



The Future Patient Journey:

A tool to improve the experience of patients who undergo a transcatheter aortic valve implantation (TAVI) by reducing their pre-operative anxiety.

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Preface

Welcome to my graduation project, my final project as a student at TU Delft!

I am proud to present to you my graduation project **'The future patient journey: A Tool to Reduce the Pre-operative Anxiety of Patients who undergo a Transcatheter Aortic Valve Implantation (TAVI) at Erasmus Medical Center.'**

I hope you enjoy reading the report as much as I have enjoyed working on this project.

I could not have achieved this result without the help of others. Therefore I would like to thank the following people:

Richard, from our first meeting, I enjoyed talking with you. I was always inspired and full of energy after a meeting with you. Thank you for your clear and supportive advice and for always challenging me by asking the right questions.

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Papa, thank you for teaching me how to take on new challenges and to enjoy working hard. Thank you for teaching me to ask questions and to learn. You will forever be my motivation and my biggest inspiration. ♡

Daan, thank you for always celebrating my success with me and helping me to tackle my challenges. Thank you for taking the time to read through my report.

Thank you to my housemates for being a continuous support along the whole process.

To my family, friends, and all others who have helped me throughout this journey: thank you.

Enjoy the read!

Executive summary

The healthcare sector has reached a turning point in which the patient stands central during the continuum of care. Erasmus MC is a leading hospital in health care innovation and thrives on pioneering this shift towards value-based care. Value-based care is a philosophy of delivering optimal care for the patient while reducing costs.

To reach this, Erasmus MC has implemented a five-year strategy focused on dedication and technology. Dedication emphasizes the importance of providing a patient with the right treatments and supporting them in the process. Technology is seen as an enabler in both the procedures as well as improving patient experience. The question now is how to create the perfect balance between dedication and technology to optimize the patient experience while streamlining the journey for Erasmus MC staff. This project focuses on the specific case of the Transcatheter aortic valve implantation (TAVI) procedure. This procedure involves the implantation of valve prostheses in the native aortic valve of the patient's heart by percutaneous puncture via their transfemoral artery. It is a minimally invasive procedure under local anesthesia, meaning they are vividly awake during the procedure. TAVI patients are, on average, 80 years old.

This project evolved from a problem identified by an interventional cardiologist at the Erasmus MC. He noticed that technological advancements were improving the procedure; however, the patient experience was not progressing. The majority of the patients were anxious and uninformed prior to the procedure. This is a problem because pre-operative anxiety affects the interaction between cardiologist and patient, it hinders the person from processing information (Cammen, 2021), affects the post-operative recovery process (Yuzkat et al., 2020), and decreases overall patient satisfaction (Herrera et al., 2009). Therefore, the challenge was: Design a tool to improve the patient experience by reducing pre-operative anxiety of patients who undergo a TAVI.

Keywords

Shared-decision making:

A process in which both the patient and healthcare professional work together to decide the best plan of care for the patient. When making a shared decision, the patient's values, goals, and concerns are considered.

Value-based care:

A philosophy of delivering optimal care for the patient while reducing the costs of healthcare. Therefore, there is a focus on the optimal care for the patient.

To tackle this, extensive user research was conducted on the journey of TAVI patients. This led to a reliable patient experience curve identifying the pain and success points as well as the reasons for these peaks. Concurrently, the enablers of positive patient experience are defined through a literature review. This led to the concept proposal, an improved TAVI patient journey. The new patient journey consists of (1) several new touchpoints throughout the continuum of care that ensures the patient feels recognized and improves the continuity, (2) a physical care package (Zorgpakket) delivered to the patient's doorstep, supporting the patient by providing them with the right tools to prepare themselves for the procedure, and (3) a 3D animation of the TAVI procedure, creating an accessible manner for elderly patients to use technology which has an added value for the patient journey.

An extensive validation study has proven that the new patient journey, specifically the Zorgpakket, helps the patient feel at ease by providing the tools to form the right expectations and increase trust through empathy and professionalism. The aimed long-term effect is to eliminate the pain points in the experience curve.

The proposal is a desirable solution that fits the patient's needs while streamlining the workflow of the healthcare professionals. The different aspects of the project are applicable in other areas within the healthcare sector and will serve as inspiration within Erasmus MC to reach the goal of value-based care.





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Part 01

Introduction

1.0 INTRODUCTION

This chapter introduces the background and relevance of the subject of this graduation project. This chapter begins with an introduction of Erasmus MC and the cardiology department. Next, you will find a description of the problem from where this project originated. Lastly, the approach of this project is presented.

1.1 Erasmus Medical Center

Erasmus Medical Center (EMC) is located in Rotterdam, The Netherlands. It is a leading hospital in healthcare innovation. The three core tasks at EMC are patient care, education and research.

