow."

A lot of patients would like to be in contact with other patients who are in similar situations, as this gives them a sense of support and recognition, especially in the beginning, and helps them form expectations for further along in the recovery. It also helps patients put their experiences into perspective.

Pa 10: "The good thing was that all three of us were bothered by it and than you do kind of find support in each other."

Pa 5: 'The good thing about a group is that it provides you with a reference and a group is not all the people who have had surgery on the same day'…'It makes you think; in 6-7 weeks, I will be there as well.'

Pa 6: "I want to for example know, if other people also have just like me this pain, I would like to know that."

However other patients believe that the experiences of other patients would not add anything to their rehabilitation as no one has been through the same things as they have been so their experiences are not comparable.

Pa 2: "Everyone is different and everyone experiences it different and I never really feel the need to hear how someone else is doing it."

MOTIVATION

For a lot of the patients work was a big motivator. Because they wanted to be functional again as fast as possible, they made sure to train a lot and follow up on their physicians' advises.

Pa 6: "Because I really wanted to function like I used to and they told me; in that case you just have to move as much and as fast as possible."

Pa 9: "Not that I don't like it at home, but I just really wanted to go back to work again."

Being generally very motivated many patients ware willing to do more than advised, sometimes even too much.

Pa 7: "Then I also got exercises to do at home. I did those a lot, then I did a little bit too much."

Pa 5: "I just kind of have the motivation, like; we just do it and preferably more than advised."

Pa 10: "Sometimes my problem is, I don't know what my limit is until I have surpassed it."

This left patients having to find a balance between their willingness to train and exercise and not doing too much, which was especially difficult in the beginning.

Pa 7: "You need to be careful with that, finding a balance, I managed but only in the end.."

Pa 5: "Sometimes you have to go a bit too far to know how far you can go."

However fear of falling and pain held other patients back despite their motivation.

Pa 6: "I cannot say that I am scared of it, but I do not really like pain."

When their fear or pain caused them to be satisfied before reaching their old level of functionality again, often friends and family tried to keep them motivated. Not all patients were equally grateful for this, however.

Pa 4: "I only hear like; you should not accept it, you should go on, you should keep it up. But at some point it leaves you a little..."

Further more, rehabilitation together with other patients can motivate them to do more than they would have when rehabilitating alone.

Pa 5: "In a group you are more motivated to do more than you would be when you are alone."

RTW FACILITATORS AND BARRIERS

Certain factors at the work place promote the patient's RTW, while others form barriers for their RTW.

The following were mentioned during the interviews as facilitators:

- When patients really enjoy their work, this motivates them and makes them forget about the bad parts.

Pa 3: "It all does not matter, I like doing my job."

Pa 6: "But I really like going there, you know, I really enjoy it. Otherwise I would have said a long time ago; I am not coming anymore."

- When the patient can start in less physical demanding activities or gradually increase the load on their knee.

Pa 5: "It is because I returned to work at such a slow pace, I really feel like it all went quite well."

Pa 1: "At the time I already started working a day less, because of the advise of the occupational physician'…'For my body it was good, but I did not like it."

- When the patient feels supported by their employer and colleagues, so the patient could work how and when he wanted.

Pa 10: "My supervisor said; good if you are here. And everything that was needed to facilitate that, you just take care of that. Let's say, we pay for it."

Pa 5: "No pushing at all, so that was good."

Pa 9: "That was the good thing about therapeutic work, I could go home when I wanted, but you just don't want that."

- When others assist the patient in his mobility issues.
- When the workplace allows for adjustments to the patients' new physical needs.

Pa 10: "My employer got me a high chair, so I can sit on that while filming or explaining something in front of the class."

- The patients figure out tricks to keep doing all work activities.

Pa 6: "I do my job, but I bend my knee in a different way than someone else would."

The following were mentioned during the interviews as barriers:

- Physical work requires conscious effort to be careful
- The patient's employer did not have desk work for the patient.

Pa 5: "I am standing all day, so you have to make sure to pay attention with lifting, that your knee allows for that."

Pa 9: "Someone else has a job that he can do while seated, but I don't. That is just different."

- The employer pressured for clarity and knowing what to expect.
- The patient did not take enough breaks as he had his own company.

Pa 7: "I had my own printing company at the time, so you really did not have time to be ill."

- Patients who were not provided with guidance from the occupational physician had a hard time knowing what to do and what not to do at work.

Pa 3: "I was just thrown in and I just went back to work."

Pa 1: "I have always said; it is a shame I did not have to go to the occupational physician, because he might have said like; you should not have gone to work so fast."

- Patients tend to feel too responsible towards their employer and colleagues, which makes them return to work before they are ready

Pa 9: "I would postpone it for the company and you should never do that, you have to take care of yourself."

- Patients who could start with deskwork, mostly experienced hindrance from aspects not directly related to their knee pain and function, but more in terms of fatigue and a lack of concentration.

Pa 1: "After such a surgery, you are just really tired for a while, so when asking what influence it had on work; I worked a lot less hours."

- All patients said they thought deciding how to spend their energy and what to focus on in building work activities was very difficult for them

SATISFACTION WITH THE OUTCOME OF RETURN TO WORK

Overall most patients are quite satisfied with the outcome of their rehabilitation process with regard to RTW. Some even say they would do it again in an instant.

Pa 9: "I had not expected to be able to just do my own work again, so I am very happy to be back. It makes me appreciate my weekends again.."

Looking back patients were in general also very glad that they were not just physically but also mentally ready for work very early on in the process. Also because the patients reflected on their progress during the rehabilitation, they now realised that they had a lot more limitations at work before surgery than they realised at the time, which makes them even more satisfied with the outcome of the RTW.

Pa 1: 'In the phase that you are in you do not actually know what you are missing, what your problem is'...'Looking back now, I say; it has been a big limitation."

Some patients who did have a very good RTW but were not guided in it by an occupational physician, afterwards wonder whether they did not end up doing too much too fast and would have liked more guidance in this part of their rehabilitation process.

Pa 3: "Of course I went to work quite fast and maybe I should have taken more time for that. It cost me a lot of time and fatigue. And of course it took a toll on my private life."

However, also some patients still experience difficulties at work and have a hard time coming to terms with their new limitations. Also because they do not understand why their rehabilitation was less than ideal., they believe that the physicians should have advised them better or that a lot of mistakes were made that the physicians do not want to admit.

Pa 4: "I think a lot of mistakes have been made by the doctors, amongst them as well.."

Pa 6: "I don't get it, it makes me think; how could it have gone so different for me?"

3.3 DISCUSSION

The main factors that influence the patients' experience of their RTW rehabilitation are: his motivation, information received before surgery and the expectation the patient formed either coming true or not, the guidance by the physicians, contact with other patients and support from the workplace.

Specifically for the patients' experience of the return-to-work, the following aspects influence the patients' experience:

- Support from the employer and colleagues, this was also found by the studies by Hofstede et al. (2016) and Franche & Krause (2003).
- Not being pushed to RTW too soon.
- The patient deciding how to work and how long to work.
- Whether the patient likes his job, as work can make patients feel useful when they enjoy doing it and give more meaning to their life (Ieder(in) et al. 2015).
- Whether the patient can start working from home/ behind a desk to reintegrate early. In a study by Leinonen et al. (2011) it was found that especially people, whose work is dependent on their physical abilities, will take a longer time to recover.
- The patient feeling to responsible towards colleagues and the employer.

An overview of the patient's experience of his rehabilitation has been added to the care journey, as can be seen in figure 18.

From the results of this research, a difference in needs of patients who were guided by the occupational physician during their rehabilitation and patients with whom the occupational physician was not involved:

- Patients with guidance of the occupational physician felt supported in RTW.
- Patients without guidance of the occupational physician felt insecure and unsure. This supports the finding in the study by Maillette, Coutu, Gaudreault (2017), where it was found that The strength of the patient's beliefs in his or her ability to reach a certain goal was proven to be a strong predictor for the level of workparticipation after surgery.
- The occupational physician helped make adjustments at work and make the employer understand.
- Patients without the guidance of the occupational physician sometimes felt they returned to work too early.

LIMITATIONS

As this is a qualitative study with a small group of participants the results of this study should not be generalised. the patients have been selected from different hospitals in the Netherlands to ensure more variety in the data.

The patients were selected from a group of willing participants from an earlier study. This factor possibly influences the results as these patients tend to have a more outward focus and have typically been more motivated (to return to work) than the average patient.

The patients were selected on having physically demanding activities as part of their work activities. Therefore, they are faced with different issues and have a different focus than the average patient, who can also have a very static job.

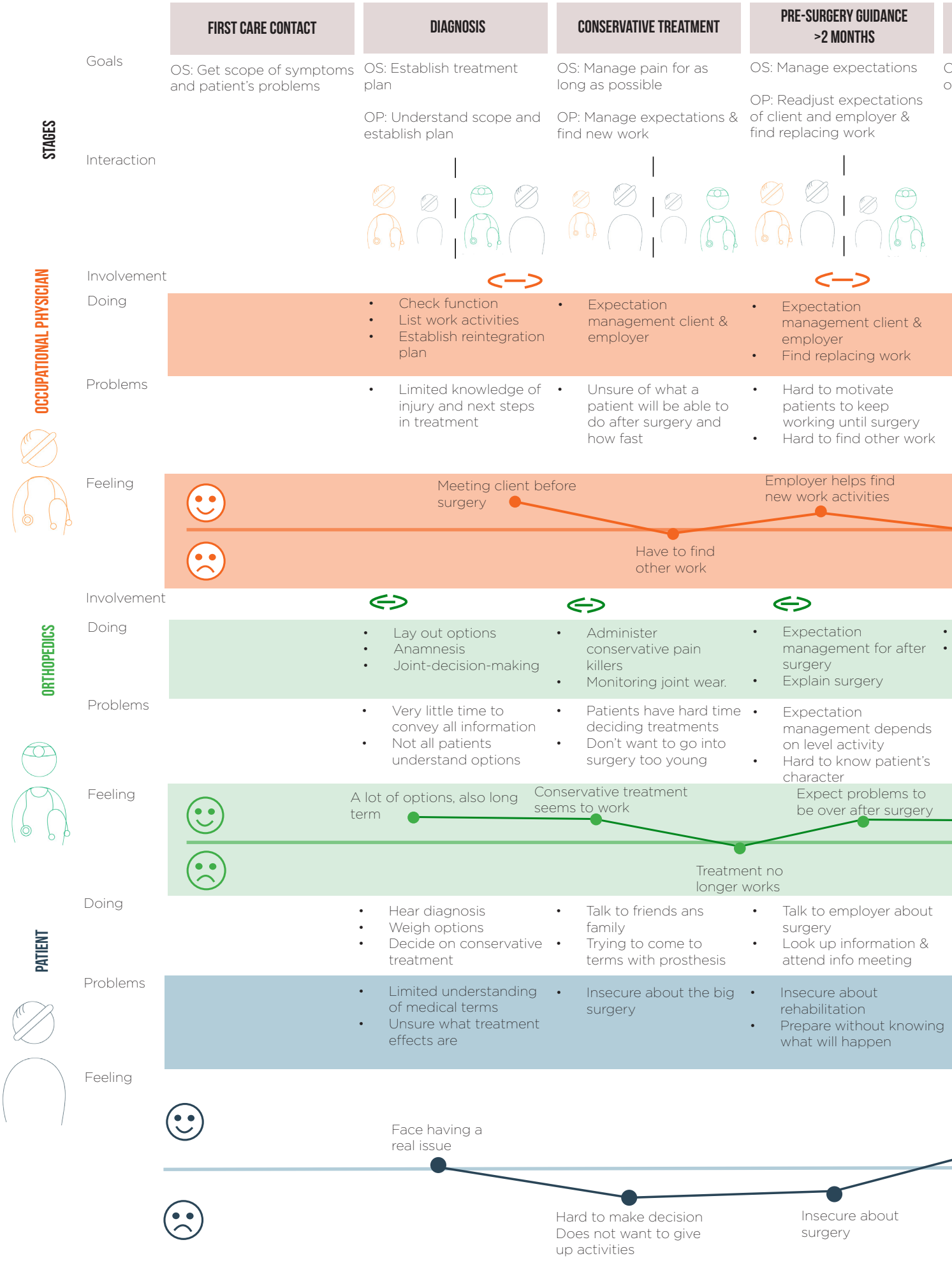


Figure 18: The care journey including the patients' experiences

HOSPITALISATION 1-2 DAYS	BASE RECOVERY 6-8 WEEKS	REHABILITATION 1-2 YEARS	COMPLETE RECOVERY
OS: Perform successul operation	OS: Ensure good results of operation OP: Assess function and mobility	OS: Ensure good healing of prothesis OP: Guide reintegration in work together with employer and motivate client	OS: Complete function regain OP: Full return to original work

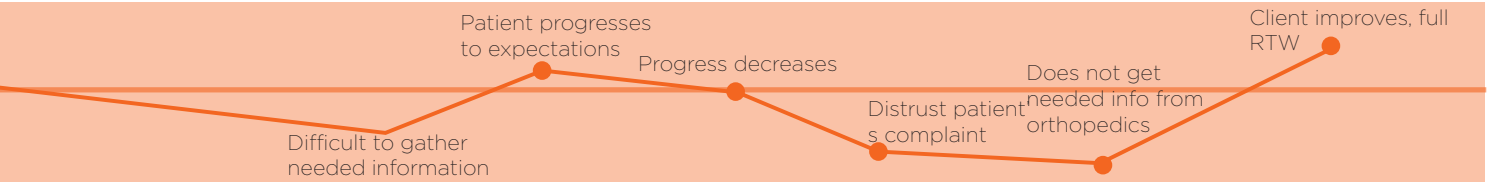
- Gather information of orthopedics
- Provide advice of function and load for employer

- Guiding work reintegration with regular check ups every 6 weeks

Complete work recovery:
- Hours
- Work activities
- Expense of load

- Long wait for answer orthopaedics
- Does not receive sufficient/relevant information

- Uncertain of patient's true abilities
- Has to rely on patient's reporting
- Unsure what happens with physiotherapist and other physician's treatment
- Rehabilitation times unpredictable



Placing prosthesis
Explain results of surgery to patient

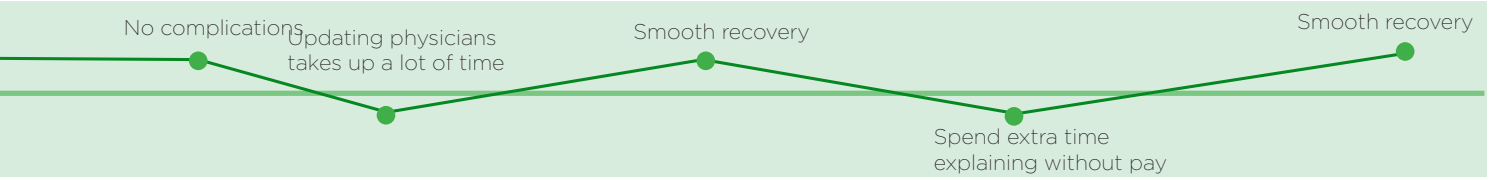
Check:
- Function recovery
- Prosthesis attachment
- Prosthesis placement

- Check-ups looking for load related knee pain at 3 months and 6 months

- Complete recovery:
- Function
- Wound
- Amount of load

- Not enough time to spend on updating physicians

- No knowledge about function & work
- Don't want to give work advice
- Unsure what will happen with information
- Uninteresting basic questions



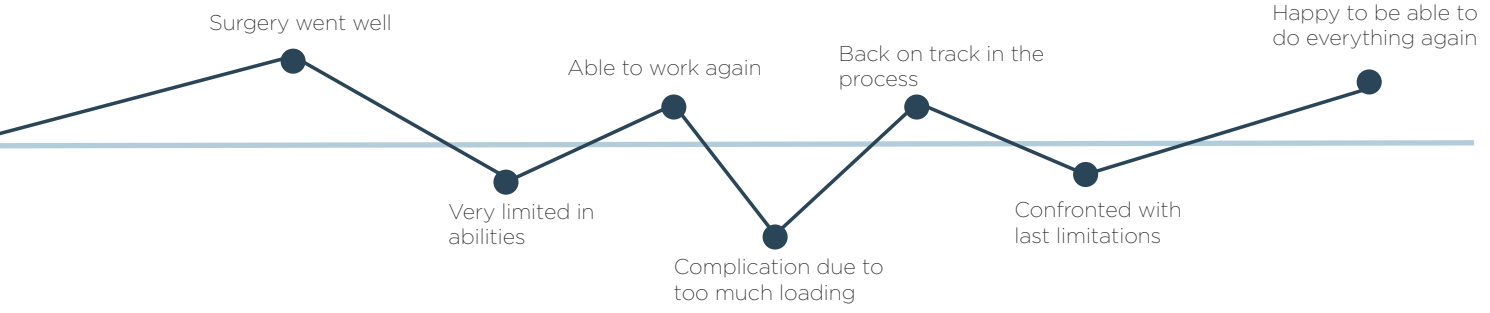
- Base function recovery
- Exercises with physio

- Return to work
- Function recovery
- Rebuild activities in spare time

- Complete recovery:
- Work
- Hobbies
- Mobility

- Hard to come to terms with limitations
- A lot of pain
- Fear of movement

- Hard to regulate activity level
- Expectations do not always come true
- Unsure about what activites are good
- Tired, distracted at home



3.4 CONCLUSION

How do TKP patients experience the current work-directed care?

Most TKP patients are generally very happy with the guidance the receive in their rehabilitation due to the personal and committed involvement of the physiotherapist. The orthopaedic surgeon is considered very knowledgeable and patients appreciate his honesty and directness, however not all patients feel like they had a good connection and could communicate well with the orthopaedic surgeon. When the occupational physician was involved in the return-to-work guidance, patients generally appreciated the help in managing expectations, the direction he provided in what activities they should watch out for at work and his patience to allow more gradual work-recovery. Patients who did not receive guidance of the occupational physician experienced more insecurity and felt like they were more 'alone' in their recovery at work. The communication between physicians was in general very limited, some patients even mentioned feeling like the physicians did not read through the information other physicians provided or were annoyed by having to answer the same questions over and over again.

How could the return-to-work guidance for TKP patients be improved?

All patients expressed a need for clearer expectation management and more guidance in regulating their activity level and knowing how their recovery is coming along.

Furthermore, the physicians should communicate more and set clearer goals or provide the patient with more handholds in their rehabilitation, preventing them from feeling lost. Also amongst each other, the physicians should communicate more to prevent them from confusing the patient with contradicting advises.
Communication with other patients in similar situations should be encouraged, as patients felt more supported and understood, as well as that this provided them with clearer expectations and motivated them.

OPPORTUNITIES

Based on the results of this study the following opportunities have been identified, which had not yet been found based on the literature study in the previous chapter:

- The patients should be informed more on different possible outcomes of their RTW
- The physicians should not provide the patient with contradictory information or inform on the same subjects.
- The occupational physician should work closely together with the employer to make the patient feel supported in their RTW
- The occupational physician should focus on helping the patient understand what activities at work and how much of these activities could benefit their recovery or should be avoided.
- The patient should receive more mental support nect to the typically physical focus of the rehabilitation guidance
- The patient should be stimulated to share his experiences with patients in similar situations.
- Allowing the patient to not be conduit in the information transfer, but separate participant in care process.
- The occupational physician should make sure the patient's employer and colleagues understand the patient's limitations and the effect on those on his work activities.
- The patients should be motivated to exercise enough, but also held back when needed.
- The patients should be able to ask the care providers questions outside of the set meetings.

CHAPTER 4: FOCUS

INTRODUCTION

Based on the results of the background research on the current treatment of patients with a knee prothesis and the current guidance provided by the occupational physician and the outcomes of the field research, a focus can be determined for the development of a solution to improve the collaboration between the occupational physician and orthopaedic surgeon in the work-directed care for TKP patients. This focus is described in this chapter, starting with the problem definition and interaction vision which lead to the design goal and criteria to fulfil this goal.

4.1 INTERACTION VISION

The current exchange of information is experienced as far from optimal according to the occupational physician because of it being too slow and a lot of misunderstandings, making information useless. Also, the occupational physician finds the current contact often frustrating. He is unsure what kind of answer his questions will receive and whether his questions will be answered.

The occupational physician believes the orthopaedic surgeon to be uninterested in his progress, and therefore never updates or send feedback. The orthopaedic surgeon, however, would like to receive feedback.

The orthopaedic surgeon experiences the current interaction as mostly inefficient and time-consuming, as the orthopaedic surgeon does not see added benefit in contact with the occupational physician for his own practice. Sometimes the questions, asked by the occupational physician, are seen as annoying, as the occupational physician can ask the same questions twice for the sake of their client's file.

Also, the orthopaedic surgeon views the current information exchange as circuitous, as the patient should according to them not be the carrier of information. Some patients provide wrongful information because of misunderstanding or being unmotivated to return to work.

The values of this interaction are visualised in figure 19.

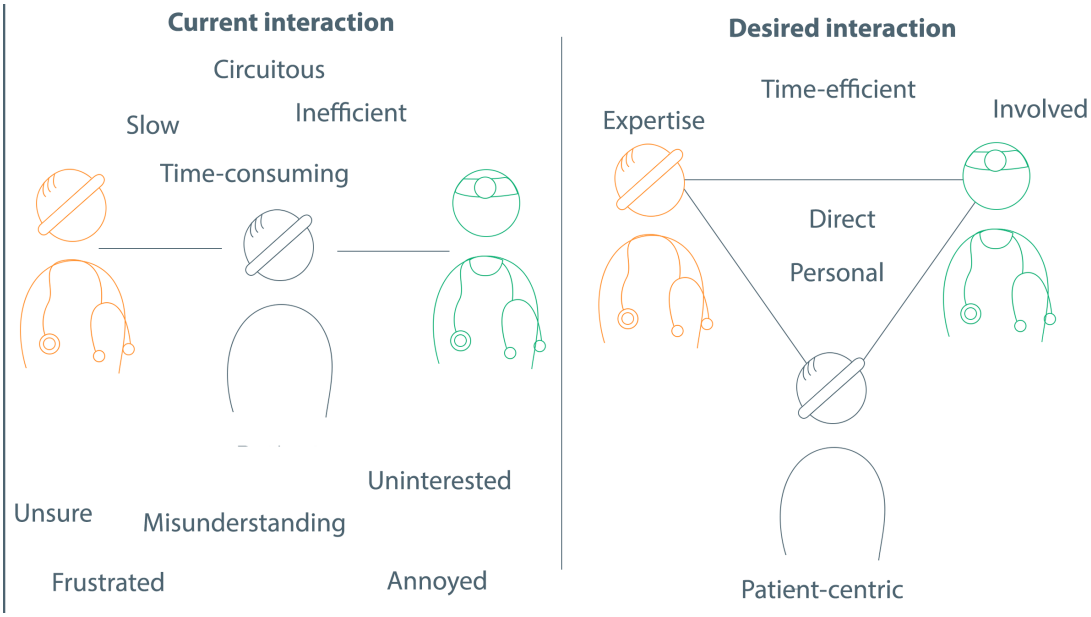


Figure 19: Values in the desired interaction compared to the current interaction between occupational physician, orthopaedic surgeon and patient

Based on these interaction values. an interaction vision has been made, that better fits with their needs in the work-directed care, as seen in figure 20.