Erasmus MC has developed a strategy for a period of 5 years (2019-2023), that is focused on Dedication and Technology (Koers23, EMC).

Dedication

The strategy aims at always having the person central. Erasmus sees every patient as an equal partner involved in the decisions made during their journey. The goal is to provide someone with the treatments to stay healthy for longer and support them during the process.

Technology

Technology is needed to make significant advancements in the health sector. It can help patients receive improved treatment, go home quicker, and have an overall better experience. Erasmus sees the necessity of working together with other sectors to remain a progressive hospital and continue improving patient care.

As concluded from the strategy, Erasmus is shifting towards value-based care. Value-based care is a philosophy of delivering optimal care for the patient while reducing the costs of health care. The main focus still lies on the patient-centered care.

Cardiology

Within EMC, one of the largest departments is the thorax center. The following three specialisms work together in the thorax center: cardiology, pulmonary medicine, and cardiothoracic surgery. The cardiology branch is specialized in treating patients with cardiovascular diseases. In addition, Erasmus MC is a leading hospital in interventional cardiology. Interventional cardiologists treat patients with structural heart diseases through catheter-based procedures.

The project is a collaboration between the Technical University of Delft (TU Delft) and Erasmus Medical Center (EMC).

These two work areas are believed to work well together to improve the health care system, both on effectiveness and patient experience.



Figure 1: Startegy Erasmus MC



1.2 Transcatheter Aortic Valve Implantation

The information presented in this subchapter is taken from literature, clinical lessons from M. de Ronde (TAVI- coordinator, EMC), other specialists at the cardiology department, and the contextual analysis from observations.

First TAVI in the Netherlands

2005 - at Erasmus MC
under general anesthesia

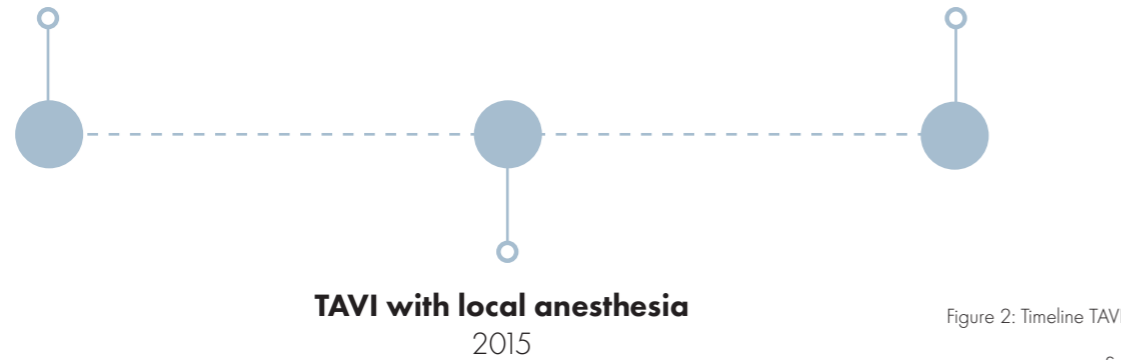


Figure 2: Timeline TAVI EMC

Sources:
(De Jaegere et al.,2006)
(Interview, de Ronde, 2021)

Introduction

This project focuses on transcatheter aortic valve implantation (TAVI). This procedure involves the implantation of valve prostheses in the native aortic valve of the patient's heart by percutaneous puncture via their transfemoral artery. It is a minimally invasive procedure under local anesthesia. This procedure is conducted by interventional cardiologists.

History

The implantation of aortic valves was previously only done with open-heart surgery; however, this had many burdens for the patients, especially elderly patients suffering from aortic stenosis. Erasmus MC is a pioneer in the field of TAVI intervention. Figure 2, shows a timeline of TAVI in the Netherlands.

Aortic valve

The aortic valve is a heart valve located between the left ventricle and the aorta, as seen in figure 3. The function of this valve is to allow blood to leave the heart from the left ventricle through the aorta, preventing the backflow of blood from the aorta to the left ventricle. When the aortic valve is thickened and narrowed, this is called aortic stenosis (AS).