BEING ATTENDED TO AT A FAMILY DINNER IN A LUXURY RESTAURANT

Figure 20: Newly formulated interaction vision

Being attended to at a family dinner in a luxury restaurant, where the care providers take the roles of the chef cook, the sommelier and the maitre. Every one of them has his own expertise and therefore, his own task in providing the perfect meal experience for the guests. They have worked together for years, so they know what to expect and can easily adapt when needed. They work towards the same goal, adjust their services to each other's work, but develop their own plans to best suit the guest's wishes.

The guest in this is the patient, who, has to trust the experts to provide him with a meal that fits his needs. When the courses are served, they will be explained. Next to the services of the restaurant personnel, the other guests in the restaurant of course also affect the dinner experience, as the guest looks around, to compare his meal and service to the others and hears their experiences of their own dinners, which are so similar to his. Thereby his restaurant experience is his own, but not unique, which comforts him.

This interaction vision will be used to develop the idea directions further and choose the final concept.

4.2 PROBLEM DEFINITION & GOAL

The **COMMUNICATION** in the **WORK-DIRECTED GUIDANCE** before and after TKP surgery for **WORKING PATIENTS** by the **ORTHOPAEDIC SURGEON AND THE OCCUPATIONAL PHYSICIAN** in the current integrated care does not fit with the **INFORMATION NEEDS** of the occupational physician and working TKP patients, nor with the current **WORKFLOW** of the orthopaedic surgeon.

This causes the orthopaedic surgeon to experience the current communication as irrelevant with regard to his provided care and thus time-consuming. Therefore, the occupational physician receives information which is not directly usable in his practice as occupational physician. This results in the patient receiving contradicting information and becoming increasingly confused and unable to form fitting expectations. Therefore, pain and function decrease are experienced more intense, problematic and discourages the patient from returning to daily business if this is related to his knee problems.

The reasons for this problem, as identified in chapter 2, are:

- Lack of understanding and knowledge of each other's methods and practice
- No shared goals or sub-goals
- Different communication styles that lead to misinterpretation and confusion, for example using the same words with different applications.

Based on this problem definition and the interaction vision, the design goal has been formulated:

The solution should facilitate an **INVOLVED, TIME-EFFICIENT COMMUNICATION** between the **OCCUPATIONAL PHYSICIAN AND ORTHOPAEDIC SURGEON** in the work-directed guidance of working knee-prosthesis patients **BEFORE AND AFTER SURGERY.**

This communication should be based on their **INDIVIDUAL AREAS OF EXPERTISE** while focusing on **COMMON GOALS** to improve their current **PATIENT-CENTRED** care processes, while ensuring a fit in their current **WORKFLOW**.

4.3 CRITERIA

Based on the results of the previous studies, criteria have been formulated for the improvement of the collaboration between the occupational physician and orthopaedic surgeon in the work-directed guidance of TKP patients.

FUNCTIONS

- The care professionals that are involved have to be patient dependent
- The solution has to facilitate direct communication between the orthopaedic surgeon and occupational physician
- The solution has to take into account the specific activities a client has to perform at work
- All information exchanged has to be possible to be saved in the patient's file
- The exchange of information has to be independent of the patient's subjectivity
- The solution has to fit within the normal workflow of the orthopaedic surgeon and occupational physician
- The tool has to allow for the patient to set goals for his rehabilitation together with several different physicians
- When a plan is included this has to be adaptable during the care process
- The solution has to facilitate expectation management of the client

- Should be as time-efficient as possible
- The solution should clarify the processes of the orthopaedic surgeon and occupational physician to each other
- The solution should make the interaction between orthopaedic surgeon and occupational physician more personal
- The solution should be usable for the most important care professionals in the patient's care
- The solution should stimulate personal goal setting depending on the patient's work
- The solution should make the care professionals feel more involved in the whole of the patient's care
- The solution should focus on the care professionals individual fields of expertise
- The information provided by the orthopaedic surgeon should be easily translatable in functional allowances in the patient's work.
- The information exchanged should provide insight in patient specific characteristics
- The care providers should be able to see when the patient meets with whom
- The care providers should be informed when possible problems in the patient's rehabilitation could be occurring
- The patient's progress in different areas of his rehabilitation should be visible for all care providers
- The solution should facilitate more standardised formulation of communication between the caregivers
- The tool could allow for patients to share information about his rehabilitation progress with family and friends
- The tool should make information of the patient's care and progress available to him outside of meetings with the physicians
- The tool should make the patient aware of both the expected process as well as possible outcomes that differ from the average or ideal
- The tool should allow for the patient to report on his experiences during recovery
- The tool should allow the patient to directly contact his physicians outside of meetings
- The subjects involved in the tool should depend on the person and his job
- The tool should help physicians estimate a patient's personal abilities and limitations
- The technology used should be as easily navigated as possible
- The tool should give the patient guidance in regulating his activity level
- The physicians should only be provided with information of they can directly use it in their practice
- The tool should help remind the patient to do the exercises prescribed by the physiotherapist
- The tool should stimulate contact with patients in similar situations
- The tool should help manage expectation of the employer
- The tool should stimulate a more personal and involved contact between the patient and his physicians.
- The tool should make the patient aware of actions to be taken to promote the process at home
- The tool should provide understanding in

allowances and abilities and what activities are prudent as well, especially during work

CONTEXT

- The solution has to be possible to be used by the orthopaedic surgeon within 10 minutes.

- The solution should be possible to use both when in direct or in indirect contact with the patient
- The tool should make the patient feel supported while sharing his progress during meetings with physicians

SAFETY

- Sensitive information has to be kept safe
- No sensitive information can be possible to share
- No sensitive information can be possible to be seen by unauthorised parties
- The patient has to always provide consent before sharing medical information with occupational physician
- The employer cannot receive medical information about the client
- The tool can not trigger allergic reactions with the patient

- The orthopaedic surgeon should feel secure knowing what the information provided is used for
- The patient should be able to see what information is exchanged between the care professionals
- All care professionals should be able to look into relevant parts of each other's patient files with the patient's consent
- The tool should allow patients to only share the information they feel comfortable sharing with other patients

NORMS AND STANDARDS

- This solution should fit within the set bounds of the 'Wet Verbetering Poortwachter'

(Rozenburg, N.F.M., Eekels, J., 1998)

CHAPTER 5: IDEATION

INTRODUCTION

In this chapter the three idea directions are explained. These directions are used in an evaluation with 10 TKP patients. With this evaluation, insight is gained in how the the needs and experiences in the current integrated care of the patient are represented in the current idea directions. Using these insights, the directions are developed further into concepts.

The evaluation is done by conducting interviews with 10 TKP patients, as the second part of the second research, which was described in the 'In the field' chapter. The participants were presented with stodyboards and sketches of the idea directions and asked for their opinions on them, focusing on; the patients' need for information (what kind of information, for what purpose and from whom), and the timing in the process.

5.1 IDEA DIRECTIONS

DIRECTION 1 - FLYING START

This idea direction focusses on the pre-surgery phase in which the orthopaedic surgeon and occupational physician both establish their treatment plan.

Goal

This idea direction has been developed with the goal to facilitate the indirect information exchange between the care providers during their separate meetings with the client without the client being the carrier of information. Also it allows the care providers to set up their own expertise-based plan for the patient's care.

Use in the RTW context

This sheet is filled in by the orthopaedic surgeon and the occupational physician during their meetings with the patient before surgery. For the storyboard that explains the use of this idea in context (see fig. 21) (Lelie, C., 2005).

Both physicians have their own sections in the sheet, which suit their areas of expertise. The information is useful for both as it can influence the treatment plans of both and provides a more complete image of the patient's physical state, his work and his character and goals.

In order to establish common goals, the patient

Figure 21 Storyboard Flying Start

fills out two sections; about his activities outside of work, about himself and what is important to him.

The goals are set according to the GAS-goal-setting method during follow-up meetings between the patient and the orthopaedic surgeon and the patient and the occupational physician. With the orthopaedic surgeon a goal is formulated that focusses on the patient's physical function after rehabilitation. With the occupational physician a goal is set concerning the patient's function at work.

In the last section the orthopaedic surgeon and occupational physician set out their treatment plans in main goals and sub-goals, so all three parties know and understand what final goal they are working towards.

Between the meetings with the physicians, the patient is the carrier of the sheet. He receives it during the first meeting (which is usually with the orthopaedic surgeon) takes it home, where he can use it to explain his situation and goals to family and friends and brings it to other meetings with the occupational physician and orthopaedic surgeon.

Figure 22 shows the front of the sheet and figure 23 shown the back of the sheet.

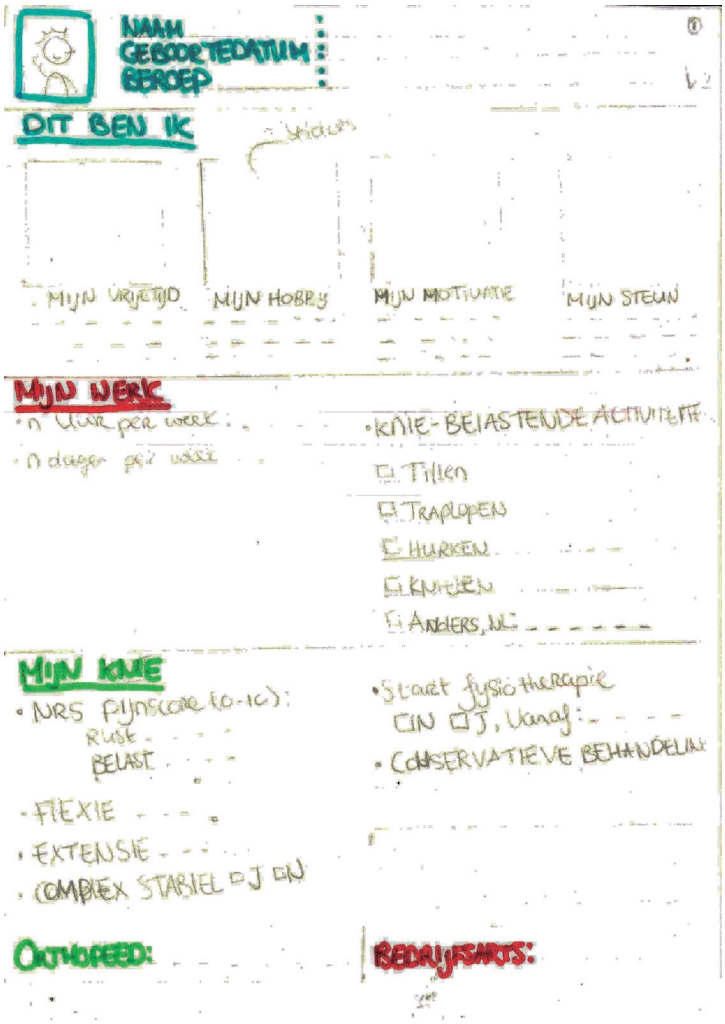


Figure 22 Front of flying start information sheet

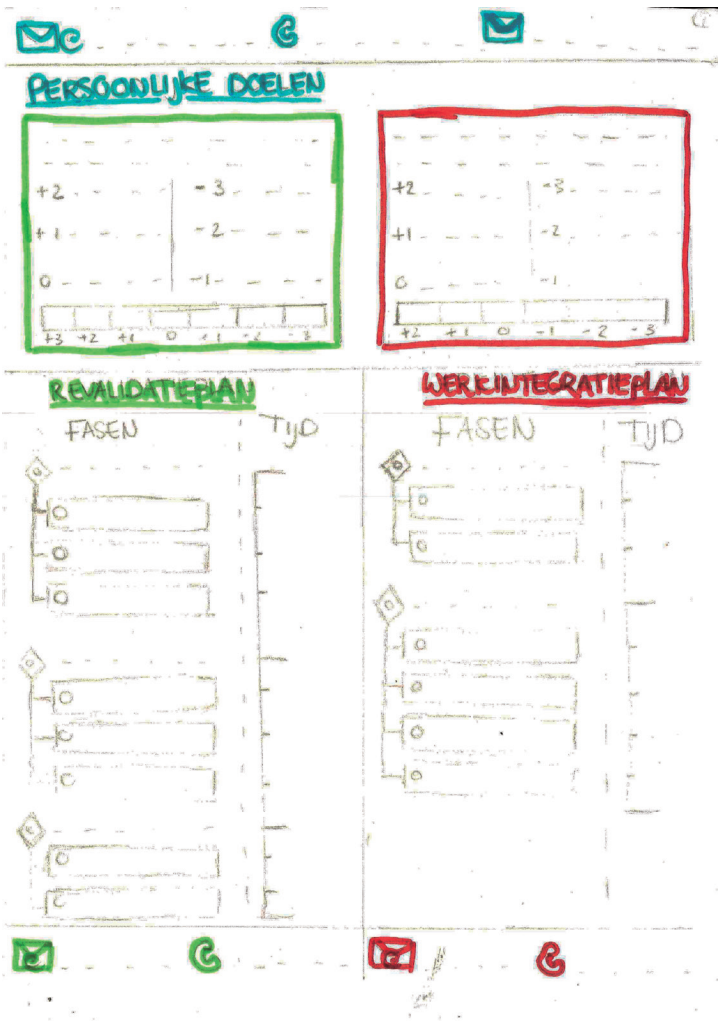


Figure 23 Back of flying start information sheet

DIRECTION 2 - MY TEAM

This idea direction focusses on the rehabilitation phase in which the occupational physician and orthopaedic surgeon both guide the patient towards complete recovery in function and at work, together with other care providers.

Goal

This idea direction has been developed with the goal to involve all physicians from beginning to end in a patient-centric team. The idea direction focuses on making all information available for all care providers, in order to form fitting expectations. By doing so, it encourages a personal, direct and expertise-based interaction from a distance.

Use in the RTW context

MyTeam is an online interface in which the team surrounding the patient is made visible with their goals for rehabilitation, the progress concerning those goals and that allows the participants to communicate with each other in messages and through calling through a secured connection. For the storyboard that explains the use of this idea in context (see fig. 24).

My Team is set up together with the patient during the first meetings with the orthopaedic surgeon and occupational physician. During the set-up the patient provides consent for the care

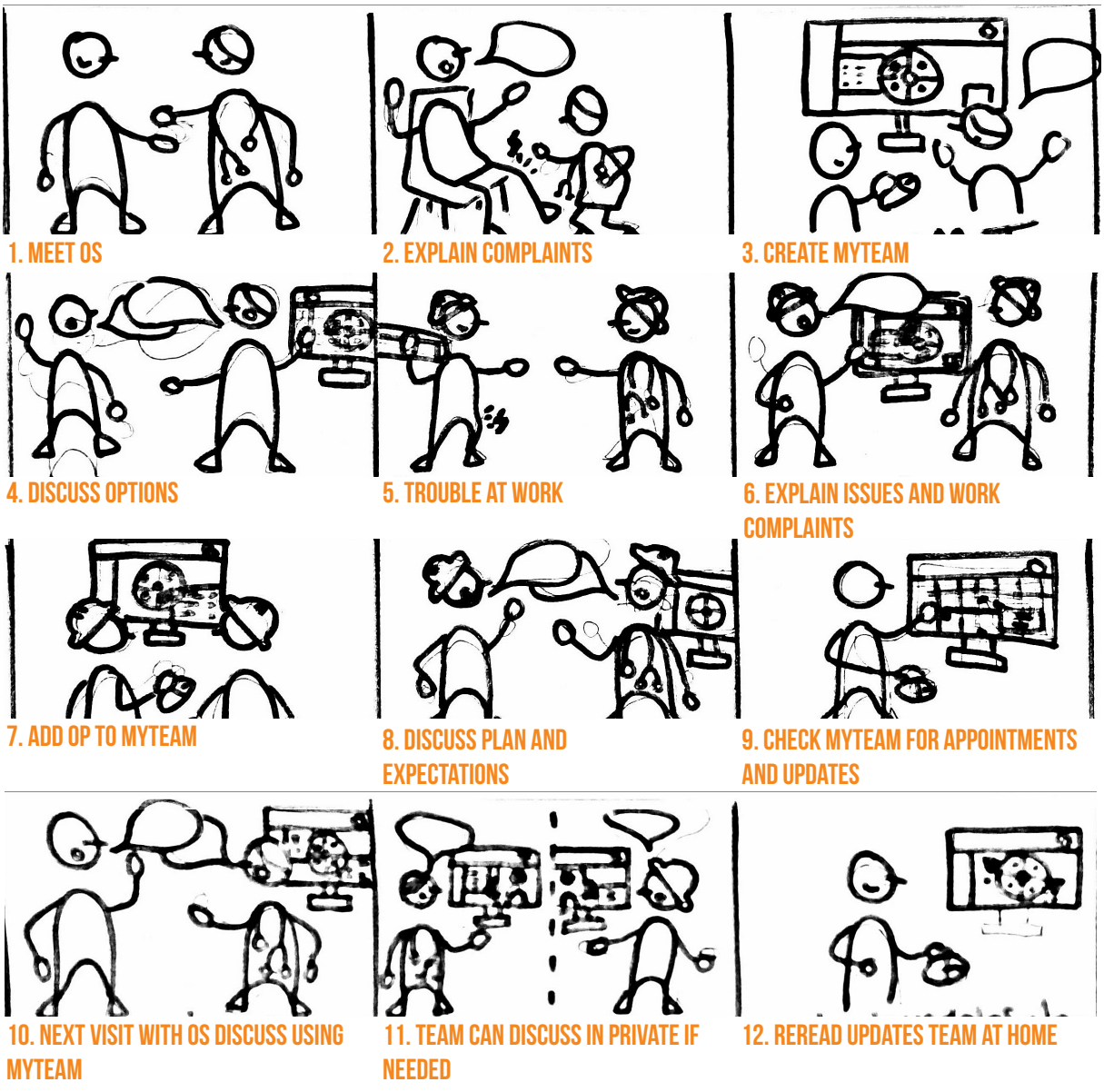


Figure 24 Storyboard My Team

providers to share information.

All participants have their own parts of the interface which are especially for them and not visible for the others, unless they decide to share them. The information exchanges and shared information are inserted in a common patient file. The care providers can now communicate without all information going through the patient, when needed.

Figure 25 shows the main page of My Team as seen by the patient, some the other patient pages seen are shown. Figure 26 shows some of the sub-pages for the occupational physician.

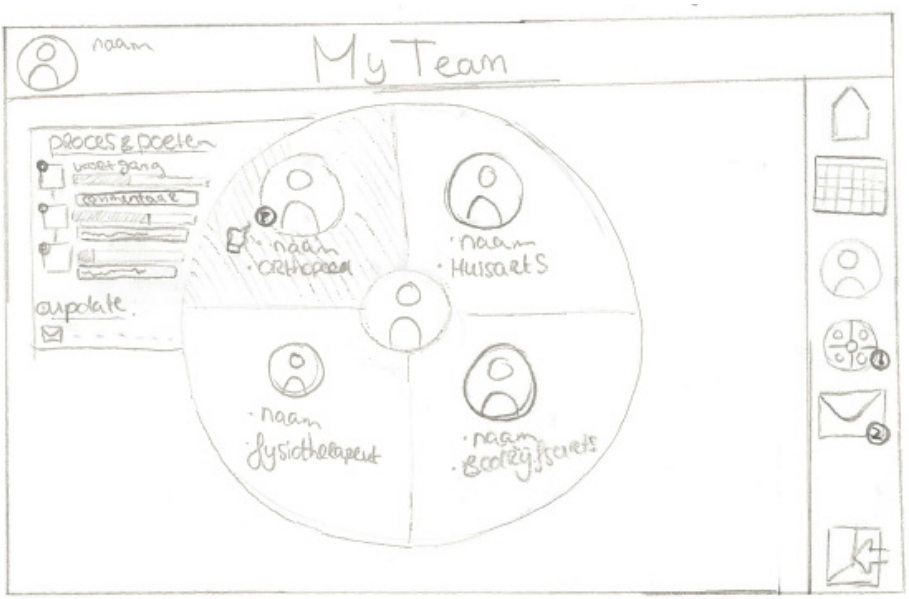


Figure 25 Patients view of the My Team main page

Figure 26 Occupational physician's subpages of My Team interface

DIRECTION 3 - OUT OF OFFICE

This idea direction focusses on the support and guidance for the patient during the rehabilitation phase.

Goal

This idea direction has been developed to allow the physicians to provide the patient with guidance when this is needed, outside of standard meetings, by providing objective insight in the patient's current state of functional recovery.

Use in the RTW context

This idea directions consists of a mobile app and feedback on a wrist band. In a lot of jobs, employees are not allowed to take their phones on the work floor, the wristband serves as a replacement in thos moments. For the storyboard that explains the use of this idea in context (see fig. 27).

The system provides the patient with feedback on their activity level. It warns them when they are too active and motivating them when not doing enough. The wristband has two sides, one for work and one for other physical activity. On these two parts, symbols are shown, depicting the patient's different activity goals, on an E-Ink screen with three lights next to them. These lights show how close the patient is to completing his daily target for that goal When the patient is too active the wristband vibrates.

The patient inserts what activity they undertake in the mobile app. Afterwards the wristband registers the time of the activity as soon as the user presses 'Start' and stops when the user presses 'Stop'.

In the app the user can see a more extensive overview of their activity over several days and during the day.

Figure 27 Storyboard Out of Office

Also, the view of the care providers regarding the patient's progress on their goals can be read in the app.

With this idea direction, the physicians are able to see the patient's real activity level and if needed provide feedback in between meetings. this allows for more relevant guidance, at the moment when the patient needs it.

The interfaces for the patient and the physicians are shown in figure 28 and 29.