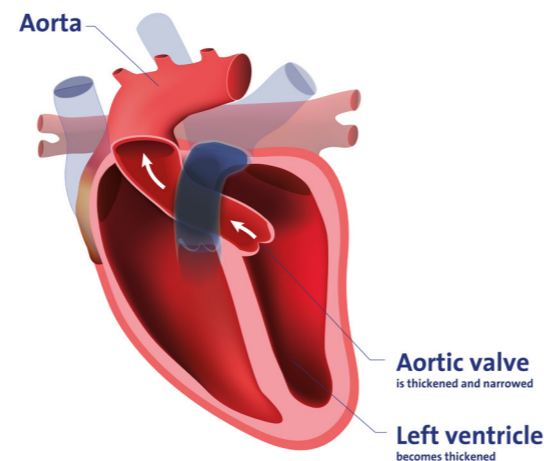


Figure 3: Anatomy heart

TAVI patients

The average age of the patients who undergo a TAVI is 79.8 (de Ronde,2021). Their age makes them more vulnerable and may hinder them from understanding the procedure. Figure 4 visualizes socio-demographic factors and the averages for a TAVI patient.

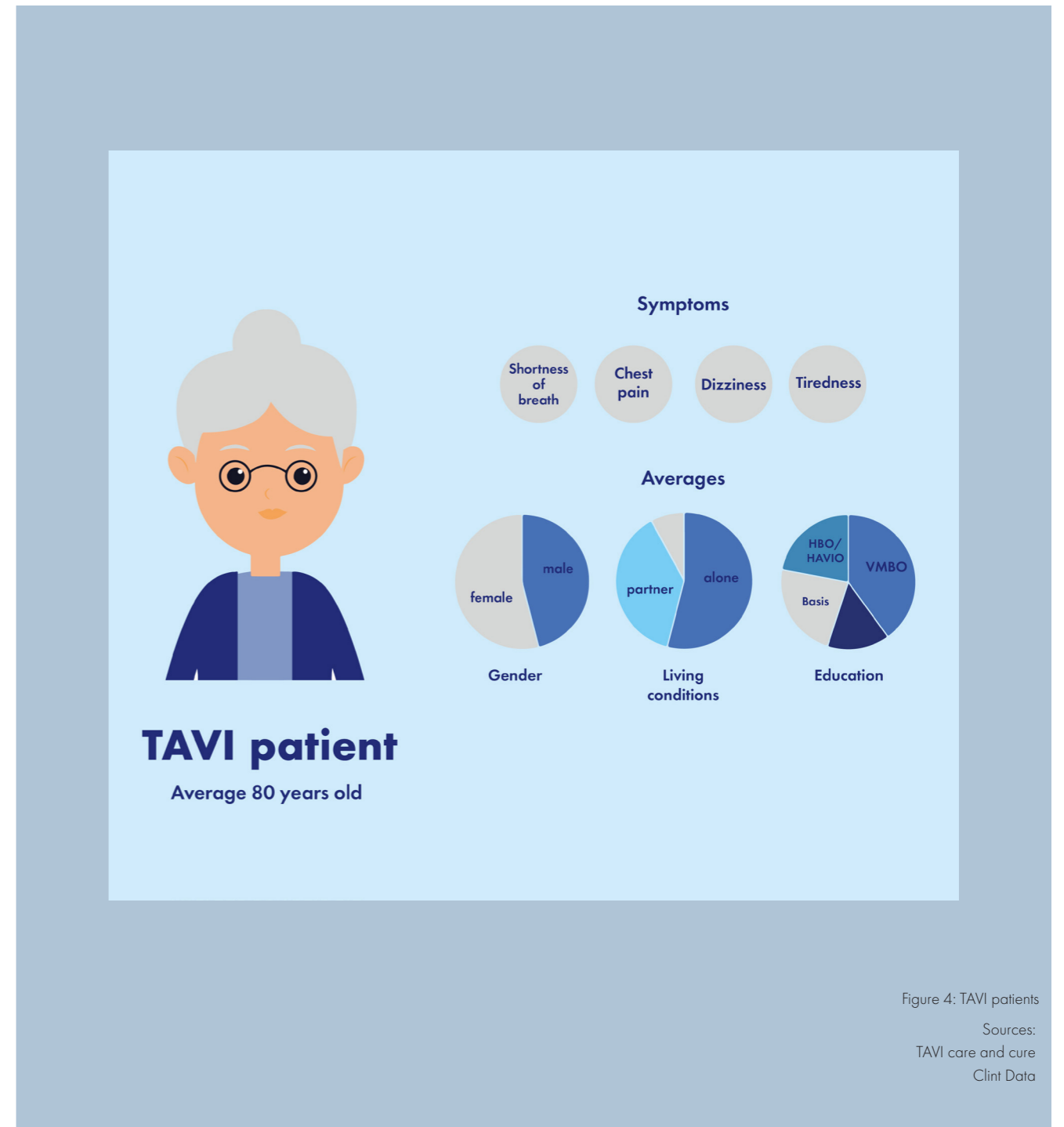


Figure 4: TAVI patients

Sources:
TAVI care and cure
Clint Data

Medical tests are conducted on the patients to classify the level of severity of the aortic stenosis. Also, the patients' symptoms are classified based on two values: New York Heart Association (NYHA) and Canadian Cardiovascular Society (CCS). Firstly, NYHA is a functional classification that analyzes the severity of the symptoms by placing patients in one of four categories (I-IV) based on their limitations in terms of shortness of breath during physical activity. CCS is a grading used to classify the severity of exertional angina and chest pain (0-IV). The patients' organ function and other co-morbidities are also analyzed at the hospital by conducting various tests.

Furthermore, a comprehensive geriatric assessment is incorporated in the TAVI-patient pathway to analyze the vulnerability (frailty) of the patients and other geriatric anamneses. Frailty is defined as a state of reduced physical, cognitive, and social functioning, resulting in a reduction of reserve capacity for dealing with stressors (Clegg et al., 2013). Besides frailty, it is essential to analyze the patient's risk of delirium. Delirium is the most common acute neuropsychiatric disorder in hospitalized elderly, resulting in an acute confusion state (Scheffer et al., 2011). Approximately 20% of patients suffer from delirium after the procedure (Goudzwaard et al., 2019). The risk of delirium is related to their age and cognitive abilities. If the risk of delirium is high, measures are taken to prevent this before and after the procedure. Some of the measures taken are ensuring they use their glasses and hearing aid correctly, visibly hanging a clock and calendar close to their bed, or asking them to bring family photos to look at (Geriatricians, EMC). These are important to ensure the patient does not become confused.

Other medical assessments (e.g., Multi-slice computer tomography (MSCT), Lab tests, Electrocardiogram (ECG)) are completed prior to the procedure to ensure an entire image is made of the arteries and aortic valve of the patient.

All these elements are taken into account when deciding whether the patient qualifies for a TAVI procedure.

Health care professionals

A specialized medical team is involved in the TAVI procedure. The leading doctor is the interventional cardiologist.

Stakeholders

In this figure 5, the stakeholders involved are presented based on their degree of interaction with the patient. It is important who the patient primarily interacts with during their journey to ensure they are taken into consideration.

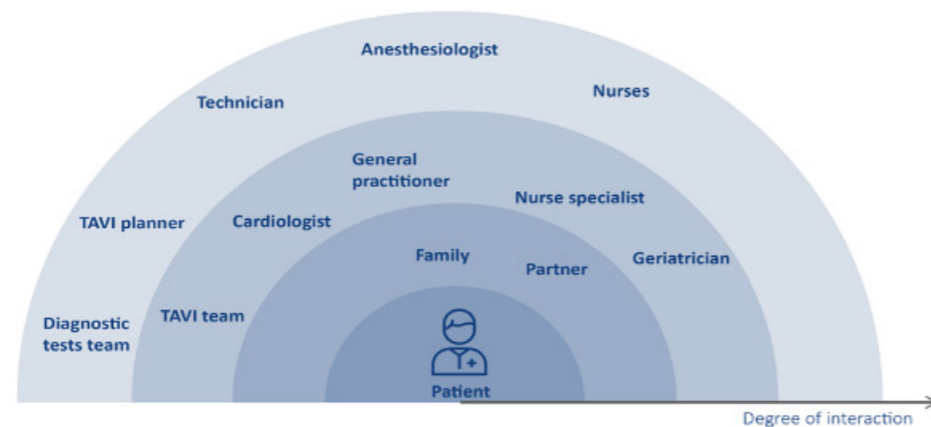


Figure 5 :Stakeholders important for patient.

Procedure

As mentioned previously, the procedure is conducted with local anesthesia, meaning the patient is awake. The procedure has a duration of approximately 60 minutes. The procedure is most often performed via de femoral artery; however, it can also be done via other arteries, as seen in figure 6. During this intervention, the cardiologist makes an incision in the patient's groin and inserts a short hollow tube under echo-guided puncturing, called a sheath. Then, the valve prosthesis is compressed and guided into the artery with a catheter. The cardiologist guides the valve and catheter to the position of the aortic valve and slowly unfolds the valve prostheses, as seen in figure 7. The new valve implant pushes aside the leaflets of the diseased valve. Immediately, the function is taken over by the new aortic valve. The function and position of the aortic valve are investigated by either a trans thoracic echo or a contrast angiogram. A detailed description of the procedure can be found in Appendix B.1.