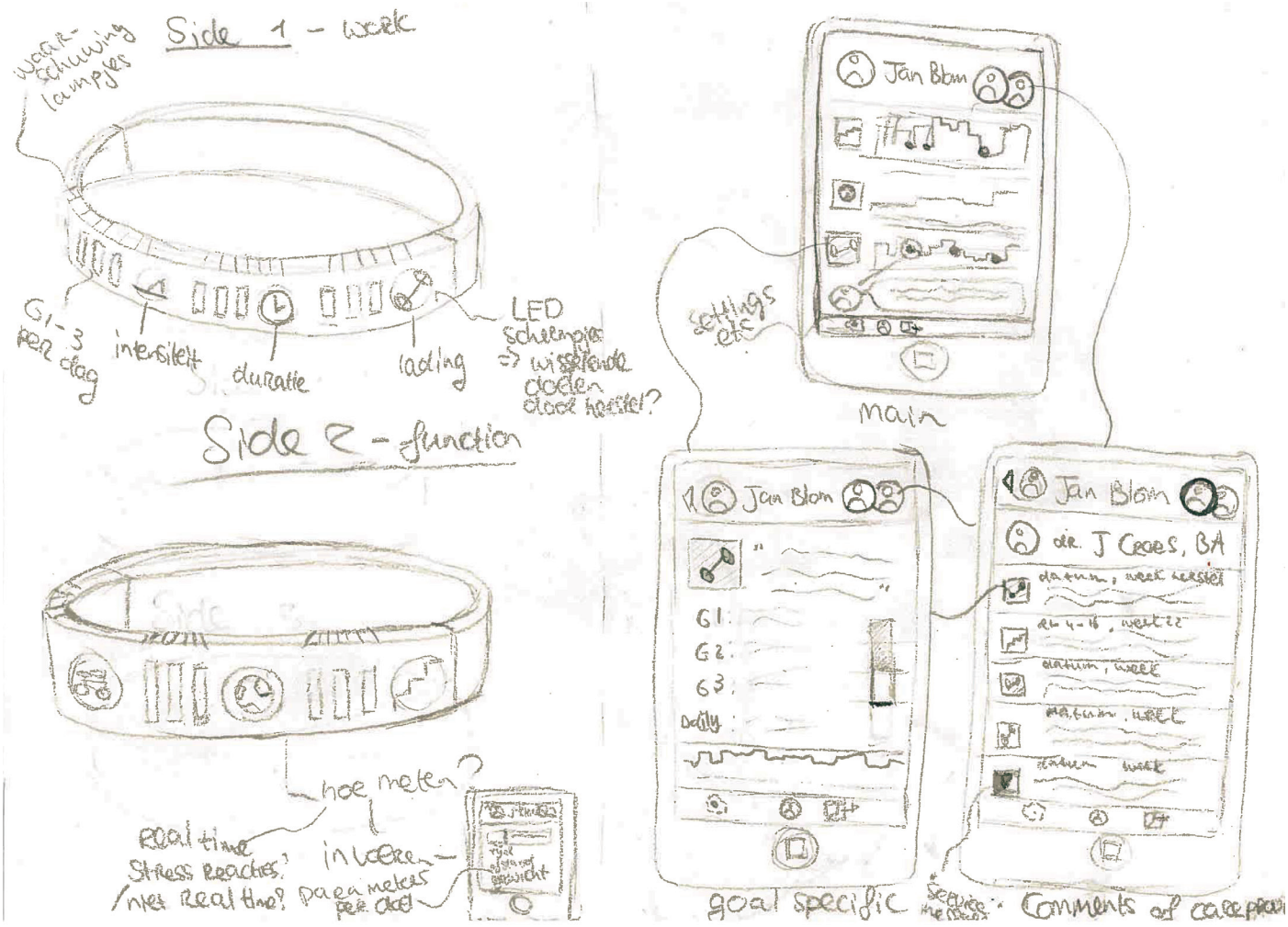


Figure 28: Patient interface of Out of Office

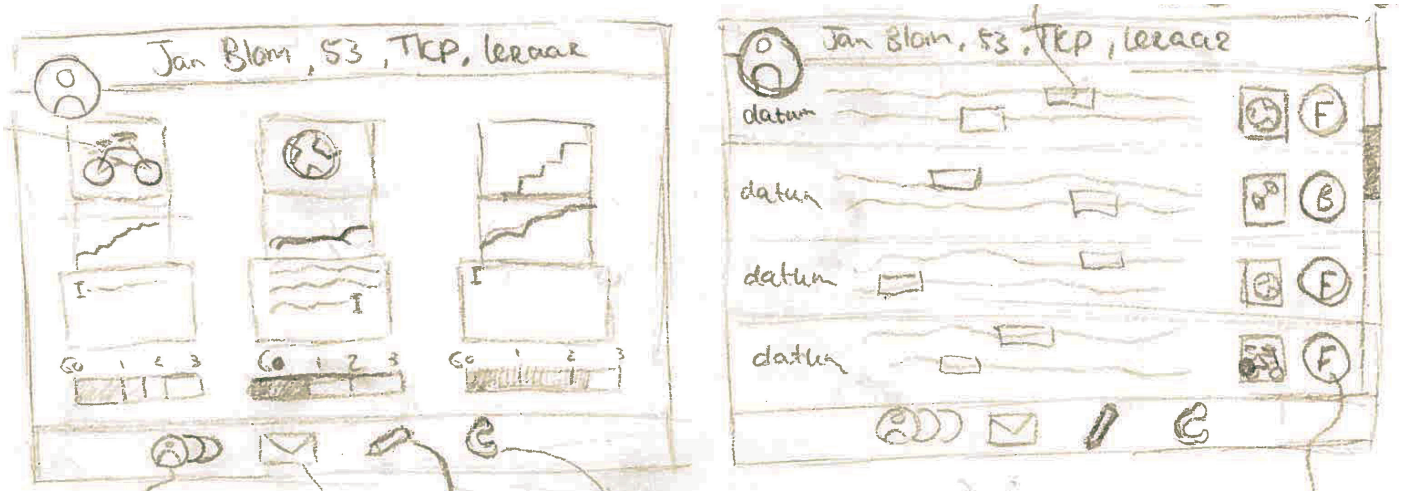


Figure 29: Care providers' interface of Out of Office

5.2 IDEA EVALUATION

INTRODUCTION

During the second study on the experiences of TKP patients in the current integrated care, the idea directions have been evaluated by the patients as well. For this evaluation, the main question was:

What aspects of the presented solution possibilities, to improve collaboration between the occupational physician and orthopaedic surgeon, should be improved upon to optimise the patient experience?

METHOD

During an individual interview, the participants were presented with low-fidelity mock-ups of the three idea directions. The participants were only introduced to the general idea of the solution directions.

The question the participants were asked is:
'Imagine during your guidance by the occupational physician and orthopaedic surgeon, a solution like this was used, how would you imagine this would have influenced your return-to-work and how would you have experienced this?'

This triggered the participant, to reflect on the benefits and possible disadvantages of these different guidance scenario's, during which the session leader asked questions, focussing on;

- The patient's need for information; what kind of information, for what purpose and from whom.
- The timing in the process; when does the patient need what.

ANALYSIS

he conversations were recorded, using a phone-operated audio recorder.

The conversations during the session were analysed using statement cards (Sanders & Stappers, 2013), to discover patterns or clusters.

The insights gathered have been used to develop the idea directions into concepts.

Idea direction 1 - Flying start

In general the patients thought the first idea provides valuable insight and is nice to reread after meetings, as patients tend to come up with new questions after coming home. Also, the planning element of this idea helps motivate the patient in his recovery. Furthermore, the patients think it is very helpful to be able to share this information with friends and family to check whether the goals are realistic and to help all involved to know what to expect. Designing such a plan together with physicians would help establish a personal bond.

'My physio asked me what my goals actually were'...'I said I want to get back to my old level and to be able to do my job again.'

We did not really make a plan, but we did as much as possible try to provide guidance in it.

However, the patients are afraid it might take up too much time for the physicians and does not yet include the physiotherapist, who would possibly have even more to offer than the orthopaedic surgeon throughout the rehabilitation process. As the patients usually set goals together with their physiotherapist and occupational physician, but did not make a real plan, this plan might not fit in the care providers' way of working.

More specific feedback can be seen in figure 30.

When establishing such a plan, before or after... helps form a personal bond, I think.

Especially for your home environment that is very nice, so they know what to expect and how far along you are and what your goal is.

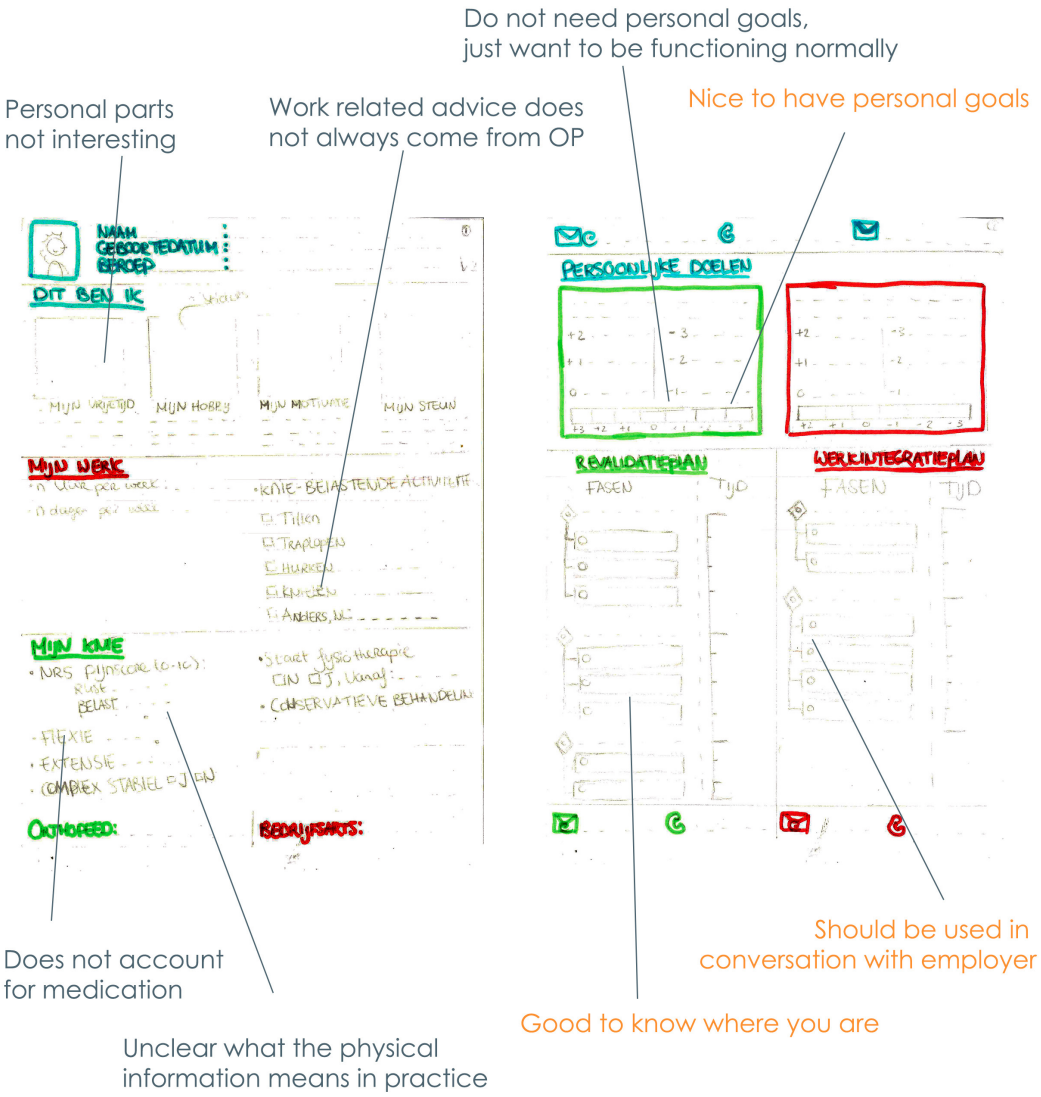


Figure 30: Patient feedback on idea 1

Idea direction 2 - MyTeam

The patients really liked that MyTeam makes all information surrounding his care process accessible in one place. It thereby provides the care providers with an easy overview of the process.

Furthermore it would help the patient feel supported during his meetings with the care providers, as he is able to show the feedback of other care providers. The subjects on which they provide feedback, should be personal depending on the patient and his job. The patient also wants to be able to provide his own feedback and experiences in case of complaints, or at special moments in the process.

However not all patients feel comfortable with just all treating physicians being able to see their personal information.

Finally the patients really like to be able to directly contact the physicians or at least be provided with their contact information.

More detailed feedback can be seen in figure 31.

It might not be a bad idea, if every patient would have a calendar and they have a specific complaint in a certain period of time and the physicians might be able to see a pattern.

Than you should be able to discuss it, we are having a conversation right now and you have your own image of me, which is fine. But maybe I meant something else. So I should have to possibility to provide feedback.

'I don't have any secrets, but there would be so many people that would be able to see your information.'

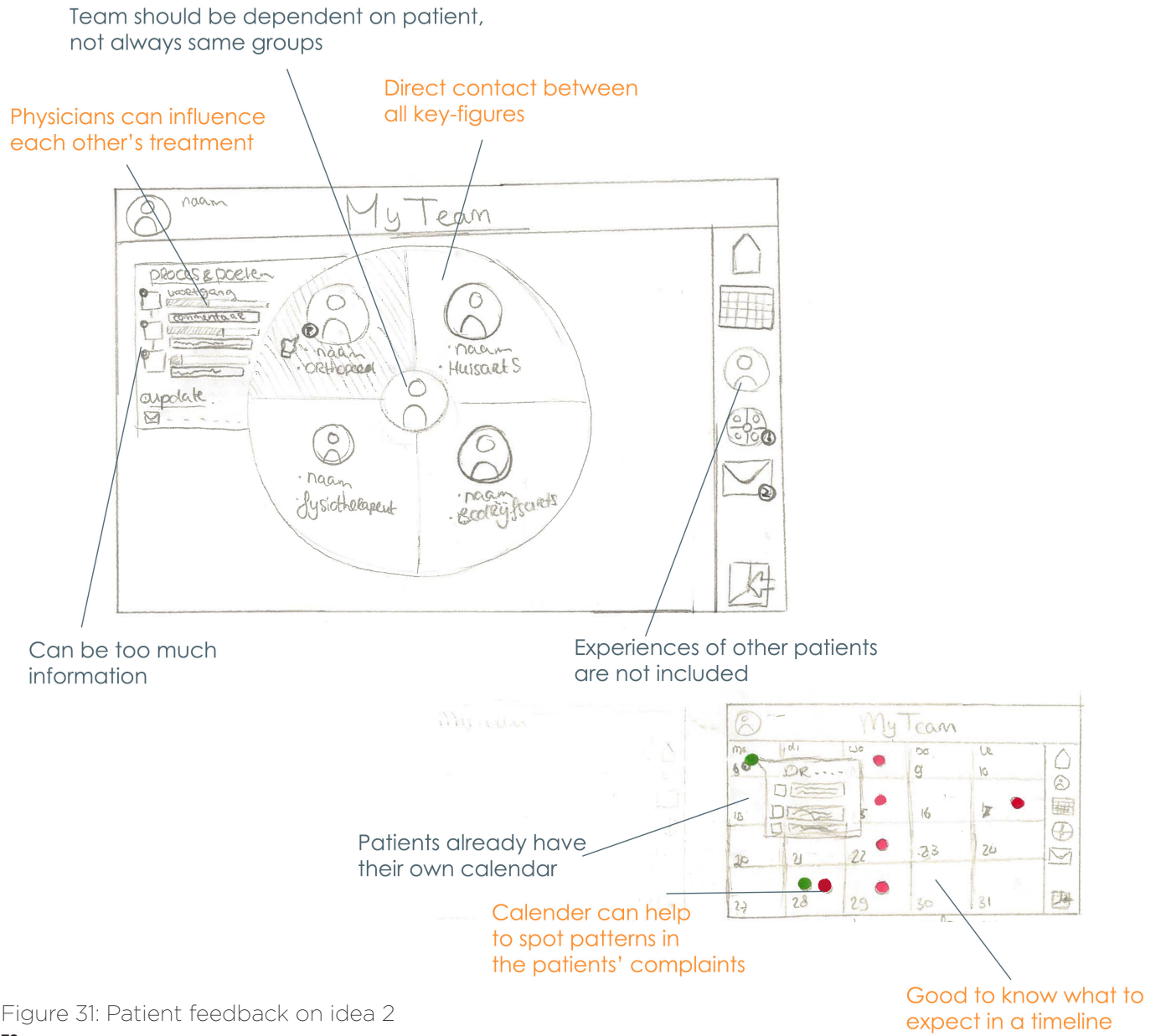


Figure 31: Patient feedback on idea 2

Idea direction 3 - Out of Office

The patients believe that a tool that warns when not exercising enough would motivate them. They would also like to be warned before doing too much. Rewards could make this tool even more stimulating. However, for some patients this tool would just be a fun extra.

I went too far very often and than this would be a big help for me, like; He, take a break.

The patients believe it is difficult for the physiotherapist to determine every patient' s personal limitations, especially in the beginning of the rehabilitation. To make the care providers understand the patient' s progress, the patient likes being able to show them this information.

I would really like being able to see how you are doing for yourself. Look, when you go to the occupational physician, he already has all these preconceptions on paper and this is your own, you can just show it.

Also the exercise goals should be adjusted from day to day depending on other activities or the days before, when the patient had maybe exercised to little or too much.

Furthermore, the patients would like the idea of the physicians to be more involved on a daily basis, or when problems occur.

However, the information that the physicians receive should only be the information that they need to act upon to prevent too much pressure being put on them.

Direct involvement of the physician in the rehabilitation process would of course also provide with the possibility to, when something is going wrong... ask something.

The more data you collect, it makes you feel like you have to do something with it and I really think that is too much.

More detailed feedback can be seen in figure 32.

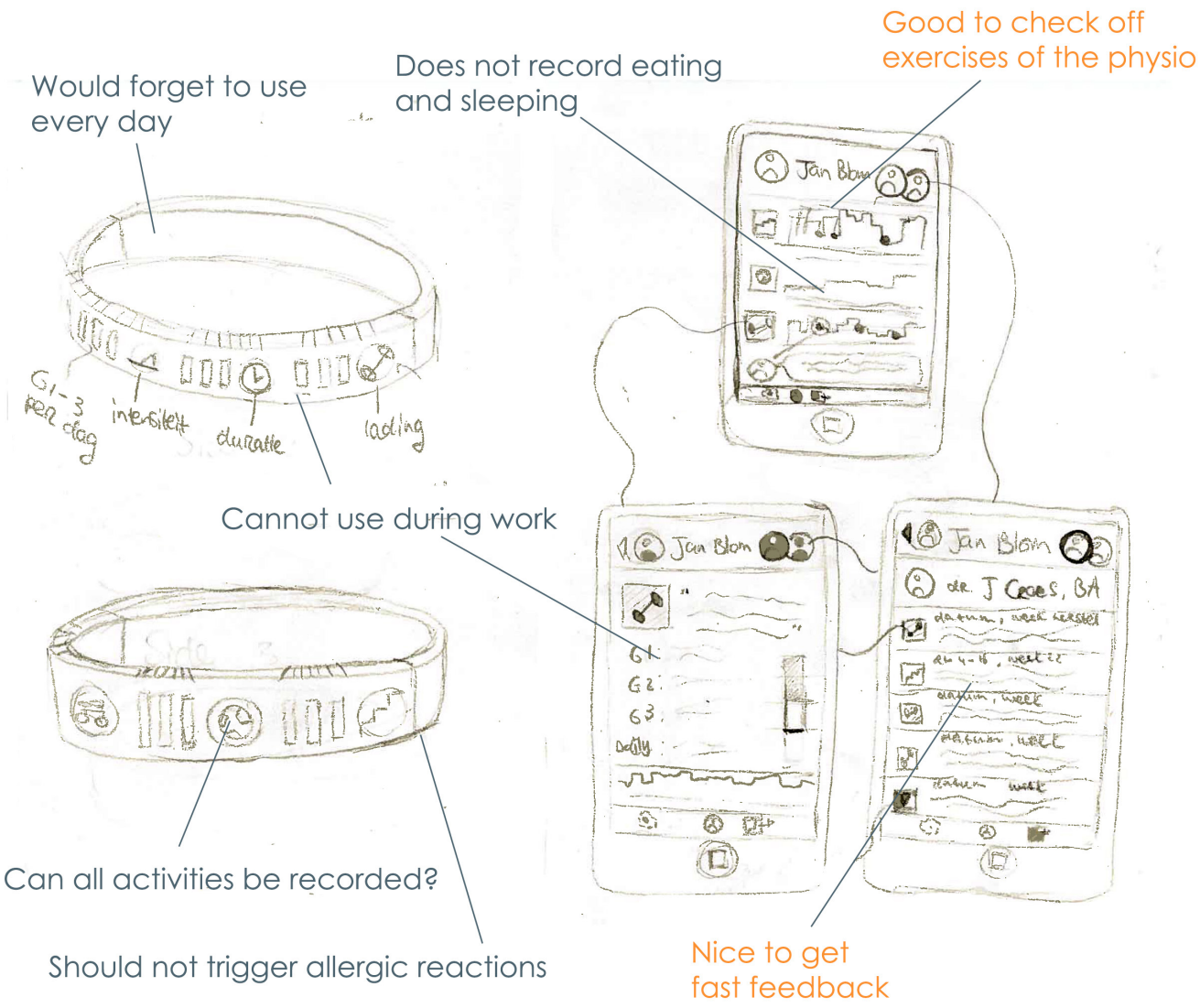


Figure 32: Patient feedback on idea 3

DISCUSSION

Limitations of the study

The main points of improvement were on the function and interpretation of the presented information and the people involved in their care that could benefit from the use of these ideas.

The participants could only provide quite general feedback, as the storyboards and prototypes, which were presented to them, were low-fidelity. However, this allowed the participants to feel more open in expressing their opinions about them (Lim, K-Y, Pangam, A., Periyasami, S., Aneja, S., 2006). Also, the low-fidelity of the presented materials allowed the participants to think more freely on the possible implications of the idea directions.

As this study has been done with a small sample group, the results cannot be considered definitive. They do provide guidance for the further development of the idea directions and new criteria, as these can be compared to the opportunities identified in the earlier studies with occupational physicians, orthopaedic surgeons and patients.

CONCLUSION

What aspects of the presented solution possibilities, to improve collaboration between the occupational physician and orthopaedic surgeon, should be improved upon to optimise the patient experience?

In general all solution possibilities were considered helpful and would motivate the patient during recovery. However, some points of improvement of course remain.

The Flying Start solution should provide the patient with information which is easier to understand in allowances and tips for everyday life, as well as allow for the rehabilitation plan to change depending on the patients' progress during rehabilitation.

The MyTeam solution should be improved to provide the patient with clearer expectations and allow them to contact other patients, as well as provide feedback towards the physicians on their experiences of their care.

The Out of Office solution should have more simple and easy to navigate technology and allow for patients to keep track on their progress on the tasks set out by the physiotherapist as well as extra activities they do during the day and at work. Their exercise goals should account for the extra activity as well, to make sure the patients do not run into complications due to their high activity level.

5.3 CONCEPTS

Based on the feedback of the patients, idea directions have been developed further into concepts. The following sub-chapters discuss the most significant changes.

CONCEPT 1 - FLYING START

Instead of just in the first meeting with the occupational physician and orthopaedic surgeon, the patient takes this with him to all meetings with care providers. The concept exists of a small personal booklet of insert covers in which the sheets are stored, see figure 33.

The care provider fills out the relevant parts of the main sheet for his expertise (see figure 34) during his meeting with the patient. Based on this, the other care providers adjust their goals and plan for the rehabilitation (see figure 35).

An extra sheet has been added, which provides the patient with an overview of questions most patients face to help prepare the patient for meetings. It also has space for the patient to add his own questions, which come up while rereading the information at home or discussing with family and friends (see figure 36).