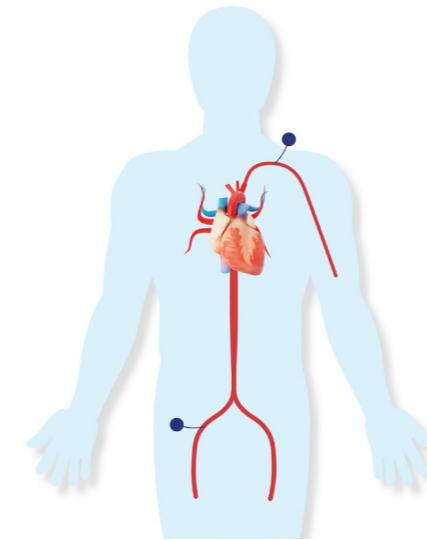


Figure 6: Common arteris used as entrance for TAVI.

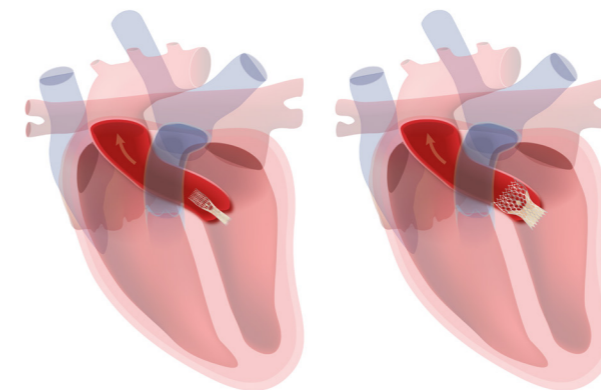


Figure 7: Valve unfolding.

Risks and protection

A cerebrovascular accident (CVA), also referred to as a stroke, is the most feared TAVI-related complication (Vlastra et al., 2018). To reduce the risk of a stroke, a filter-based cerebral embolic protection is implemented (Van Mieghem et al., 2016). Implementing this filter prevents the flow of debris into the patient's brain.

Another complication that can occur is heart arrhythmia. Meaning the heart beats at an irregular pace. One out of five patients experiences this after a TAVI. If this occurs and persists, the patient will need a permanent pacemaker.

Furthermore, the risks are minimal and can be handled adequately.

TAVI Care and Cure

TAVI care and cure is an Erasmus-initiated project to improve patient-centered care during the TAVI pathway. The TAVI care and cure program aims to improve outcomes, patient satisfaction, and quality of life in patients who are treated with a heart valve implantation. This project reaches its aim by gathering data through baseline questionnaires (pre-operative), quality of life (QoL) questions, and by following the patient; 6 weeks, 1, 3 and 5 years after the TAVI procedure. In addition, the patient's complexity will be evaluated by applying a multidisciplinary approach, including geriatric assessments of frailty (vulnerability) and cognitive function (De Ronde et al., 2019). This data is collected and analyzed in clint (health care program) as seen in appendix B.2.

ART-VR

ART-VR is a research project which was recently started at EMC, with the goal to disconnect the patients from the operation room by distracting them. This research is setup together with the company, SyncVR. SyncVR is a company which develops VR interventions for the medical sector. They provide EMC with the VR glasses, as well as the content which is shown to the patients.



1.3 Introduction to assignment

This project evolved from a problem identified by an interventional cardiologist at the Erasmus MC. He noticed that technological advancements were improving the procedure; however, the patient experience was not progressing. The majority of the patients were anxious and uninformed prior to the procedure and there was a need for a more holistic approach. From this problem, this graduation project arose.

This graduation project focuses on analyzing and improving the patient experience of patients that undergo a TAVI procedure. During this procedure, patients are conscious, therefore, more prone to suffering from high anxiety levels. As previously mentioned the average age of the patients who undergo a TAVI is 79.8, this plays a substantial role. Their age makes them more vulnerable and may hinder them from understanding the procedure.

Pre-operative anxiety is common prior to a medical procedure. There are many reasons for this, for example having uncertainties, lack of control, and knowing the risks. Therefore, sedation is often used to calm patients and help them sleep during the procedure. However, no general anesthesia or sedation is used during the TAVI procedure because this can slow down the recovery process.

At the same time, high anxiety levels can also be problematic for the procedure. It can influence the overall patient experience and satisfaction (Herrera - Espineira et al., 2009).

The main focus of the project is to improve the patient experience of the patients by reducing pre-operative anxiety. The project will be approached by mapping the patient experience pre, peri, and post- TAVI. This will help understand a patient's emotions and transform the pain points into opportunities. The goal is to design a tool for the patient to improve their patient experience.

The project aims to improve patient-centered care while staying within the boundaries of the current TAVI patient journey and developing a concept that is implementable in the short term. These elements are essential for Erasmus MC and align with its innovation vision.

This is visualized in figure 8.

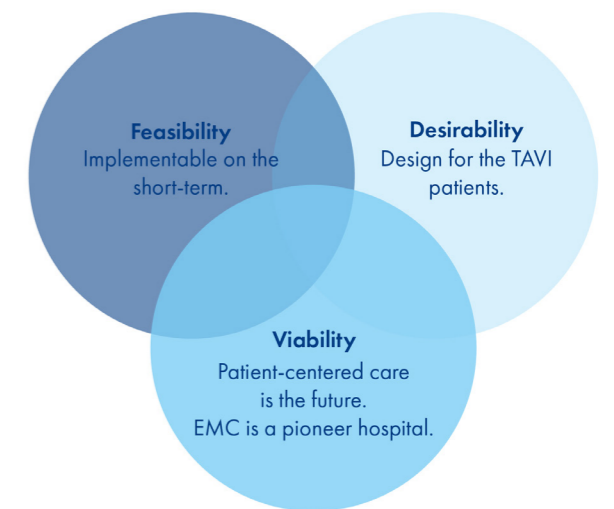


Figure 8: Three lenses of innovation

1.4 Approach

The design goal of this project is to develop a tool that will improve the overall patient experience of TAVI patients by reducing their pre-operative anxiety. As said in the previous sentence: pre-operative, meaning the focus lies on the preparatory phase before the procedure. The tool will be created after conducting thorough patient research that leads to a representative patient journey map. Patient journey mapping is a method to establish a visual record of all the stages a patient goes through during their disease (Melles et al., 2021). It is often used in human-centered design. The analysis will touch upon the patient's current interactions, experience, technological abilities, personal wishes, and health circumstances. This analysis is completed to ensure the developed tool is desirable, feasible, and viable.

The general approach of the project is the double diamond design method (design council, 2005), as seen in the figure 9. This model represents a general design process frequently used at the faculty of Industrial Design Engineering at the TU Delft. It is based on the principle of diverging and converging. 'Discover and Define' primarily focus on research and exploration, followed by scoping and defining design direction. In this project, these phases will be approached by interviewing, observing users, using generative techniques such as sensitizing booklets, applying questionnaires, and a literature study. The 'Develop and Deliver' phases are about generating ideas and executing these ideas. This phase includes brainstorming, organized creative sessions, and rapid prototyping to develop and test ideas. The whole process is built up of continuous iteration loops, as insights from every phase improve the final design. This is referred to as the build-measure-learn (BML) loop; it is the most fundamental concept of the lean startup methodology (Eric Ries, 2011). BML focuses on building a prototype, then testing this with users to analyze users' reasons and reactions and, therefore, learning whether to keep or pivot the idea. Feedback is a key element of this process and helps the designer develop and improve the idea further.