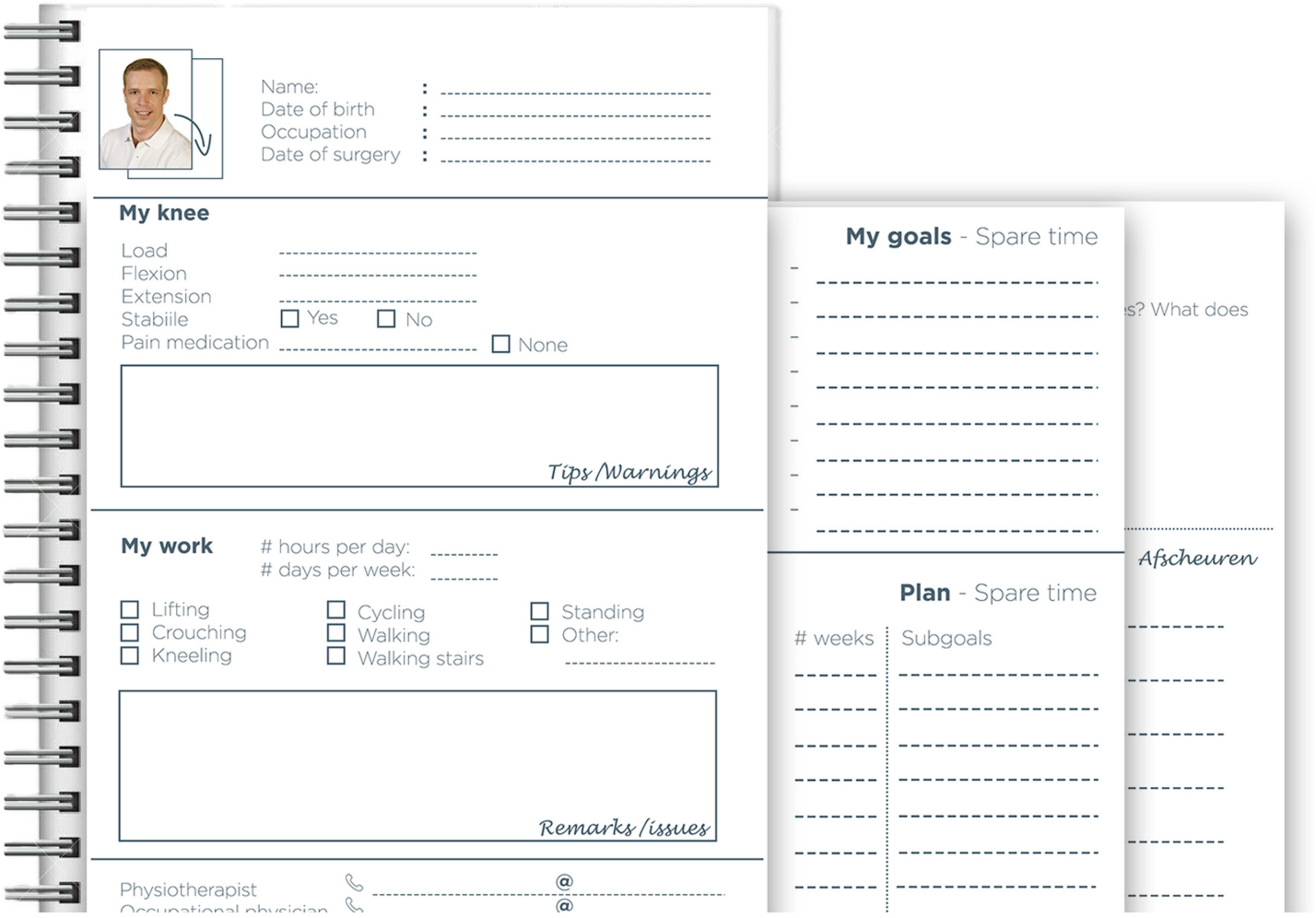


Figure 33: Flying start booklet

Name: :
Date of birth :
Occupation :
Date of surgery :

My knee

Load
Flexion
Extension
Stabiile ☐ Yes ☐ No
Pain medication ☐ None

Tips/Warnings

My work # hours per day:
days per week:

☐ Lifting ☐ Cycling ☐ Standing
☐ Crouching ☐ Walking ☐ Other:
☐ Kneeling ☐ Walking stairs

Remarks/issues

Physiotherapist @
Occupational physician @
Orthopaedic surgeon @

Figure 34: Flying start main sheet

Common questions

- What activities should I be careful with (at work)?
- How long will the prosthesis function without issues? What does this depend on?
- What can I do to promote my recovery to work?
- When should I contact the physicians again?

My questions *Afscheuren*

-
-
-
-
-
-

Figure 36: Flying start questions sheet

My goals - Work

My goals - Spare time

Plan - Work

# weeks	Subgoals

Plan - Spare time

# weeks	Subgoals

Figure 35: Flying start plan sheet

CONCEPT 2 - MYTEAM

The following main changes have been made to the My Team idea direction:

- Adding an average timeline to show what the patients can expect (see figure 37).
- Adding the option of looking into the process of other patients (see figure 38).
- Making the information of the care providers more structured, efficient and personal (see figure 39).
- Adding the option of patient feedback for the care providers.
- Allowing the care providers to inform each other without the patient seeing it.
- Adding a screen, so the patient can decide what parts of his timeline are visible for other patients, with what keywords others can find them and who of his physicians can see into his care profile by adjusting the privacy settings (see figure 40).

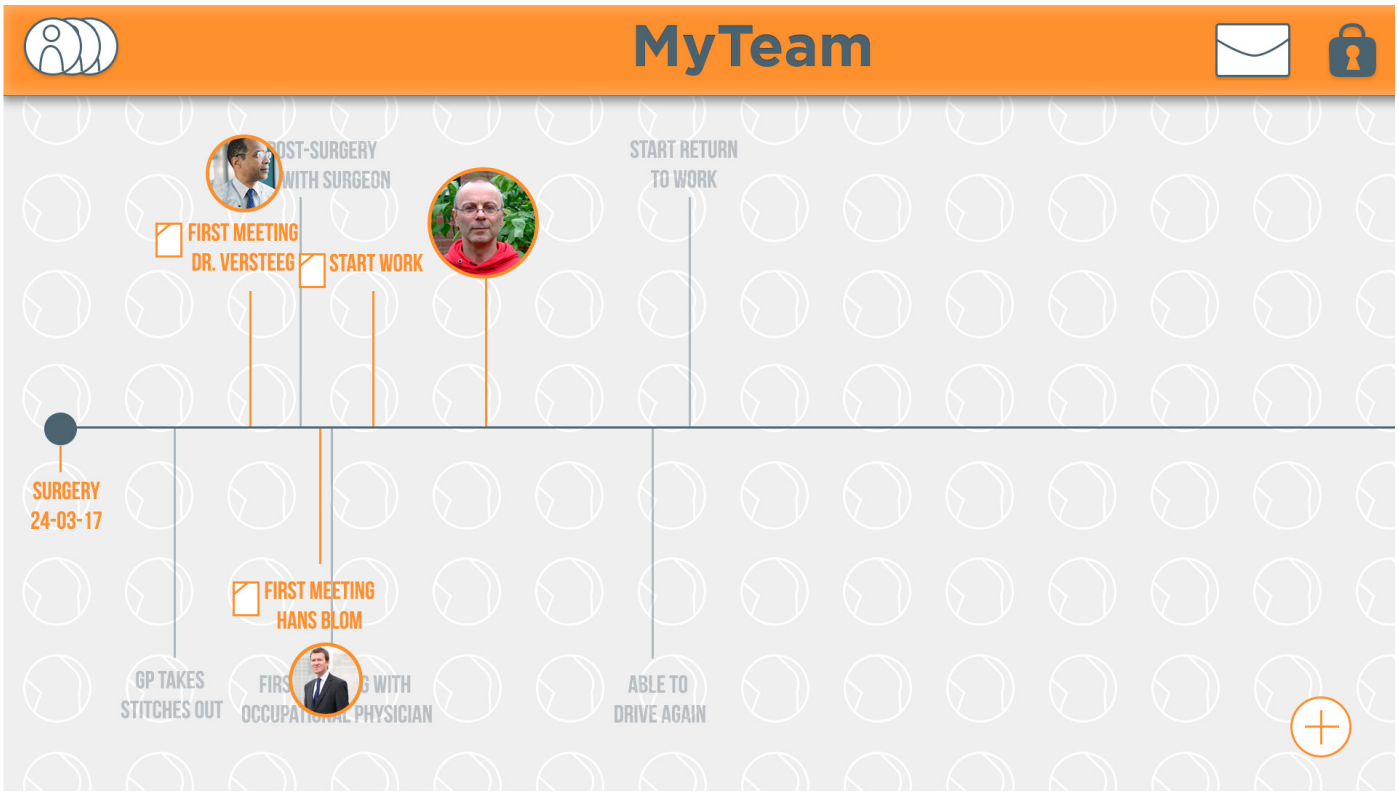


Figure 37: MyTeam personal timeline screen

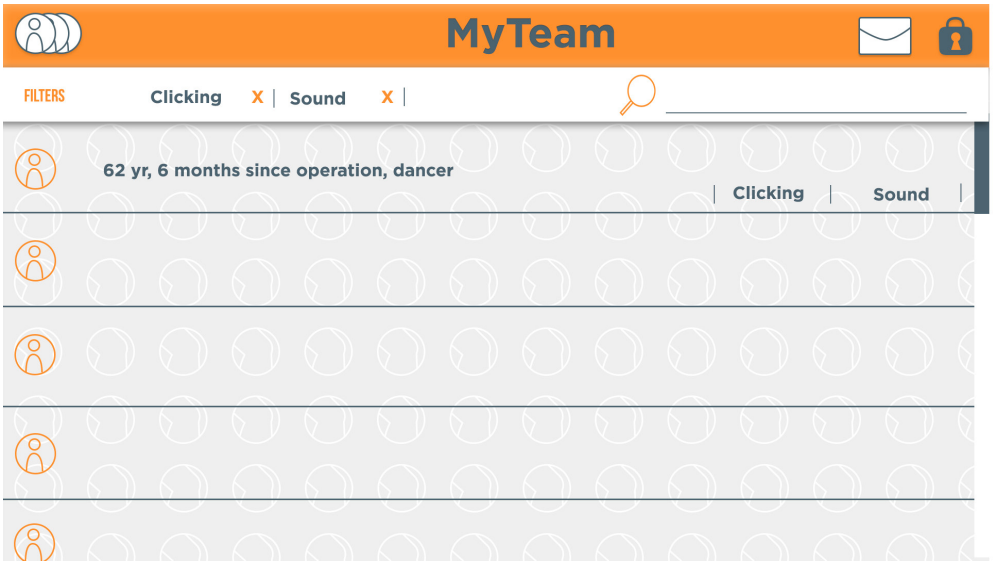


Figure 38 : MyTeam other patients screen

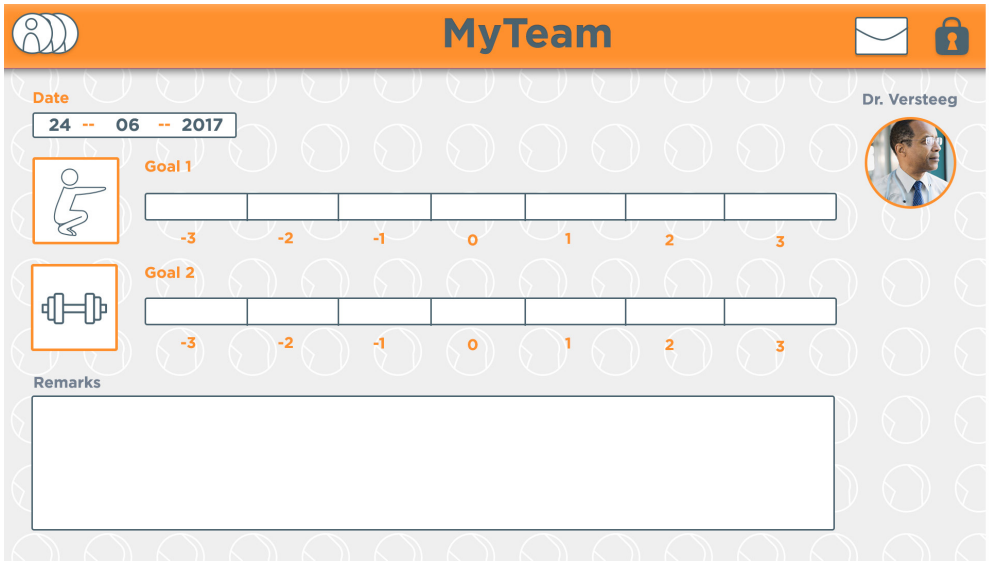


Figure 39 : MyTeam physician entry screen

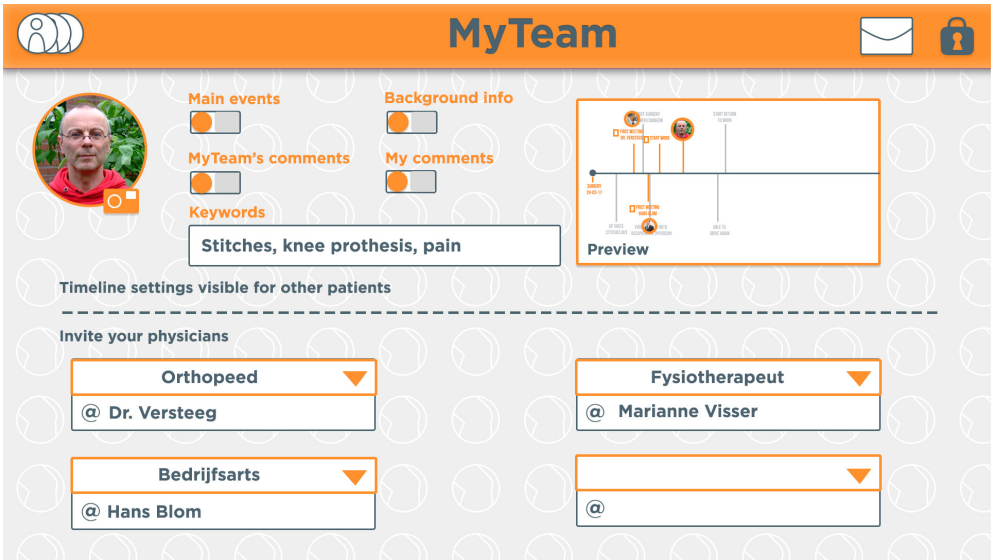


Figure 40 : MyTeam privacy screen

CONCEPT 3 - OUT OF OFFICE

Despite not all patients considering this idea direction as necessary for their recovery, the need to balance their level of activity between doing too little and doing too much, was mentioned by nearly all participants of the second study. Therefore, based on their feedback the Out of Office idea direction has been developed further as well (see figure 41).

The following main changes have been made to the Out of Office idea direction:

- Adding the option to cross off the exercises provided by the physiotherapist (see figure 42).
- Adding rewards
- Allowing the patient to add extra exercises, so the app takes these into account as well, when adjusting the goals for the day and keep track of the patients real activity level (see figure 43).
- Adding a warning option in case of complications for the care providers. this way, when the patient is experiencing complications, they can provide feedback or make the an appointment with the patient (see figure 44).

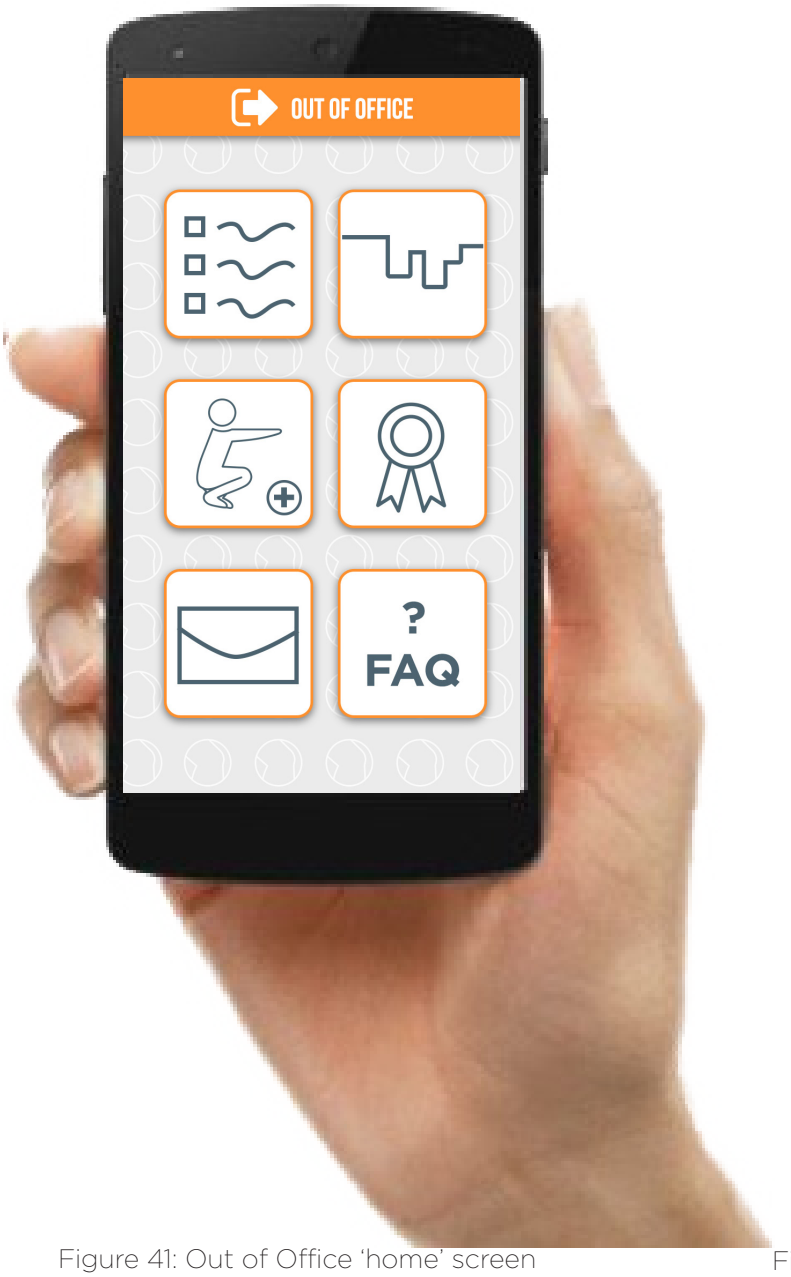


Figure 41: Out of Office 'home' screen

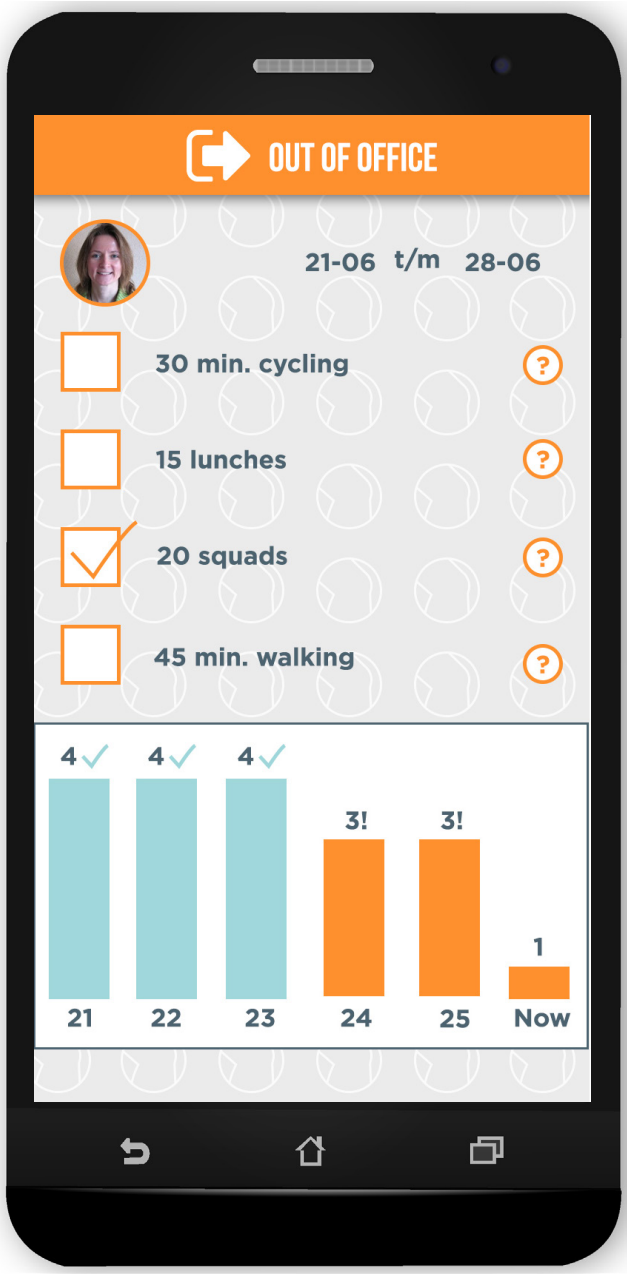


Figure 42: Out of Office exercises screen

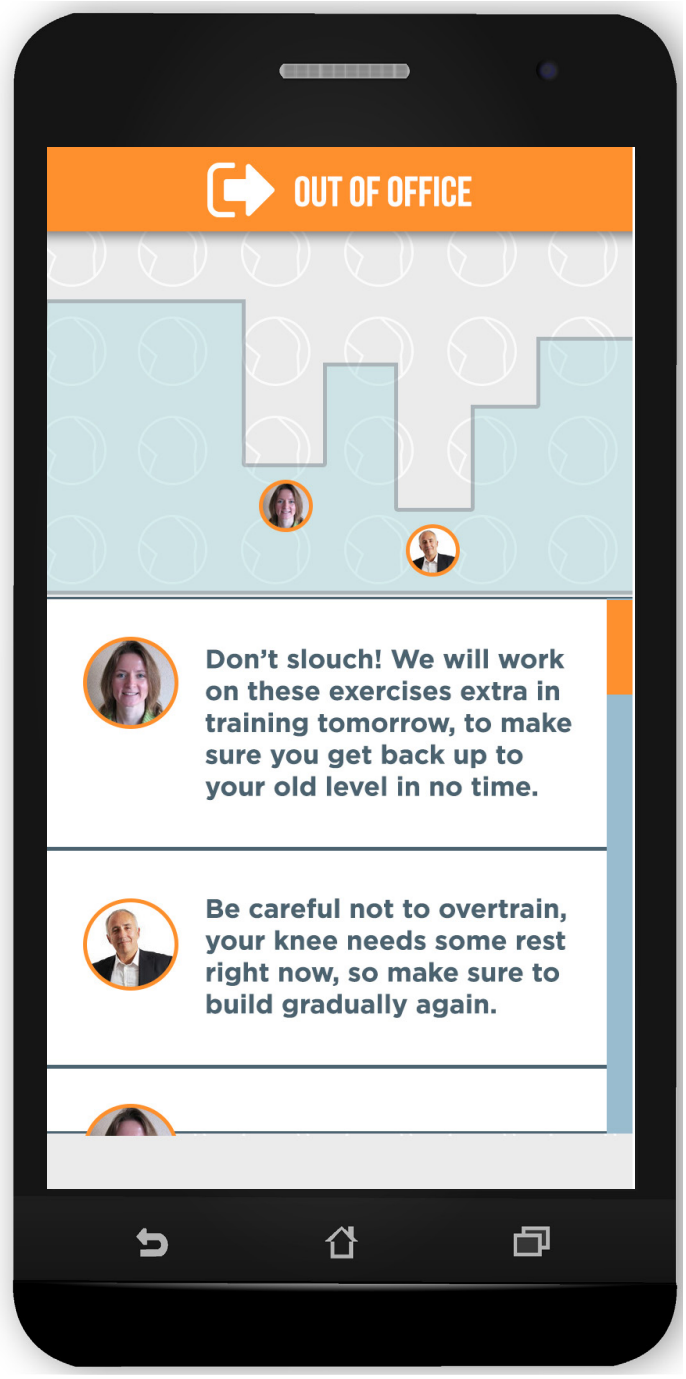


Figure 43: Out of Office activity level screen

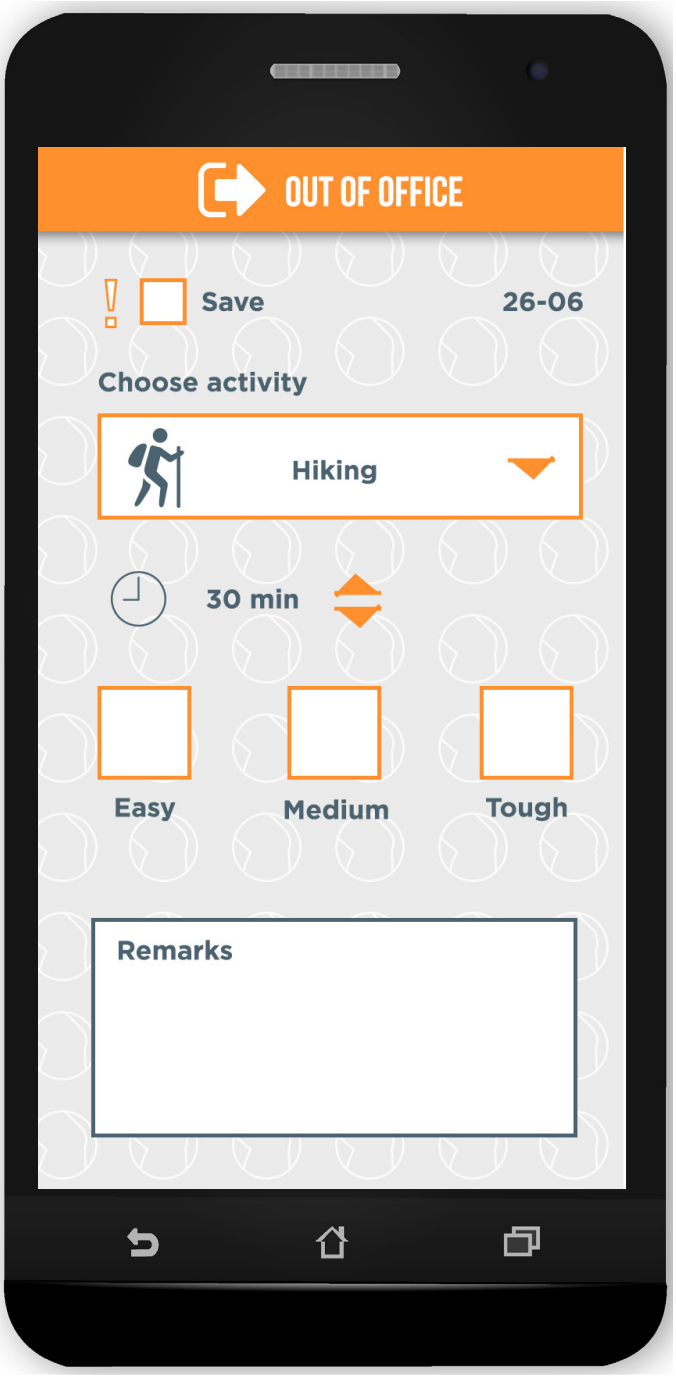


Figure 44: Out of Office new activity screen

5.4 CONCLUSION

The results of this study have identified new opportunities for further development of the three idea directions; Flying start, MyTeam and Out of Office.

One of the most important insights is that the physiotherapist is the most influential with regard to the patient's experience of the whole process. In general the patients appreciated it when their care providers were involved, personal, understanding, direct and honest and available for them when they had questions or complications occurred.

Furthermore, though the experiences of patients differ, all patients also struggled with the same issues during recovery: setting fitting expectations, feeling insecure and unsure in their level of activity, feeling lost at certain times during the rehabilitation process and being confused by the many different sources of (contradictory) advise.

The patients' experiences in the process have been used to establish new criteria and a new interaction vision, which better describes their desire for support and a sense of certainty, by being able to rely on the expertise and guidance of their physicians.

Based on the patients' feedback on the idea directions these have been revised into concepts which better fulfil these before-mentioned needs.

In the next chapter one of the concepts will be chosen to develop further based on the criteria gathered and combined from the interviews with the occupational physicians and orthopaedic surgeons and the interviews with the patients.

CHAPTER 6: FINAL DESIGN & EVALUATION

INTRODUCTION

In this chapter, one of the concepts has been chosen to develop further into a final concept. This concept is described based on its functions, use in context and possible implementation and realisation both in the current context of the work-directed guidance of TKP patients and the future context.

Furthermore, using an interactive prototype, the concept has been evaluated in a study with 5 TKP patients, 5 occupational physician and 5 orthopaedic surgeons. The goal of this study was to evaluate the tool for its;

- Perceived effectiveness
- Fit within the current way of working of the occupational physician and orthopaedic surgeon
- Fit with the expressed needs of the occupational physician, patient and orthopaedic surgeon for the RTW guidance of TKP patients in knee-demanding work
- Usability Issues

With the outcomes of this research, suggestions for improvement of the tool have been formulated.

6.1 CONCEPT CHOICE

Using the criteria that have been gathered from the former researches, the weighted criteria method has been used to evaluate the three concepts (Rozenburg & Eekels, 1998). The results of this evaluation can be found in appendix N. Based on these results, the concept MyTeam has been selected to be developed as final concept.

The most important points on which this concept scored well compared to the other two concepts were:

- **Facilitating expectation management**. This tool does not only facilitate expectation management for the patient, but also for the occupational physician, who does not encounter patients with the same symptoms in a similar line of work as often as the orthopaedic surgeon.
- **Being time-efficient for the care providers**. They need to document the outcomes of conversations with the client in their own files, so this could be linked to their entry in this system.
- **Informing the care providers when possible problems in the patient's rehabilitation could be occurring**. With this concept the care providers can choose when and on which subjects they receive information from the team. Therefore, they can especially be informed when the patient comes across complications in their area of expertise.
- **Stimulating contact with patients in similar situations**. This tool allows patients to share their experiences with others and look up other patients' experiences.
- **Stimulating a more personal and involved contact** between the patient andhis care providers. Now the care providers are often not aware what others are involved in the patient's guidance and who they are. With this concept all care providers are known to each other and have a more direct contact, to make them more personally involved.

Based on the criteria, the concept should still be improved on the following points:

- The concept should have a better fit in the working process of the occupational physician and orthopaedic surgeon.
- The information provided by the orthopaedic surgeon and physiotherapist should be more easily translatable into functional allowances for the patient's work.
- The patient should be made more aware of actions he needs to take to promote the rehabilitation process.
- The patient should be helped to better understand the effect of his activities and activity level on the prosthesis.
- The patient should not only know his allowed movements, but also what and how much movement would promote their rehabilitation.
- The care providers should only be provided with information that they can directly use in their practice.

With these pointers, the concept has been developed further into the final concept that has been used in the evaluation study.

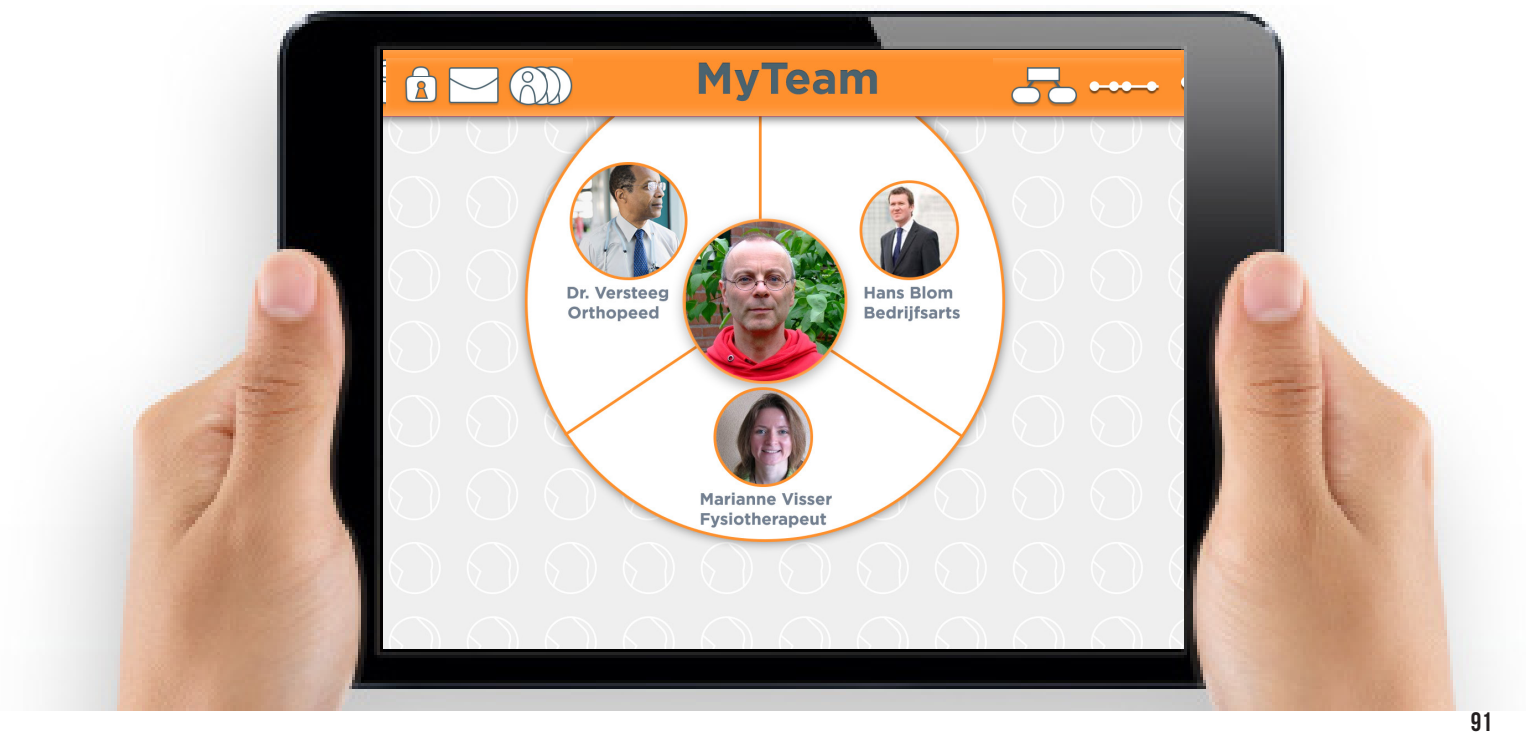
6.2 FINAL CONCEPT

The MyTeam concept (see figure 45) has been developed with the following main goal: *Forming fitting expectations based on information and insight in the complete icontext.*

Forming expectations includes being able to set fitting goals and establish a care plan. The information on which these expectations are based should be as objective as possible. This need was expressed by both the patients and the occupational physicians, as well as, though at a lesser extent, by the orthopaedic surgeons.

The way this goal has been met and what elements are needed to fulfil this goal is different per group of users. In the next subchapters, the concept will be explained from the points of view of the patient, occupational physician and orthopaedic surgeon.

Figure 45: Home screen of the final MyTeam concept



MYTEAM FOR THE PATIENT

In line with the main goal, the goal for the patient using MyTeam is:
To get an overview of his past & future care in order to understanding what to expect and feel secure.

Setting up the patient's team is done by the patient inviting his care providers and providing them with permission to see certain information or perform certain actions in the system (see figure 47).

The overview of the patients' rehabilitation process is provided in a timeline, which shows the main events of the patients' care and meetings with the care providers together with their feedback notes (see figure 48). The patient can ask the care providers questions based on their entries.

Underneath the patient's personal care process, the main moments in the typical rehabilitation process for TKP patients are shown, so the patient has a better idea of what to expect when in the process.

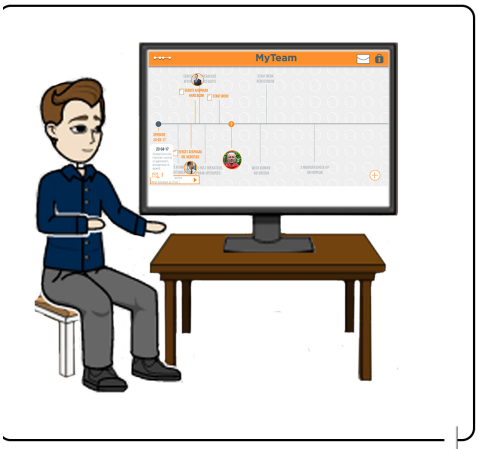
Furthermore, possible future outcomes of the patient's rehabilitation are presented in the timelines of other patients. The patient can look up these timelines by entering a specific event or complaint. The timelines of patietns, who have come across similar events in their rehabilitation, are of similar age and work in similar work environments, are then shown (see figure 49).

All these functions together will make the patient feel secure and supported in his rehabilitation back to work. Figure 46 shows the usage of the MyTeam functions by the patient.

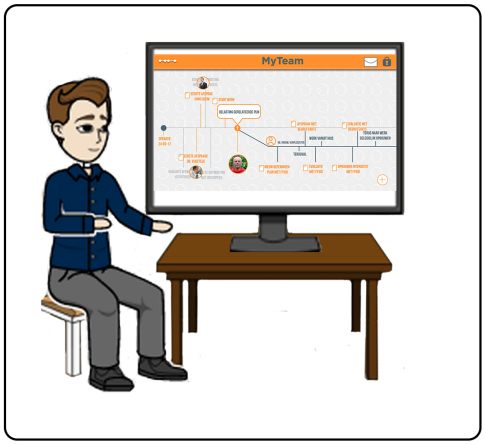
The patient meets with the orthopaedic surgeon for the first time to discuss the diagnosis and treatment options.

The orthopaedic surgeon introduces the patient to the MyTeam system and helps set it up.

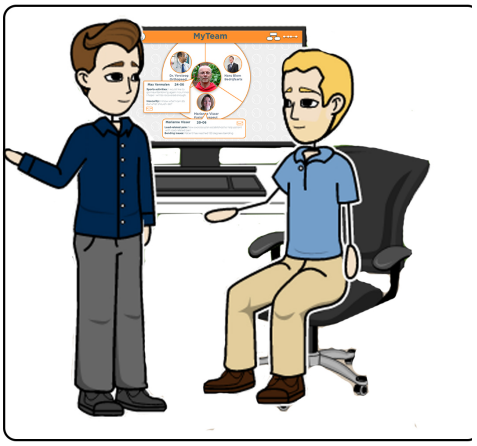
At home the patient can reread all the things just discussed with his care providers



The patient can ask his care providers a question, when something in their notes is unclear.



In MyTeam, the patient can see how other patients dealt with complications or important events in their recovery.



All care providers are always up-to-date on each other's care and advises.

Figure 46: MyTeam storyboard patient

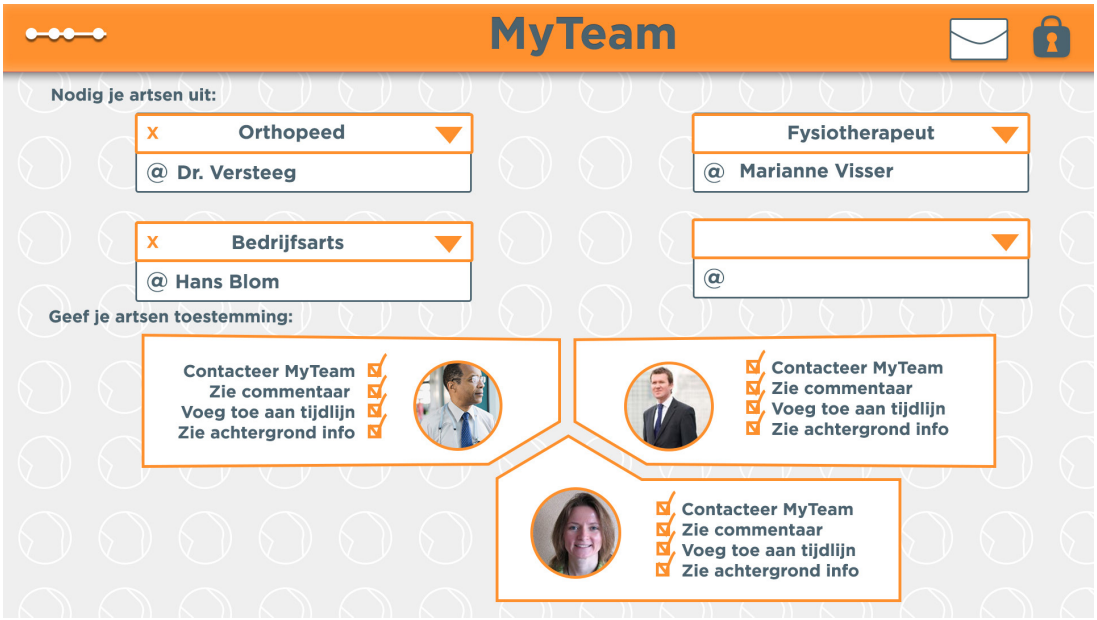


Figure 47: MyTeam inviting physicians and permission to view or add

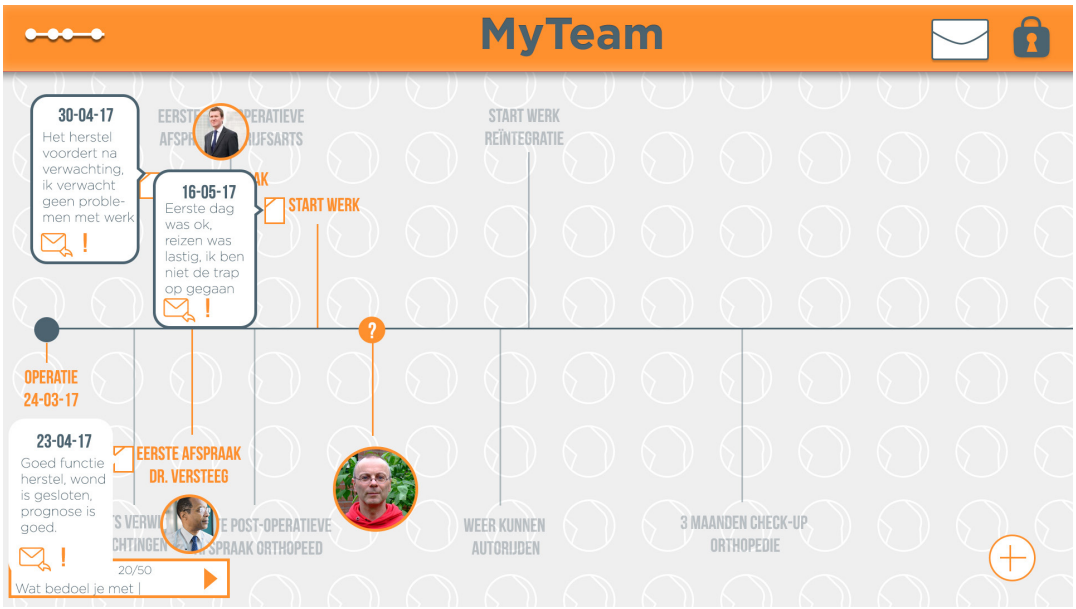


Figure 48: MyTeam patient timeline

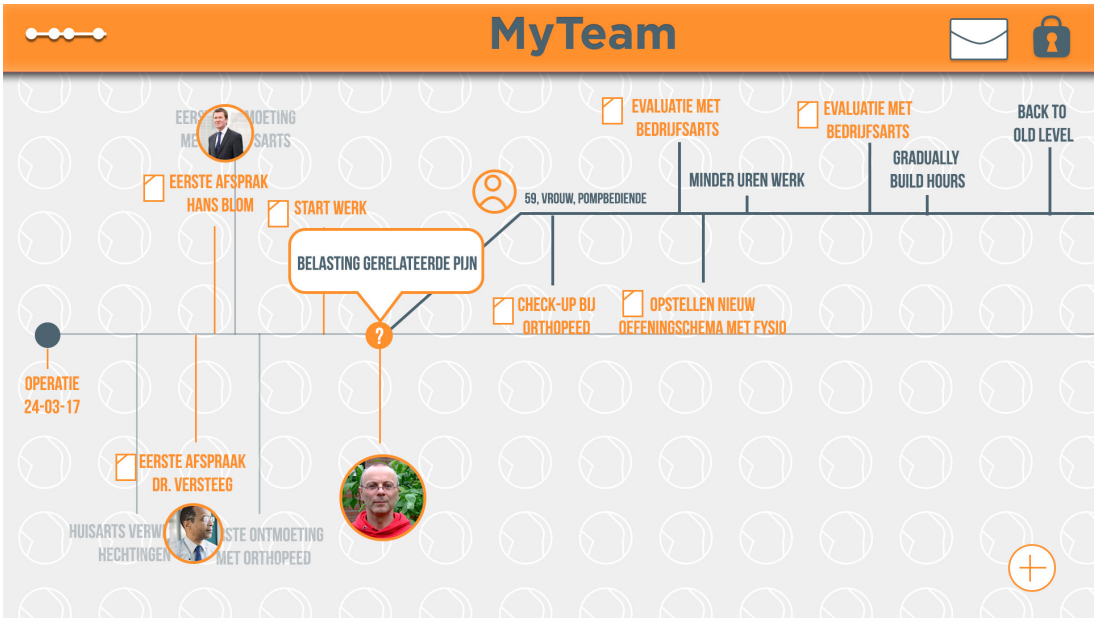


Figure 49: MyTeam possible future outcomes

MYTEAM FOR THE OCCUPATIONAL PHYSICIAN

In line with the main goal, the goal for the occupational physician using MyTeam is:
To have access to all information needed for this specific patient to form the base for the work-reintegration plan.

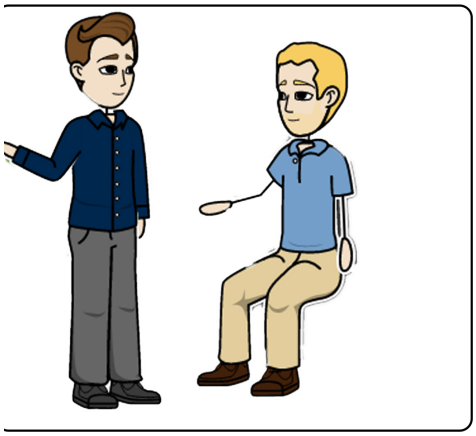
The first part of the information the occupational physicians typically need to base their plan on, is the patient's background information (see figure 51):

- Information on his treatment in orthopaedics.
- The outcomes of his surgery and the diagnosis
- The prognosis as made by the orthopaedic surgeon.

The second part of the information needed, changes throughout the rehabilitation process, depending on the patients' progress and whether or not he comes across complications. This can be found in the patients' timeline and the comments of other physicians (see figure 52).

To ensure the occupational physician receives only information he can use directly in his practice, he is able to select filters for the information, by selecting topics that interest him or are relevant for his care. These topics also provide the occupational physician with alerts to make sure he stays connected to the process outside of his regular meetings with the client, when needed.

As most occupational physicians do not come across many patients who have similar complaints in similar work circumstances, they often are less experienced guiding patients after a TKP in physically demanding work than the orthopaedic surgeon and physiotherapist. Therefore, the reintegration plan option allows them to establish a plan for the patient in his particular work, with pointers for the process, based on the terms of the 'Wet Verbetering Poortwachter'. These pointers are generated by looking at the sub-goals which other occupational physicians have used in MyTeam under the same main goal in similar patients. Whether patients are similar is based on their age and activities they do during work (see figure 53). The system only shows the 5 most used sub-goal for a main goal.