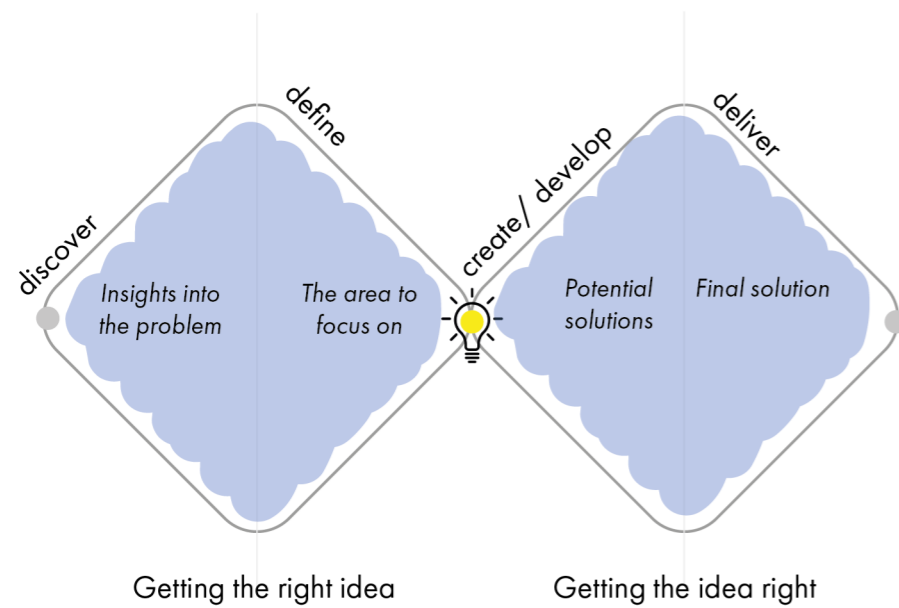


Figure 9: Double diamond

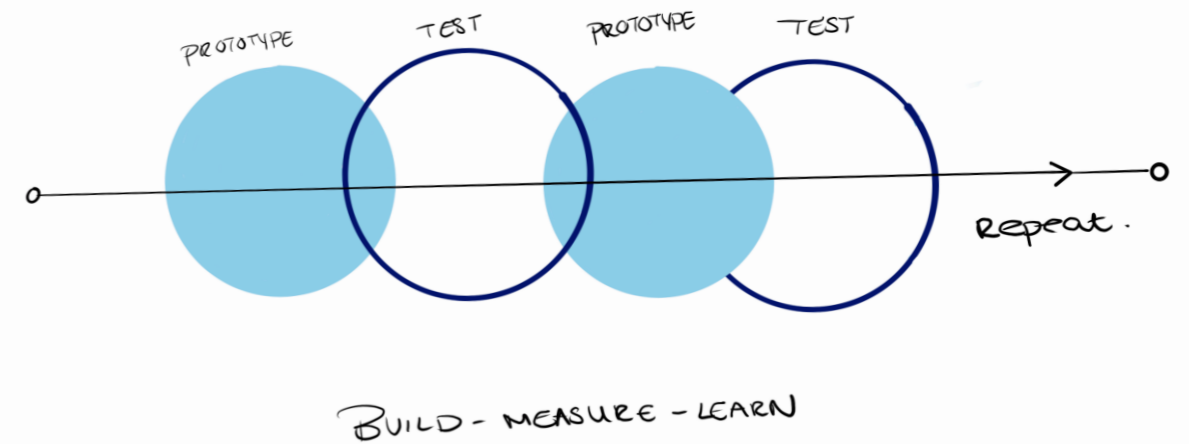


Figure 10: Iteration process and BML loop.

Part 02

Discover

2.0 LITERATURE REVIEW

This chapter presents a literature review to academically substantiate the domain of the project for which a concept will be designed. This review zooms in on various important themes within this project. Namely, patient experience, pre-operative anxiety, communication and designing for elderly.

2.1 Patient experience

In literature, there are many definitions of patient experience. For this project, the following definition is used:

“The sum of all interactions, shaped by an organization’s culture, that influence patient perceptions across the continuum of care.”
- (Wolf, Niederhauser, Marshburn, & LeVela, 2014)

This definition is taken from the paper ‘Defining patient experience,’ which conducted a literature review of 18 articles and websites and, based on this, formulated the mentioned definition.

Patient experience is divided in four elements.

1. Sum of all interactions

Patient experience is influenced by the quality and value of all interactions. Either direct or indirect and clinical or non-clinical (Wolf et al.,2014).

There are several touchpoints during the whole patient journey where the patient interacts with the organization. Interactions are the orchestrated touchpoints of people, processes, policies, communications, actions, and the environment (Wolf et al.,2014). These are all influential variables to the patient’s journey.

2. Perception

Perception is the second important element of patient experience. Perception is defined as what is recognized, understood, and remembered by somebody in a specific situation. Perceptions vary based on individual experiences such as beliefs, values, cultural background. It is essential to look at the patient’s perception and that of their support system (family and friends) in this context. Patients have an assumption about their experience based on their own previous experiences, stories heard from others, or information found on the internet. This assumption prior to their interaction with the doctor affects their experience.

The perception of health care professionals (HCP) is also a key element as this directly affects the interaction between the patient and the health care professionals. This is mainly because physicians tailor their information and way of communication based on their patient perception. (Dekkers et al., 2018). This perception is based on four global categories: the patient’s ability to manage illness, autonomy, communication competence, and interpersonal behavior (Dekkers et al.). In general, tailored communication between HCP and patients can increase the quality of care.

Understanding the values of both the patients and the health care professionals allows the opportunity to bring the values closer together (figure 11) and thus improve the patient experience ((Bastemeijer et al. 2017).

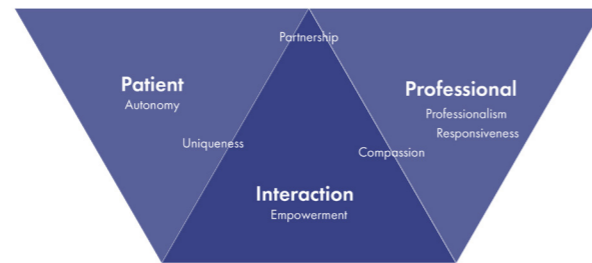


Figure 11: Taxonomy of patient values and preferences

3. Patient-centered culture

The general culture is shifting from the view that the doctor has full authority and ‘knows it all’ towards a shared decision-making approach.

This is also noticeable at EMC as many new initiatives are being developed to improve patient experience. Also, university medical centers have developed a way to measure the patient experience based on the aspects presented in figure 12.



Figure 12: (patient experience at EMC , erasmus website).

In addition, the recently published 2021 ESC/EACTS guidelines for the management of valvular heart disease are more focused on integrating the values of the patient and patient-centered care, as can be found in Appendix C.1.