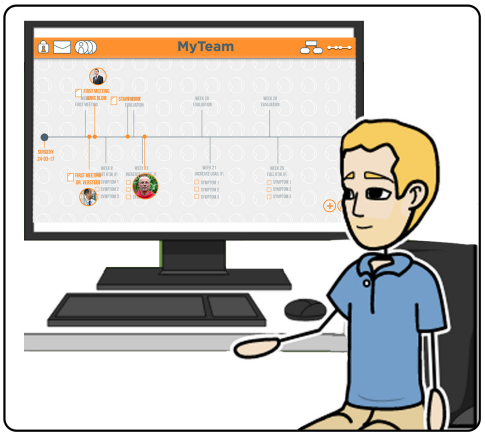


The occupational physician meets the patient for the first time to discuss his surgery and possibilities for work reintegration.

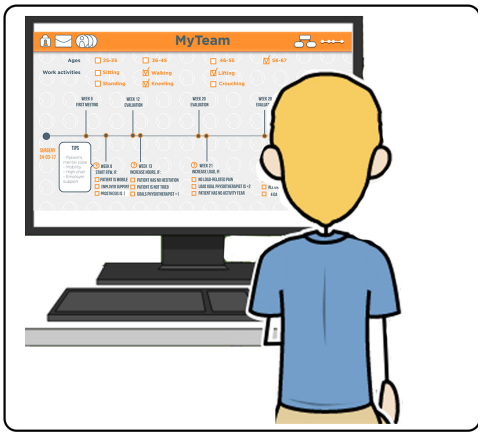
The patient adds the occupational physician to his MyTeam.

The occupational physician can now look into the care pre-surgery and the comments of the other care providers.

When he misses information, the occupational physician can send a direct message to one of the other care providers.



The occupational physician also adds his own findings to the patient's timeline.



Based on a standard checklist provided by the experiences of other occupational physicians, the occupational physician makes a

Figure 50: MyTeam storyboard occupational physician

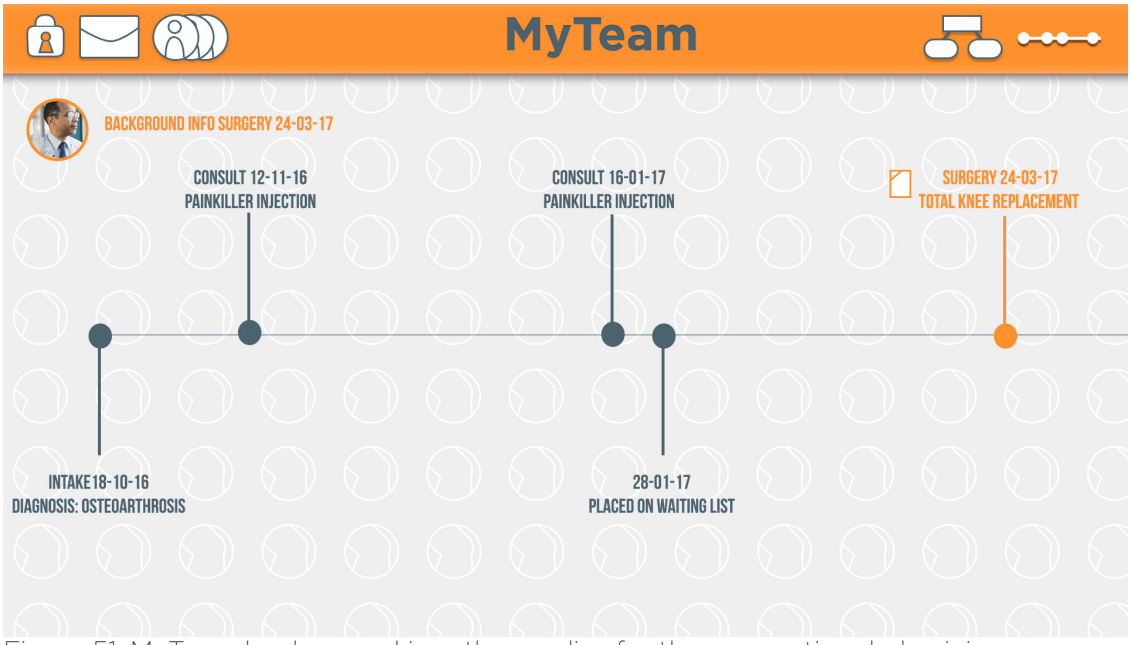


Figure 51: MyTeam background in orthopaedics for the occupational physician

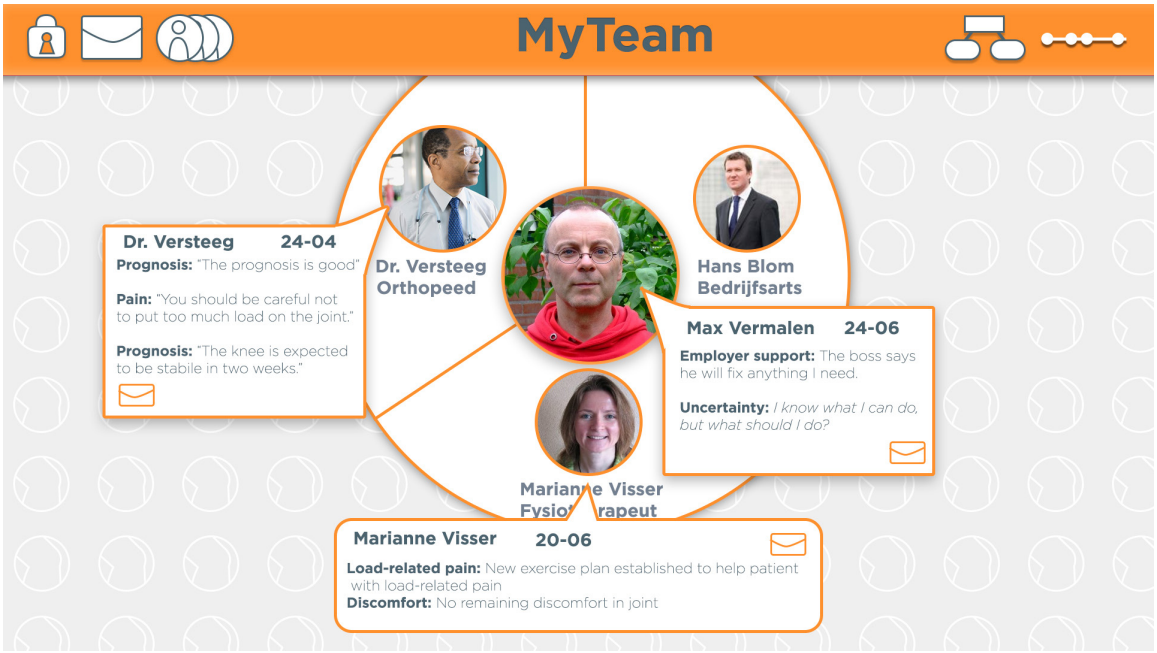


Figure 52: MyTeam comments other physicians on topics of interest

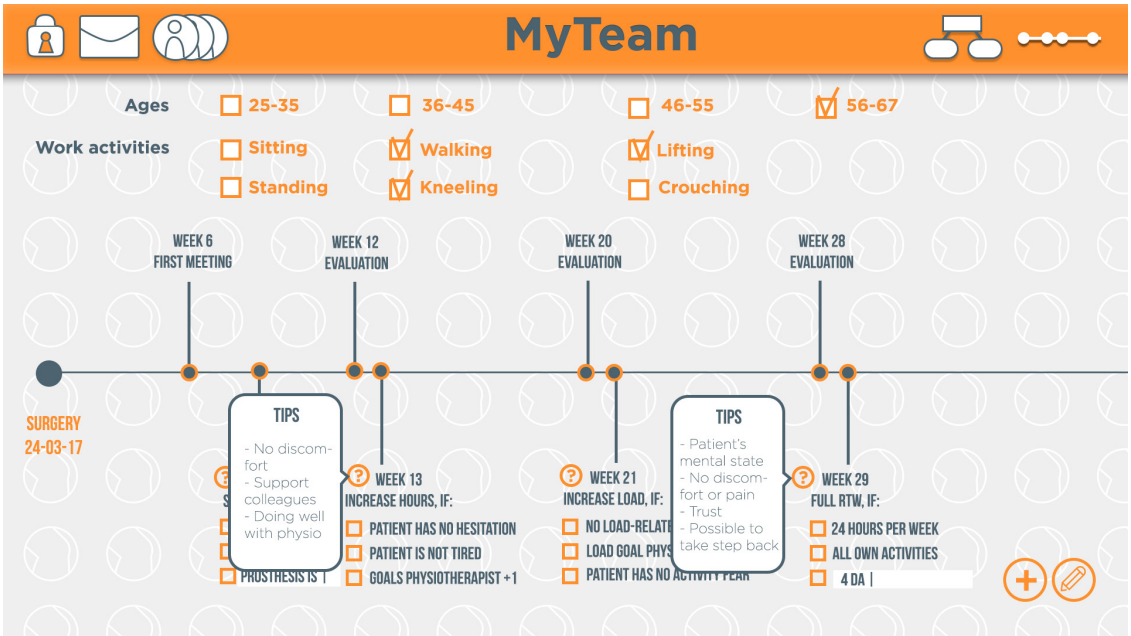


Figure 53: MyTeam reintegration plan occupational physician

MYTEAM FOR THE ORTHOPAEDIC SURGEON

In line with the main goal, the goal for the orthopaedic surgeon using MyTeam is: *'To support rehabilitation back to work, by supplying information when needed and being alerted when their expert attention is required.'.*

The orthopaedic surgeon typically plays a small role in the patient's rehabilitation process after surgery. He does not have much time to spend per patient outside of the standard 10 minutes check-up meetings with the patient. Therefore the orthopaedic surgeon only uses this system just after a meeting with the patient, to fill out the results of the meeting (see figure 55), or when the system alerts him based on the comments of the other physicians or the patient.

The orthopaedic surgeon selects subjects on which he is alerted and can be contacted by the other team members, depending on his interests and specific areas of expertise (see figure 56).

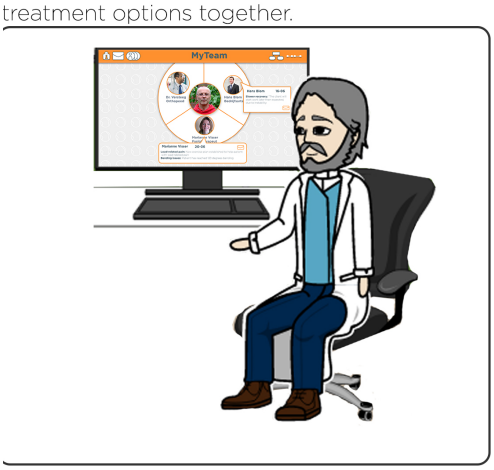
The information which the orthopaedic surgeon receives is also filtered through this system, based on this system. This way he only receives information, which is directly usable in his practice, unless he disables the filters (see figure 57).

Figure 58 shows the usage of the MyTeam functions by the orthopaedic surgeon.

The orthopaedic surgeon meets the patient for the first time to discuss the diagnosis and treatment options together.

The orthopaedic surgeon introduces the patient to MyTeam & starts setup.

After the meeting, the orthopaedic surgeon sets his own alerts and enters an update on patient's status



The orthopaedic surgeon gets notified when his specialised attention is needed or when he needs to set another meeting.

During the next meeting, the orthopaedic surgeon has read all needed information to be up-to-date with the patient's status.

Figure 54: MyTeam storyboard orthopaedic surgeon

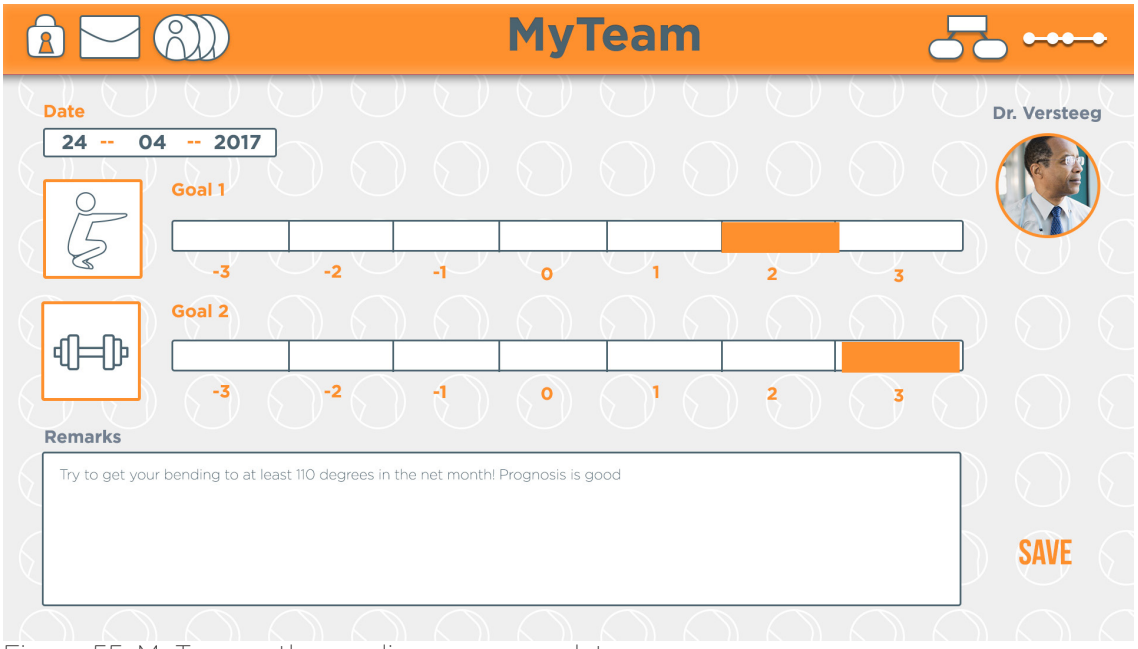


Figure 55: MyTeam orthopaedic surgeon update

Figure 56: MyTeam information filters orthopaedic surgeon

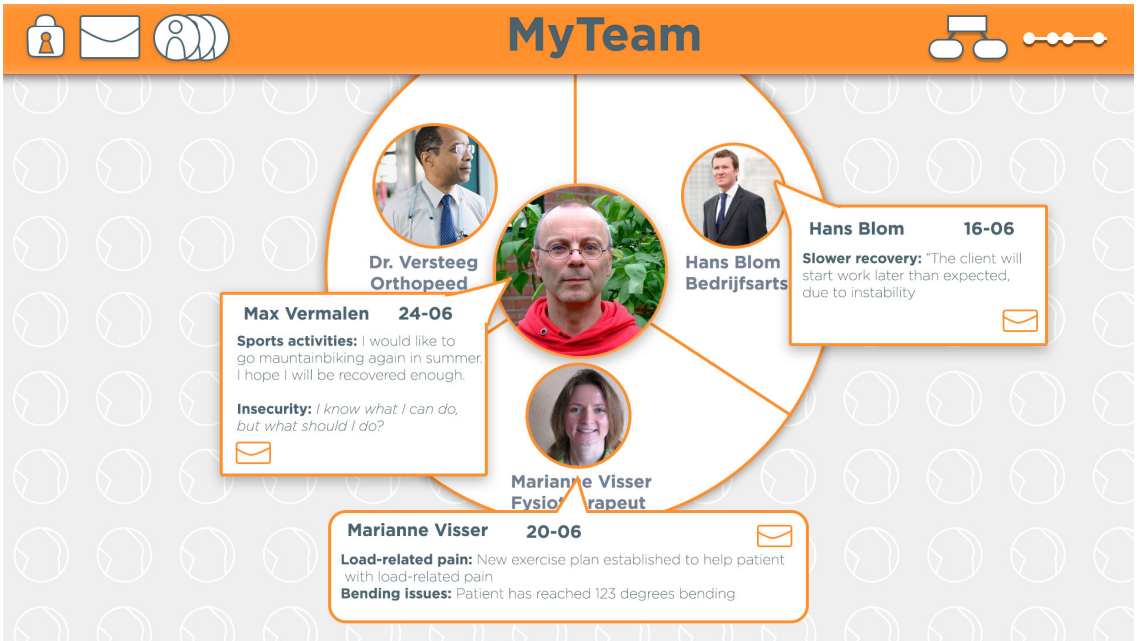


Figure 57: MYTeam physician entries based on the selected information filters

6.3 EVALUATION STUDY

To evaluate the MyTeam's suitability to the work-directed care context and possibility to improve the guidance by the occupational physician and orthopaedic surgeon, of TKP patients back to work, an evaluation study has been conducted.

INTRODUCTION

The goal of this study is:

"To identify aspects of MyTeam to be improved, in order to;

- *Ensure the fit of the tool in the current work processes of the orthopaedic surgeon and occupational physician.*
- *Improve the perceived effectiveness of MyTeam in the collaboration between care providers in work-directed care..*
- *Identify the elements of the tool that support the collaboration.*
- *Ensure MyTeam stimulates the proper interaction qualities.'*

METHOD

This study is done by performing qualitative interviews combined with a walkthrough. For this walkthrough an interactive prototype of MyTeam is used.

Participants

The participants of this study have been selected from the group of participants of the previous studies, as the tool is based on the results gathered from these interviews. In total 3 occupational physicians and 3 orthopaedic surgeons and 5 knee-prosthesis patients have participated. All occupational physicians and orthopaedic surgeons work at different hospitals or occupational services. The patients have been selected for doing knee-demanding work and having experienced issues in the guidance during their RTW. For the demographics of the participants, see table 4.

Recruitment

The participants have been contacted over the email, with an information letter as written in appendix O and P. With this email, the Informed Consent was included to inform the participants on the contents of the interview, see appendix Q.

The interviews

The interviews took up 40 minutes in total. During the first 20 minutes the participants were asked to complete a series of tasks using the interactive prototype, that fit within the scenario presented by the researcher. During this walkthrough, the participant is encouraged think out loud and ask questions when needed. The tasks will be dependent on the group of participants with whom the tool is tested.

Table 4: Participant demographics study 3

Occupational physicians		
Sex	Male	3
	Female	1
Years of experience	<5	1
	5 to 10	1
	>10	2
Amount of TKP patients per year	1	1
	2 to 3	2
	>4	1
Orthopaedic surgeons		
Sex	Male	3
	Female	0
Years of experience	<5	0
	5 to 10	1
	10 to 20	1
	>20	1
Amount of TKP patients per year	<10	0
	10 to 30	1
	>30	2

Patients		
Sex	Male	2
	Female	3
Age	40 to 50	0
	50 to 60	2
	60 to 67	3
Level of physically demanding activities at work	Mostly lifting & other demanding activities	3
	Mostly standing & walking	1
	Mostly seated	1
Occupational physician involved	Yes	3
	No	2
Time since knee prosthesis	3-6 months	1
	6 months - 1 year	2
	>1 year	2
RTW	Full	3
	Partial	2

For the occupational physicians the tasks were:
- Change the subjects on which you would like to be informed by the team.
- Look up the information you need in the client's personal rehabilitation process.
- Adjust your reintegration plan.
- Look up information of other team members, which you need to evaluate the client's progress.

For the orthopaedic surgeons the tasks were:
- Change the subjects on which you would like to be informed by the team.
- Look up the information you need in the patient's personal rehabilitation process.
- Look up information of the other team members, which you need to evaluate a patient's progress.

For the patients the tasks were:
- Set up your personal 'MyTeam'.
- Find out what happened with similar patients in a moment in their RTW similar to yours.
- Provide feedback on a message of one of your team members.

During the next 15 minutes the researcher asked the participant three main questions:
- In what way would this tool fit in your current way of working with patients with a knee prosthesis in knee-demanding work?
- What aspects of the tool would be beneficial or disadvantageous to the effectiveness of tool for facilitating the work-directed collaboration with the occupational physician/orthopaedic surgeon?
- What needs in the work-directed guidance of patients with a knee prosthesis in knee-demanding work remain unfulfilled?

When needed additional questions have been asked for clarification.

In the last 5 minutes the participant was asked to fill out a survey on the interaction qualities of the tool (see appendix R).

The interviews took place in person, so the researcher can explain the scenario and the prototype of the tool. Also, the participant can fill out the survey, while asking questions when needed.

Analysis

During the walkthrough, the participants' actions were recorded as touch points by the system called 'LookBack'. The interviews were recorded using a phone operated audio recorder.

The analysis of the usability issues, which came up during the walkthrough of the prototype, has been done by examining the problems at different levels of the User Action Framework (or UAF in short) (Khajouei, Peute, Hasman, Jaspers, 2011). This framework exists of 4 first level categories with subcategories within these four, depending on the usability issues identified during the evaluation study. The 4 first level categories are:
- Planning; the user's ability of work goal decomposition. The user establishes a goal, decomposes the goal into tasks and establishes an intention of what to do to accomplish the task.
- Translation; the user's ability correctly interpret the system's presentation, for their content or meaning.
- Physical action; the user's ability to execute the tasks by manipulating user interface objects
- Assessment; the user's ability to perceive, interpret and evaluate the resulting system state.

The categorisation of the issues in the UAF is accompanied by a quote. Also, a severity rating is given to the usability issue, depending on; the possible effect of the usability issue on the usage of the system. These ratings range from 0 to 4, no problem to usability catastrophe (see figure XXX). This severity rating is based on Nielsen's classification (Nielsen, 1995).

The analysis of the questions during and after the walkthrough has been done by formulating statement cards. The quotes on these cards are clustered based on their paraphrasing.

The surveys have been analysed using Excel to find the distribution of the participant's answers.

Pilot

The first evaluation study served as a pilot to tune the method. The first interview with a participant from every participant group served as pilot for the system, to check for functional problems. The results of the analysis of the method during these pilot interviews are described in appendix S. No major changes were needed, so the pilot interviews have also been analysed for the results of this study.

RESULTS

The results of this study exist of three parts:

- The usability issues uncovered during the walkthrough.
- The qualitative insights from the interviews after the walkthrough and the participant's statements during the walkthrough.
- The results of the survey on interaction qualities.

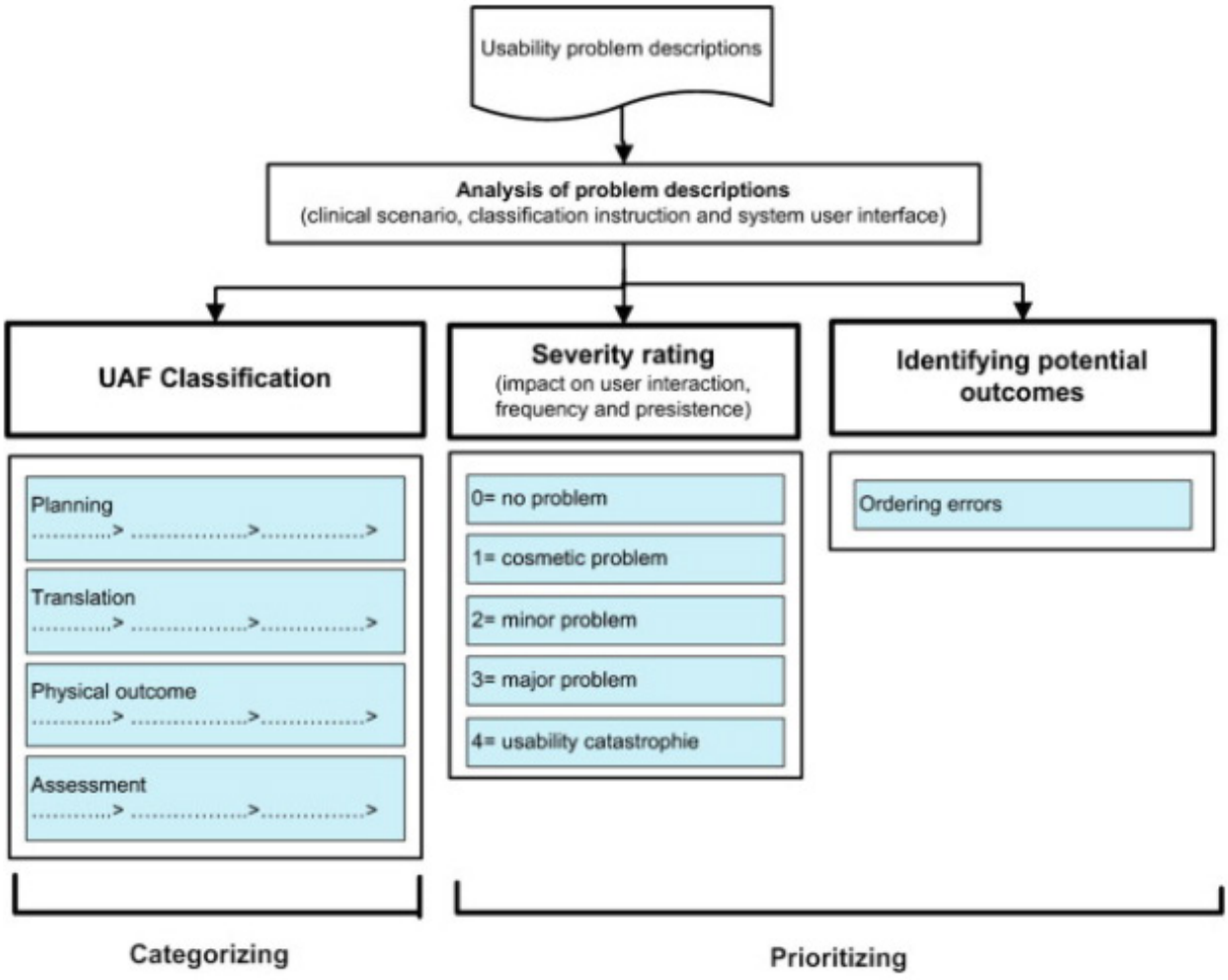


Figure 58: Overview of the usability assessmant of Khajouei, Peute, Hasman, Jaspers (2011)

Usability issues

The usability issues with a severity rating of 2 or higher, are shown in table 5. An overview of all usability issues found is shown in appendix T.

Based on these results, the screens with the biggest need for improvement due to usability issues, are:

- In the system overall, the MyTeam icon should be made to look more like a click-able object and it should be more clear to the user what information is shown on the page, which he is on.
- The rehabilitation timeline, for easier recognition, a clearer overview of the timing of the entries and making the experiences of other patients easier to find.
- The patient's screen on which they invite their physicians and provide them with the needed permission to use the system, for easier to read lay-out.

Table 5: Usability issues with a severity rating of 2 or higher

Level 1:	Level 2:	Level 3	Level 4	Voorbeeld	Quote	Severity	Effect on use
Planning	Users knowledge of system state			Participants do not know what page they are on	OP 1: 'Is dit het zorgplan?' OP 2: 'Want hier staat continu MyTeam boven.'	3	Participants do not recognise to have found the information they need
				Participants do not see what button matches the page they are currently on	PA 1: 'Daar ben ik nu?'	2	Participants are frustrated as button 'does not react'
	Users model of the system	User ability to determine what to do first		Participants do not look for information on other patients in their own timeline	PA 1: 'Ik zie niet staan hoe ik bij anderen moet kijken, dit is mijn tijdlijn.'	2	Participants first look for other pages before looking in timeline
Translation	Content and meaning	Clarity, precision and predictability		Mailbox recognised as care history in terms of caremoments instead of messages	BA 1: 'Op zich wel duidelijk wat er allemaal in staat, maar ik denk toch niet dat dit de zorggeschiedenis is' PA 3: 'This is just a history of the doctors and physio appointments.'	2	Participants do not keep looking for another page with an overview of the patient's care
		Completeness and sufficiency of meaning		Description of subjects does not match with professional lingo	OP 1: 'Do you know that with a lot of things, I do not know what it is?'	2	The care providers do not understand what the information entails
				Physiotherapist not seen as physician, so not invited in the 'Invite physicians' page	PA 1: 'Moet ik hier nou ook de fysio hebben? Nee, want hier staat artsen.'	2	The patient does not add the physiotherapist to his team
	Presentation	Perceptual issues	Discernability	Timeline not recognised as being timeline because of the lack of time stamps	PA 1: 'Ik zie hier geen tijdslijn in. Als ik nou bij een andere patiënt zou kijken, dan zou ik denken; Na hoeveel maanden is dat?'	2	Participant is confused, does not get all information that she desires
	Task structure and interaction control	Consistency and compliance of task structure		as filters instead of pages, despite placing inside page and not on top bar		2	Participants are confused and take longer to find the desired information
Physical action	Perceiving physical objects	Perceiving objects as they are being manipulated	Discernability	MyTeam button not recognised as being button	OS 1: 'Je zit toch een beetje op die witte dingen te staren'	4	Participants do not find the MyTeam page
Assessment	Information display		Layout and grouping	Invite physicians' page not recognised as top part left and right belonging to the same function	PA 1: 'Ik dacht dat het hier een ander stuk was, dat het een tweede deel was.'	2	Participant cannot find where to add more physicians
		Presentation	Perceptual issues	Unclear what teammembers have entered messages	OS 1: 'Als je nu hiernaar kijkt, zie je niet welk vakje je moet openen.'	2	Participant is unsure whethere he has new updates

Interviews
The information gathered from the interviews after the walkthrough and the participant's statements during the walkthrough, can be clustered in three main categories:

- Fit within current context of work-directed care
- Influence on the cooperation
- Information support

The complete clustering can be seen in appendix U.

Fit within current context of work-directed care
When the MyTeam system would be implemented in the current care, the care providers expect it will change the way they work.

The occupational physician expects to spend less time on documenting. The orthopaedic surgeon expects, he will have to spend less time reading patient files provided by other care providers. The orthopaedic surgeon can more easily see when complications occur and with what care provider.

OS 1: "I think for me, it would take even less time, because I can see when all is well, I would only have to read the last reports."

Therefore, the orthopaedic surgeon believes more timely adjustments can be made when the rehabilitation deviates from the average. The orthopaedic surgeon also likes that the information requests can be sent through this system and therefore be more direct and clear.

OS 2: "What would be handy is, when the occupational physician can also ask us a direct question."

Furthermore, the orthopaedic surgeon expects less face-to-face contact when using MyTeam. However, he does worry that this system will also generate extra work, because patients might experience a lower threshold for asking questions. If so, the orthopaedic surgeon should not be constantly interrupted by these questions, as this would prevent him from doing his other work activities.

OS 2: "If I am busy all day, answering these kinds of messages, I cannot do my work anymore."

Finally, the orthopaedic surgeon needs to be sure that the time spent working with this system needs to be billable as normal consult time. Otherwise, all time spent would be extra, unpaid work.

OS 2: "Does this contain a reimbursement component, yes or no, that is essential. I am not going to do this in my free time."

However, the patients say, they understand that they cannot ask all questions. They would prefer a filter to be inserted in this system or the questions to be redirected to an assistant before being sent to the specialists.

PA 1: "You cannot just bother the doctor with any care of course, They don't have time for that. I get that."

Influence on the cooperation

In general, the occupational physicians and orthopaedic surgeons agree, that this system supports their cooperation by making communication more efficient. Using MyTeam, they can more easily provide feedback on each other's work and give each other pointers.

OP 3: "What if I, as occupational physician, activate a little too much, than that physiotherapist can use the same app for friendly steering in the right direction."

The occupational physician is happy to see that using this system, other care providers will be triggered to think along on the effect of their care on the patient's work abilities, while focusing on their own specialization. Thereby, getting all care providers together to focus on the same end goal. Also, the occupational physicians believe, that this system prevents the care providers from being played against each other.

OP 3: "The patient can see; the orthopaedic surgeon says this and the occupational physician says that and they listened to the physiotherapist. No-one can get played."

However, according to the patient, one of the advantages of the system would be that he can ask a care provider to support him when he feels another care provider is trying to push him too hard.

Furthermore, the patient likes that he does not have to meet the care providers in person as often anymore. With this system less detours are needed for the care providers to get all information they need from each other.

*Pa 4: "It just has too many detours, while with this it would be *snap* much easier."*

The patients like that the care providers can now more easily communicate to provide personal care. However, some patients are still a bit sceptic of whether care providers will really use this system. Also, he believes that other care providers need to be convinced of the added benefit of this system for their own practice before they will be willing to use it.

Pa 2: "I don't trust that'…'I think it is more for the patients than that the physicians really look at it."

The occupational physicians expect that especially the physiotherapist and the occupational physician will be able to support each other using this system.

OP 2: "I think the physiotherapist and I will communicate most, as I need more input from him and he can use my input as well about what someone needs to be able to do after rehabilitation."

Using MyTeam all stakeholders will have a specific role in their cooperation.

The role of the occupational physician would be mainly in receiving information from the other stakeholders. Also, the occupational physician sets the goals for the patient's rehabilitation back to work, which all care providers work towards.

OP 1: "You make a kind of framework, and that makes you plan your meetings to check whether things are going well."

The role of the orthopaedic surgeon would be in providing feedback to the other care providers as fast as possible and help set expectations of both the patient and the occupational physicians. The orthopaedic surgeon focusses on the patient's physical complaints and by doing so provides an objective comparison for the patient's experiences.

OS 1: "It can be that I am interested in what the occupational physician wants and whether he makes a good estimation'… 'whether that fits with my expectations of the patient."

The role of the patient would be in sharing his experiences with the care providers. Also his experiences determines the aspects of the rehabilitation they should still focus on, to make sure he is content with the result of rehabilitation.

OP 2:"Recovery time, how long do they think they will need for recovery and after how long do they think they will be working again., I think those are two very important factors."

Information support

During the interviews, the occupational physician, orthopaedic surgeon and patient all mentioned information they would need this system to provide them with, and what information they would be able to add to the system for the other stakeholders (see figure 59).

Some of these results were not anticipated based on the previous studies:

- The occupational physician does not expect any pressure from the work environment with TKP patients. Thus, he does not need to be informed on the relationship between his client and co-workers or the employer.

OP 3: "The good thing about a knee prosthesis'…'that is concrete, black and white, so people understand it."

- The occupational physician wants to know more about the orthopaedic surgeon's reasoning behind his choices leading up to the surgery.
- The occupational physician and patient both wanted to know whether the orthopaedic surgeon was content with the progress of the patient's rehabilitation.

- The occupational physician and patient want more factual background information about the prosthesis and the TKP process.
- The orthopaedic surgeon would like to receive more specific information on the kind of activities a patient does during work, to base his advice on the patients allowed activities and abilities on.

OS 2: "I want to know; What kind of work does he do'….' that provides you with more insight in the complaint and whether expectations were fitting."

- The orthopaedic surgeon cannot provide a prognosis for the patient's rehabilitation in the earlier stages of the process.

OS 1: "I can never give a prognosis, especially when someone has just had surgery. That is all long term and than it is just too fresh."

- The orthopaedic surgeon would like to know, which patient he needs to spend more time on guiding him through rehabilitation.

OS 1: "When I can see here that things are stagnating and that things are stagnating with the physiotherapist as well, I know I need to spend more time on that patient."

- The occupational physician would like information about the patient's overall physical condition before surgery.
- The patient does not want the care providers to confront her when recovery is slower than average.

Pa 2: "To me, it is already bad enough when I cannot do something'… 'Than I am not part of the mass and that would not be nice to know at all."

- The patient would like tips for the problems he encounters during rehabilitation.

Pa 2: "I would put some tips and tricks with it; If you are still scared, try it this way."

Next to the information provided to the patient by the occupational physician and orthopaedic surgeon, the patient also wanted the following information from other patients:

- Their psychosocial state
- Experiences during recovery, depending on how long ago their surgery was
- Their physical state and experiences years after full recovery

Pa 1: "I would really like to know, when people after a few years, how those patients are doing."

- Whether others have the same complaints

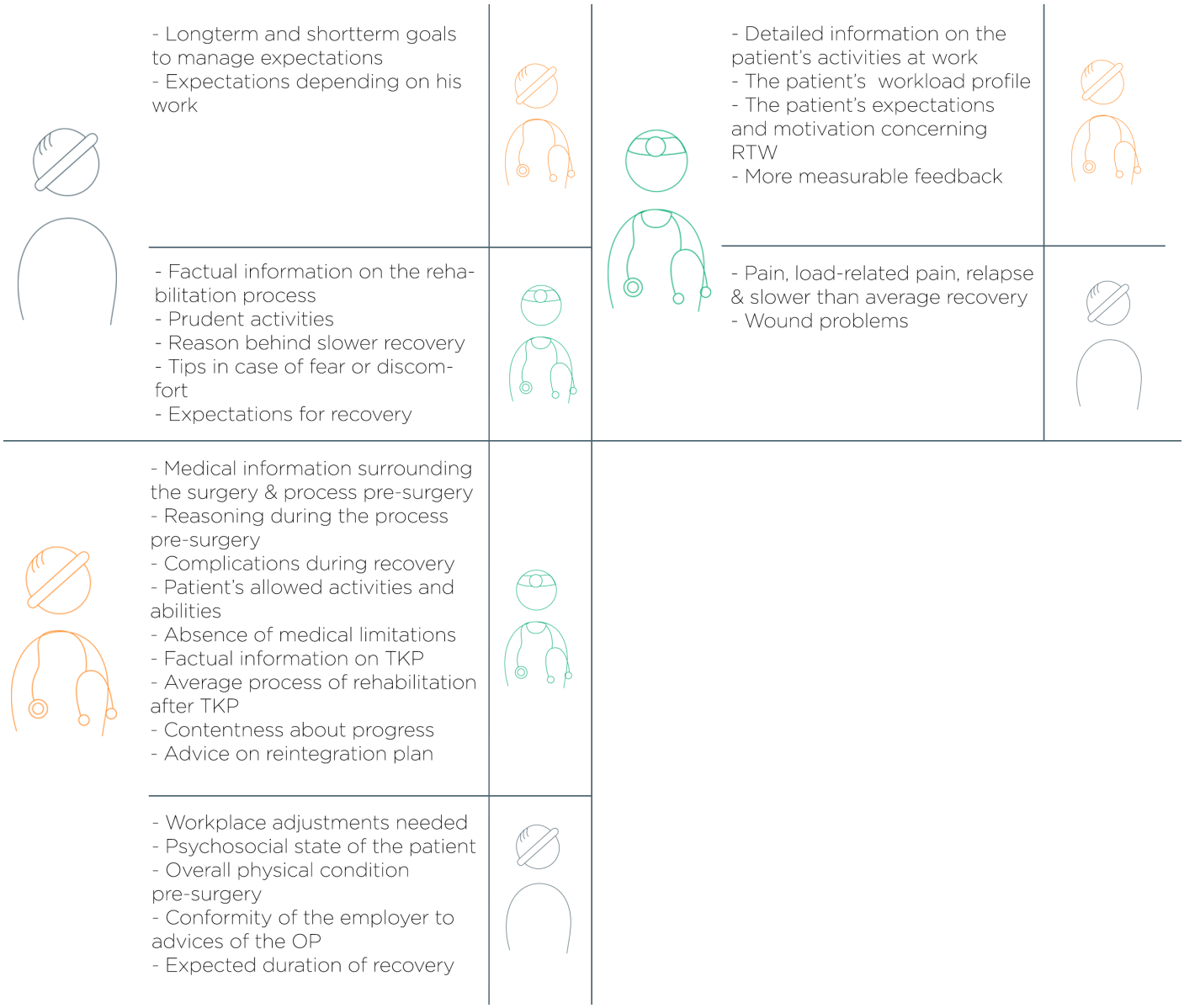


Figure 59: Overview of which stakeholder needs information provided by which other stakeholder.

Interactie kwaliteiten

Based on the survey on the qualities of the interaction stimulated by MyTeam, the results in table 6 have been generated. The interaction qualities which the participants associated with the interaction with MyTeam, were;

- Direct
- Interesting
- Supported
- Involved
- Transparant
- Patient-centric

When comparing these to the desired interaction qualities (see figure 60), the interaction qualities 'expertise-based' and 'time-efficient' should be made more prominent in the system. The quality 'controlled' should be made less prominent.

A complete overview of the results can be seen in appendix V.

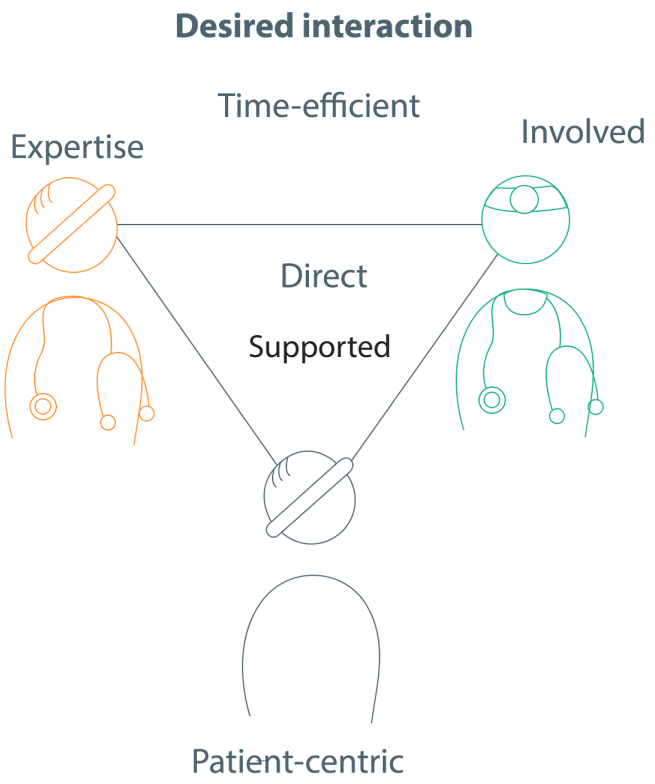
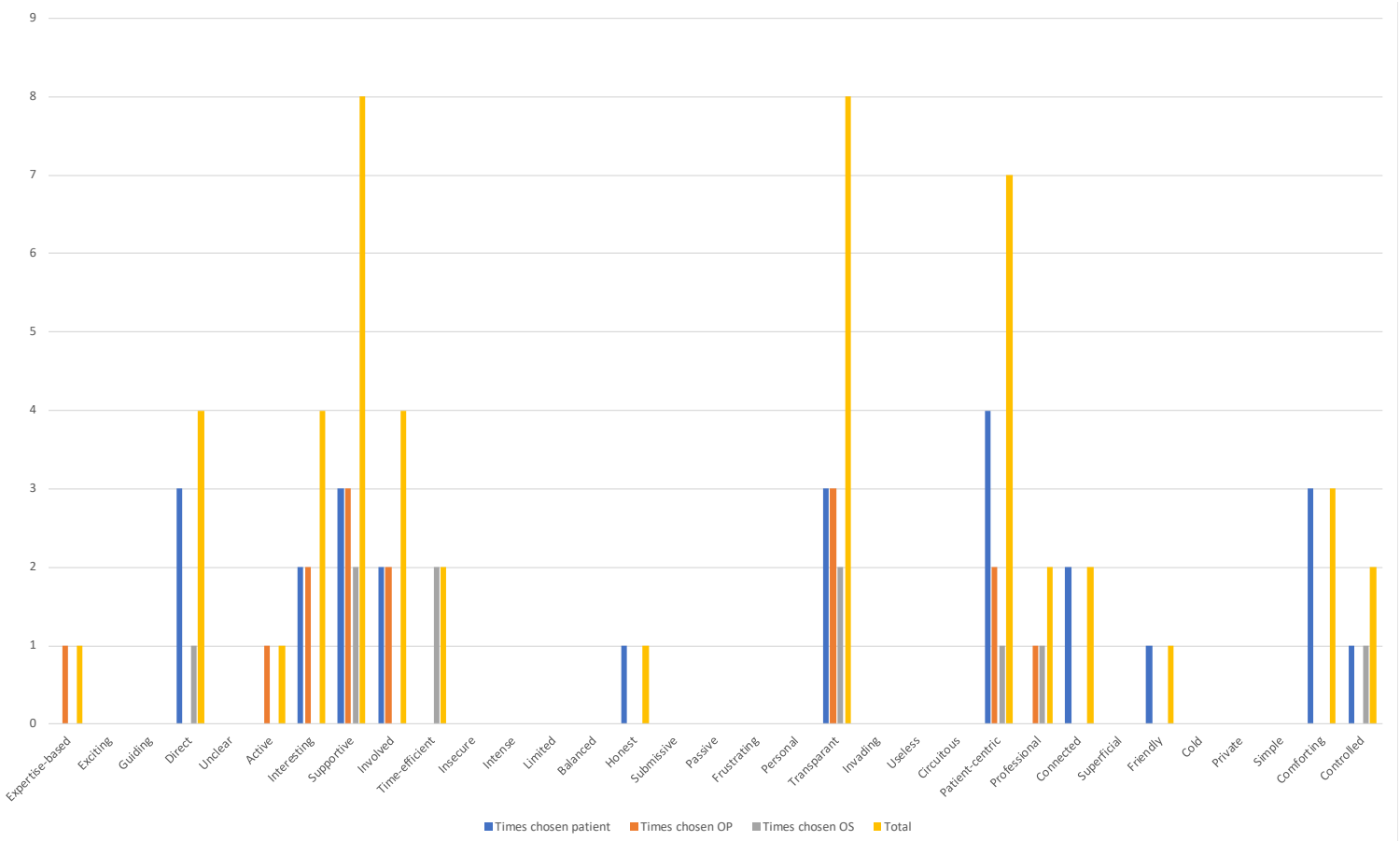


Figure 60: Overview of the desired interaction qualities

Table 6: Overview of chosen interaction qualities in survey



CONCLUSION

The goal of this research was;
'"To identify aspects of MyTeam to be improved, in order to;

- *Ensure the tool's effectiveness to improve the collaboration between care providers in work-directed care*
- *Fit properly within the way of working of the occupational physician and orthopaedic surgeon*
- *Fulfil the needs of the occupational physician, patient and orthopaedic surgeon in the RTW guidance of TKP patients with knee-demanding work.'*

Based on the results of this research, the following aspects have been identified:

- The rehabilitation timeline and the screen on which the patient invites his physicians should be improved fix the usability issues found.
- The overall lay-out of the MyTeam system should be adjusted to assist the user's understanding of the system's structure and available information.
- The users' experience of the interaction with the system should be made more expertise-based and time-efficient and less controlled.

To ensure the effectiveness of MyTeam, the following aspects need to be included:

- Care providers need to be convinced of the added benefit of this system for their own practice to be willing to use it.
- This system should prevent the care providers from being played against each other.
- Early signalling of events that could possibly influence the progress of the patient's recovery back to work.
- The role of the orthopaedic should be able to provide fast feedback to the other care providers
- The orthopaedic surgeon should check the expectations of both the patient and the occupational physician.

To ensure a proper fit of the MyTeam system within the way of working of the occupational physician, the following aspects need to be included:

- The orthopaedic surgeon's reasoning behind his choices leading up to the surgery and whether he is content with the patient's progress in rehabilitation should be made clear.
- Factual background information about the prosthesis and the TKP process should be included.
- Standardised documents should be included for the occupational physician to fill out.
- A check-list fitting with the main milestones in the patient's return-to-work.
- An option for other care providers to provide feedback on the reintegration plan.

To ensure a proper fit of the MyTeam system within the way of working of the orthopaedic surgeon, the following aspects need to be included:

- The information requests sent through this system should be direct and clear, so the orthopaedic surgeon is sure, what the information he provides is used for.
- The patients should experience a certain threshold for asking questions to the orthopaedic surgeon.
- The system should not interrupt the orthopaedic surgeon during his other work activities.
- The time spent working with this system needs to be billable as normal consult time.
- Clear signalling of possible problems presented by the other care providers or patient.
- A shared workload profile of the patient.

To fulfil the patient's needs in his work-directed guidance, the following aspects need to be included:

- An overview of both long term and short term goals in the reintegration plan to help him form fitting expectations depending on his work.
- Factual information surrounding the TKP surgery and rehabilitation process
- Tips in case of fear or discomfort
- The experiences of other patients including; their psychosocial state, experiences during recovery, answers to his questions surrounding rehabilitation, and their physical state and experiences years after full recovery.

DISCUSSION

Limitations of this research

As this study uses a qualitative approach, it can only be generalised when in line with existing literature (Lincoln, Guba, 1985). This research contributes to our understanding of the elements needed to promote work-directed care. It introduces new areas that can be looked into in follow-up studies with bigger groups of participants, to ensure these results can be generalised over the overall process of guidance in work-directed care for TKP patients.

By examining the usability issues using the UAF, problem clusters are formed based on the problem descriptions. When further analysis or discussion is performed by people, who have not participated in the original categorisation, the problem descriptions might be interpreted differently. The current categorisation was done by one researcher working independently.

The participants of this study, have been selected from the participants of the previous studies. This has been done due to the limited time frame of this project. However, this does ensure a bigger overlap with the results of the previous studies, which might not occur with a group of completely new participants.

The interactions qualities of the system are presented as quantitative results. However, due to the very small sample size of this research, the significance of the amount of times a characteristic is chosen, cannot be determined.

6.4 REDESIGN

Based on the results of the evaluation study, screens have been selected, which need the most adaptations to solve the usability issues and improve their fit with the ways of working of the occupational physicians and orthopaedic surgeon.

The main usability issue was recognising the MyTeam button as being a clickable button. Therefore, this has been made to fit better with the style of the other buttons in the top bar.

The following screens have been redesigned:

- The reintegration plan of the occupational physician
- The physician entry screen
- The patient's care timeline screen
- The physician invitation screen

To the reintegration plan (see figure 61), a timeline has been added of the general process of the client's work reintegration based on;

- The client's age
- The client's work activities and their intensity
- The client's body type
- The client's psychosocial state.

The body type, psychosocial state and the

Figure 61: Redesign of reintegration plan

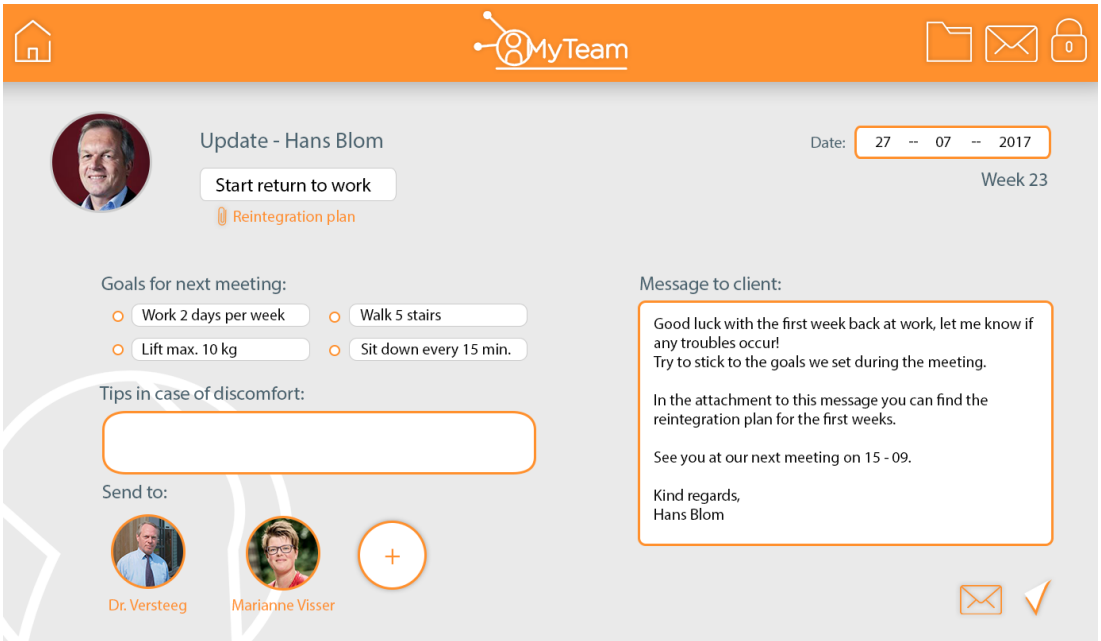


Figure 62: Redesign of physician entry

intensity of the work activities have been added as suggested by the interviewed occupational physicians. Furthermore, the stages in the plan have been adjusted to the main stages in the reintegration for the occupational physician.

The physician entry (see figure 62) has been adjusted by adding;

- The option for attaching standard forms
- The option for sharing the update directly with other care providers
- The option to provide the client with tips
- The option to easily cross of goals up to the next meeting

In the patient's timeline (see figure 63), all entries are accompanied by a timing in the rehabilitation. Furthermore, a filter has been added so the comments of only one physician can be shown. The options of; adding comments, asking a question and looking into other patients experiences, are more integrated in the timeline.

In the physician entry screen (see figure 64), functions; selecting the physicians and providing them with the needed permissions have been integrated. Also, clearer 'save' and 'add physician' options have been added.

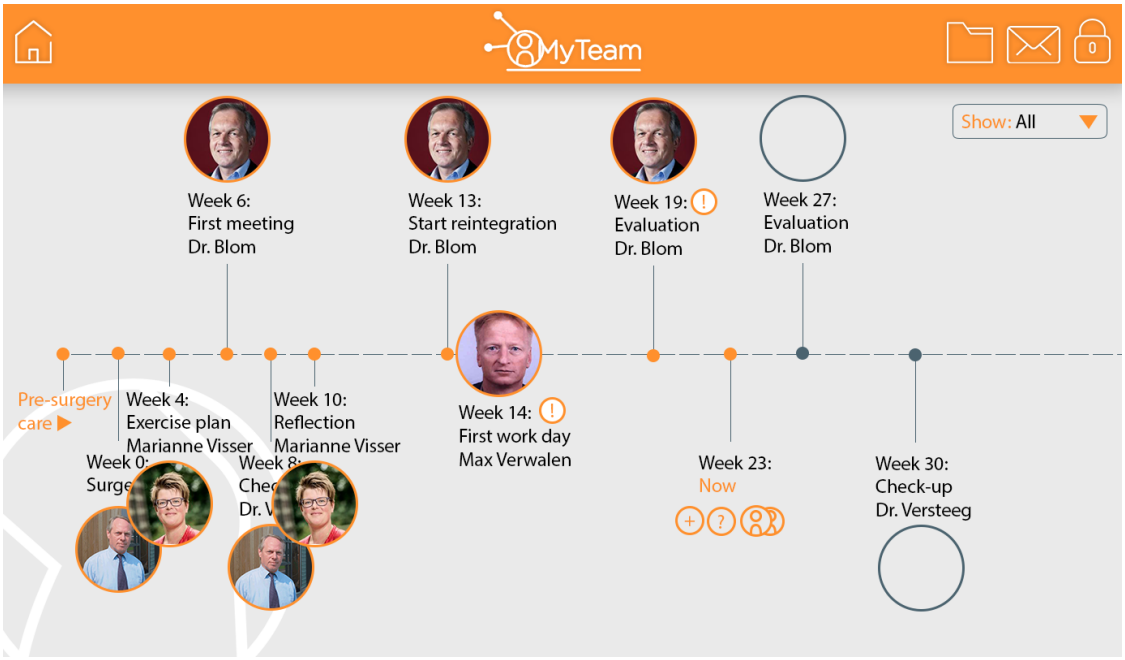


Figure 63: Redesign of timeline

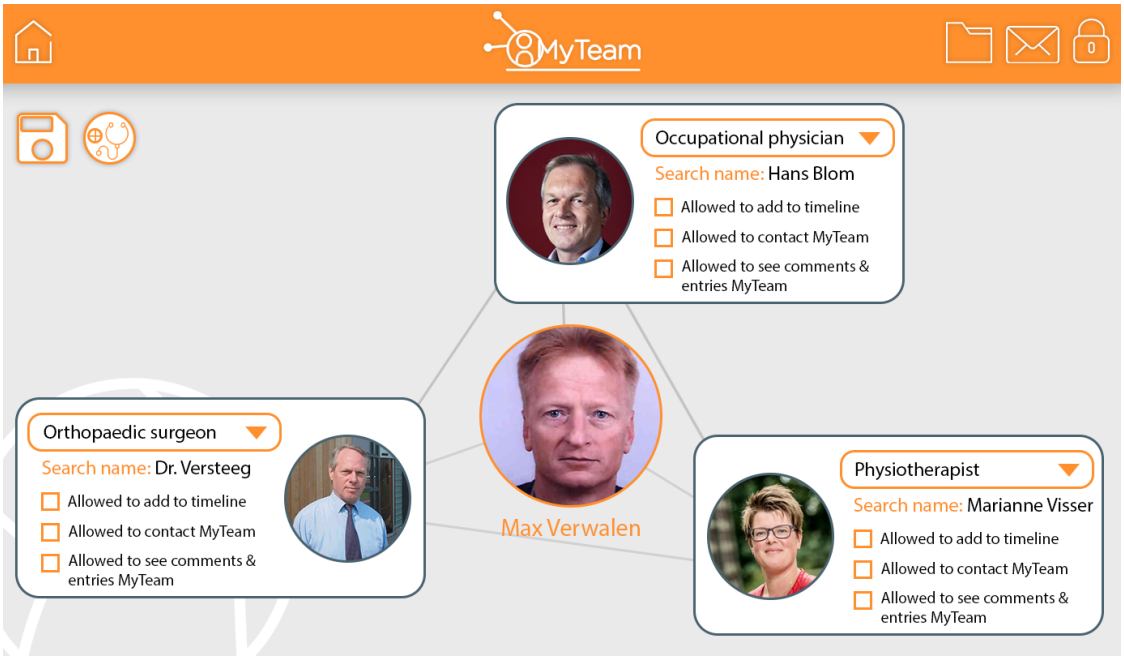


Figure 64: Redesign of physician invite screen

6.5 IMPLEMENTATION

This chapter discusses the incorporation of the essential MyTeam features in existing systems containing information surrounding the patient's care, the compensation of the care, and legislation aspects that would be applicable to MyTeam, if MyTeam was realised.

EPD

In the current care, care providers in the Netherlands already make use of a system, which is similar to MyTeam. This system is called the 'Elektronische Patiënten Dossier' (or EPD in short). This system provides them with a platform where all information on a patient's current care and care history. In order to make use of this system, patients have to provide explicit consent.

Every care provider has an EPD with slightly different functions. The information in this system exists of a combination of medical data and personal data. The medical data includes;

- Diagnoses
- Redirection letters
- Results of examinations
- Medication overviews
- Notes of treating physicians

The personal data includes;

- The patient's desire to receive information about the state of his health
- Admission or refusal of treatments
- The patient's will

(Patiëntenfederatie Nederland, 2016).

Patients can also look up information on his EPD after asking a care provider. However, notes made by care providers can only be seen when a selected care provider facilitates this and information provided by third parties can never be looked into by the patient (CM, 2016).

Getting data from another EPD is done through the 'Landelijk Schakelpunt, or LSP in short. The LSP provides insight into the patient's medical information, which is stored at different care providers. The LSP works with the 'Zorginformatiemakelaar', ZIM, which again exists of the following four components:

- An authorisation module; records and controls which care provider can see or edit which information and allows the patient to change the authorisations.
- A redirection index; redirection to care information, as f.e. which institutions are connected to the ZIM. This only includes data to make looking up care data easier, not the data on the patient's care.
- Audit logs, records who looks into or edits what data when, so the patient can check this.

To look up information using the LSP, a care provider needs to identify himself using his 'Unieke Zorgverlener Identificatie', or UZI in short (Orfeus, 2017).

IMPLEMENTATION OF MYTEAM FEATURES

A lot of the functionalities of MyTeam are already found in the current setup of the EPD, such as;

- Looking up test results
- Seeing the timing of meetings with care providers
- The patient authorising care providers
- The care providers being able to look up medical information of other providers

However, the focus of the EPD is really on the medical data, without looking into the effect of his medical care on other facets of his life or stimulating collaboration between care professionals.

The following functions in MyTeam could be added to the EPD, to facilitate a more complete image and stimulate the awareness of care providers of the effect of their care on the patient's care as a whole:

- An overview of possible future outcomes of the patient's care, including for example experiences of other patients
- An open, direct communication channel between care providers and the patient to ask questions or provide feedback.
- Alarms and filters for the care providers to be notified when information is added which applies to their care.
- A shared plan for the patient's rehabilitation
- An overview of the whole of the patient's care process over time and all care providers involved

DIAGNOSTIC TREATMENT COMBINATION

The costs of a patient's care is declared based

on the content of a 'Diagnostic Treatment Combination' (or DBC in short). This describes the activities and results that care providers deliver for a specific care request. So these depend on the patient's complaint and the determined treatment plan. Care providers can declare these activities to the patient's health insurance. Activities outside of the DBC cannot be declared to a health insurance and therefore need to be paid for by other stakeholders, such as the employer.

Care providers and health insurances together negotiate about what activities are included in a DBC, the quality of these activities, the amount of treatments and the price of the DBC (Nederlandse Zorgautoriteit, 2017).

The amount and duration of the patient's consults with the orthopaedic surgeon are also included in the DBC. Currently, a very strict separation is made between the two aspects of the patient's care; clinical and work-related care. Any care related to work is left out of the DBS, and is therefore typically compensated by the employer.

MyTeam is a combination of clinical care and work-related care. According to the results of the interviews, not only the occupational physician would be supported by this system, but also the results of the care provided by the orthopaedic surgeon would improve. Therefore, the care providers should be reimbursed for the time they spent on the patient's care using this system, the beneficial effect of this system on the orthopaedic care needs to be undeniably proven. This way the costs of the patient's improved care can be divided between the health insurances and the patients' employers.

LEGISLATION

Privacy

In order to adhere to the 'Wet Bescherming Persoonsgegevens' the concept fulfils the following points:

- The patient's data from different physicians cannot all be stored in one place. This only applies to the patient's background information, the timing of the meeting of the patient with his treating physicians and the care process of the other patients (Personeelsnet, 2013).
- The patient needs to be aware and give active permission for the use of his data, which data is used, who can see it and to what goal. (Autoriteit persoonsgegevens, 2017).
- The goal of collecting the patient's data needs to be clear and cannot be changed during the collection of the data (Sauerwein, Linnemann, 2002).
- The patient needs to be able to know only certified care officials can look into their data and they should be aware of who does so when. (Zorgaanbieders voor zorgcommunicatie, 2016)

The occupational physician and orthopaedic surgeon are also sharing information, which can only be used if they provide permission during first-use.

Professional secrecy

The orthopaedic surgeon is due to his professional secrecy not allowed to share any medical information with the occupational physician and other care providers, unless the patient provides permission.

The occupational physician's professional secrecy keeps him from sharing information with the patient's employer. He can only share the following information (NVAB, 2016):

- The activities at work, which the patient can no longer perform
- The expected duration of the patient's sick leave
- Possible needed adjustments, which the employer should make to the workplace related to the return-to-work

The occupational physician is not allowed to share (Personeelsnet, 2013):

- The seriousness of the patient's injury when not translated into allowed load and expected duration of recovery
- The diagnosis, name of the patient's illness or specific complaints or pain.
- Subjective observations of the patient's mental or physical state
- Data about the treatments, meetings with care providers.
- Other aspects, which are not directly related to the patient's work and work environment, that do influence the patient.

CHAPTER 7: CONCLUSION

The goal of this project was to improve the collaboration between the occupational physician and orthopaedic surgeon in the work-directed care of TKP patients.

Two field studies have been done, the first with occupational physicians and orthopaedic surgeons and the second with working patients. Based on the results of the first research, the experiences of the orthopaedic surgeon and the occupational physician on their collaboration have been compared. Comparing the results of this first research with the experiences of the patients on the guidance surrounding their TKP surgery, resulted in facilitators and barriers in the work-directed guidance for TKP patients. The most important conclusions made based on this comparison, are:

- Due to the small role work has in the care by the orthopaedic surgeon, communication between the occupational physician and orthopaedic surgeon is limited.
- Due to the current required indirect and formal communication, the occupational physician experiences a threshold to contact the orthopaedic surgeon.
- Due to the very formal communication and the orthopaedic surgeon feeling uninvolved in the patient's rehabilitation back to work, the orthopaedic surgeon waits a long time answering questions and keeps his answers as concise as possible.
- Due to the orthopaedic surgeon's concise answering, the occupational physician often does not receive the information he needs for his practice.
- Due to the limited communication between the care providers, blind spots on their knowledge about the patient result in contradicting advises and insufficient expectation management for the patient.
- Due to the physiotherapist spending most time with the patient, the physiotherapist has the most supportive role for the patient.

Based on these results, the MyTeam system has been developed. This concept allows direct communication between the care providers involved in the TKP patient's RTW. The goal of this concept is to make all information the care providers need in their care available, while supporting the patient's expectation management and help them feel secure.

By making the patient's care more transparent, the care providers can provide each other with feedback. Also, The care providers will have no more blind spots, so they will be able to better cater their care to the patient's individual needs.

The role of the occupational physician in this collaboration is to set the goals, to which the care providers will work during rehabilitation, as he is most knowledgeable on the patient's specific work activities.
The role of the orthopaedic surgeon in this collaboration is to use his specialised knowledge and experience to guide the others involved in forming expectations and spotting possible complications before stagnation.

This system has been evaluated with occupational physicians, orthopaedic surgeons and patients. The focus of this evaluation was on;

- The fit of the tool in the current work processes of the orthopaedic surgeon and occupational physician.
- The perceived effectiveness of the tool in practice.
- The elements of the tool that support the collaboration and information exchange.
- The interaction qualities of the tool.

This evaluation resulted in many points of improvement to base a redesign on. The most important of these were:

- The overall lay-out of the MyTeam system should be adjusted to assist the user's understanding of the system's structure.
- The interaction of MyTeam should be experienced as more expertise-based and time-efficient.
- The orthopaedic surgeon's reasoning behind his choices leading up to the surgery and whether he is content with the patient's progress in rehabilitation should be made clear.
- The information requests sent through this system should be direct and clear, so the orthopaedic surgeon is sure, what the information he provides is used for.
- The patients should experience a certain threshold for asking questions to the orthopaedic surgeon.
- The time spent working with this system needs to be billable as normal consult time.

These have been included in the redesign of MyTeam.

Important for the implementation of MyTeam is the inclusion of this care in the Diagnostic Treatment Combination, the inclusion of the main elements in the current 'Elektronisch Patiënten Dossier' and the implications of

privacy and professional secrecy on the system.

RECOMMENDATIONS

To complement the research done in this project and for further development of the MyTeam tool , the following aspects should to be looked into in the future.

Research

During this project, the needs of the physiotherapist have been left out of scope. However, according to the results of the studies done in this project, the physiotherapist is an important stakeholder, connecting the interests of the occupational physician, orthopaedic surgeon and patient. Therefore, future research should look into in what way his work can support the guidance provided by the occupational physician.

The researches in this project have been performed with very small groups of participants. Therefore, to verify the results of these researches, they should be repeated with bigger sample groups. This will generate quantitative data to support the qualitative data that is generated in this project.

A systematic review should be done comparing the effect of the MyTeam intervention in practice with other interventions in work-direced cooperation and a control group without special interventions. This review will prove the effectiveness of the intervention in practice.

Development

For the further development of MyTeam, a check should be done by an expert, to make sure the system adheres to all applicable legislation and whether the data is proficiently secured.

Also, the redesign presented in the current state has not solved all usability issues and aspects of improvement found. Therefore, a more thorough redesign needs to be made.

A next step in the development would also be the involvement of the patient's employer. The employer should have no access into the patient's medical information, but should be kept up-to-date with the developments of the occupational physician's reintegration plan. The employer supports the patient's return-to-work by making workplace adjustments if needed and supporting a gradual return-to-work. In order to do so, the employer needs to know what to expect and when.

For the implementation of MyTeam in the work-directed care of TKP patients on short term, the functions discussed in the chapter 'Implementation' should be added to the EPD of the patients' hospitals. Also, the occupational physician should be allowed access into the patient's EPD when the patient provides his consent to do so.
On the long term, MyTeam should be implemented as a centralised (national) EPD.

CHAPTER 8: PERSONAL EVALUATION

I started this project thinking it was the last thing to cross off before getting my degree and finally being able to fly out into the world. I had not realised how much this project would still teach me. These past months have been stressful, fun, tough, interesting, frustrating and, especially close to the end, very rewarding.

Working on this project 'alone', without the support of other students, was probably the most beneficial factor to the educational process for me. Working 'alone' means becoming aware of your shortcomings, as there is no one who will overcome them for you, no one to help you reflect, look at things from a different perspective or motivate you when needed. Luckily, I did not really do this project alone, as of course I had my coaches, friends, family and fellow students, but, it took me a while to use these connections to my advantage.

As probably any typical student, I tend to overestimate myself and how much can be done in a very limited amount of time. Combining this with my natural impatience has been my biggest struggle throughout this project. Doctors are very busy people, especially surgeons. Planning interviews, rescheduling them again because of emergency surgeries, and sometimes even rescheduling them again, was at times quite frustrating for me. Even more so, when this meant running late on my planning, so I ended up not having an actual summer break (yet). But these things I had to learn to accept and work through which I believe I managed well enough.

I also ran into my stubbornness during this project. I have never really liked to be criticised or taken advise very easily. This was most palpable when coming up with my concepts. But every point of critique made the project stronger and made me reflect and rethink. Without this critique, I would not have been as satisfied with the results of this project, as I am now.

My personal main goal from the start was, to find out what I want to do after getting the desired degree. I can now say, I am still not sure, but at least have a stronger inkling; I want to go into user-experience research. During this project, the research; setting it up, carrying it out and analysing the data was by far the most interesting and therefore the most fun part for me. Designing a tool was from that perspective no more than a means to an end. During my earlier education at the IDE faculty, I have never experienced this before, as the research is never truly the main focus in projects. After graduation, I will therefore look for a place where I can learn and grow in doing research by design instead of design by research.

Another goal for me was to gain more confidence in myself as an independent young professional. My personal situation changed a lot during this project, forcing me to become more independent even, than expected. In my opinion, this new situation together with this project has definitely helped me reach this goal and made me a stronger person and therefore stronger and more independent young professional. This realisation immediately benefited me, as a designer working inside a research institute as well. Even though, this project has not been my first design project inside a non-design environment, having done an internship within Unilever Foods R&D for half a year before. I again realised how this situation requires one to be both steady and lenient, confident enough to concede while staying on course.

I would not want to do it all over again, as new learnings come from new experiences, but I would recommend any other student to do a project like this:

- Challenging, both on an educational and personal level
- With critical people
- Out of your comfort zone
- In a different environment

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