In a patient-centered culture, patient empowerment is also essential, for example, by giving more control to patients over their health (Organization, W.H., Health 2020: a European policy framework and strategy for the 21st century. 2018). However, patients must have access to the correct information to reach this.

During the consultation in the outpatient clinic, the cardiologist explains the advantages and disadvantages of a TAVI compared to surgical aortic valve implantation (TAVI today, 2021). It is important that the patient and their relatives know the risks and long-term prognosis. Furthermore, options for early discharge are discussed with the patient, allowing the patient to form their opinion. In conclusion, the cardiologist makes the end decision as they know how to do so.

4. Continuum of care

“Let us look at the patient experience in total as reducing suffering and reducing anxiety... across the entire continuum of care, from the first phone call till the patient is being discharged.”

- Pat Ryan, CEO of Press Ganey (Stempniak,2013))

This quote suggests that the patient experience is vital during the whole trajectory of the patient. Therefore, it is important to look at the whole continuum of care as one and that the patients also experience it as one journey. An example of this is repeatedly interacting with one primary doctor, the treating doctor, throughout the journey. This ensures there is recognizability from the patient, which positively affects the adherence of the treatment plan, patient satisfaction, and the perceived quality of healthcare (justice,2020).

Conclusions

- All interactions influence the patient experience.
- Patient specific experiences and opinions should be addressed.
- Empathy is key.
- Patient care is broader than the diagnose and treatment. The interaction between healthcare professional and patient should reflect this.

2.2 Pre-operative anxiety

What is pre-operative anxiety?

Anxiety is 'an emotional state consisting of feelings of tension, apprehension, nervousness, and worry, as defined by Spielberger.

People feel anticipation anxiety in many different circumstances, for example, when flying. Some people are more vulnerable to this than others; this is also the case with pre-operative anxiety.

Pre-operative anxiety is defined as an uncomfortable, tense, unpleasant mood before surgery, an emotional response to a potential challenge or threat to reality (Liu,2017)

Anxiety and stress can be caused by the lack of knowledge about the diagnosis, treatment, or even hospital environment (Warner et al., 1992). The cause can also be caused by a previous experience at the hospital, which may not have been pleasant. Anxiety can be present throughout the whole patient journey, and therefore it is important to reduce it.

Better preparation

Distraction Techniques

Relaxation Techniques

Music Interventions

Exposure Therapy

How to reduce pre-operative anxiety?

In order to understand how pre-operative anxiety can be reduced, some existing examples and studies are investigated.

Anxiety can be reduced through better preparation. The effect of showing the operation room prior to the procedure was investigated in a randomized controlled trial with patients that suffer from hypertension. The conclusion was that pre-operative anxiety, blood pressure, and heart rate are lower than those who do not see the operation room prior to the procedure (Yuzkat et al., 2020). The participants were shown the operation room 1 day prior to their procedure.

Distraction techniques have been researched and evaluated, such as card games or listening to a cartoon. Having as a result that can significantly reduce the anxiety of a patient (Sahiner & Bal,2016)

Relaxation techniques, such as meditation and massage therapy, lowered the amount of diazepam needed by the patients prior to a heart catheterization (Warner et al., 1992).

Another mechanism used to lower anxiety is music interventions. A systematic review has been conducted with 42 randomized controlled trials of the effect of music intervention in pre-operative settings. Music intervention had positive effects by lowering anxiety and pain levels in half of the studies (Nilsson,2008). It is a low-cost technique to lower anxiety.

Other types of anxiety (E.g., fear of snakes or flying) are addressed by using exposure therapy with virtual reality.

To conclude, several coping mechanisms are being used and tested to ensure the patient has lower pre-operative anxiety. It is essential to provide the patients with the tools to cope with this anxiety.

Why is it important to reduce pre-operative anxiety?

- Anxiety can interfere with how a person processes information and therefore hinder them from remembering the information (Interview, T. van der Cammen, 2021). Subsequently, as explained previously, better preparation and processing of information can reduce pre-operative anxiety.
- A study was conducted to assess the correlation between patients' anxiety level and their satisfaction with healthcare (information received, privacy and comfort, and friendliness of healthcare professionals). The conclusion was that a higher anxiety level was associated with greater patient dissatisfaction (Herrera et al.,2009)
- Anxiety increases hypertension and blood pressure, affecting postoperative illness and mortality (Yuzkat et al., 2020). Especially in reference to the TAVI procedure, it can negatively influence the recovery time and increase the risk of delirium.

Conclusions

- Anxiety affects patient's health, patient's recovery process and satisfaction level.
- Anxiety can be tackled prior and during the event which causes stress. Either through better preparation, relaxation techniques or distraction methods.
- It is important to help a person with coping mechanisms when they are in stressful situations.

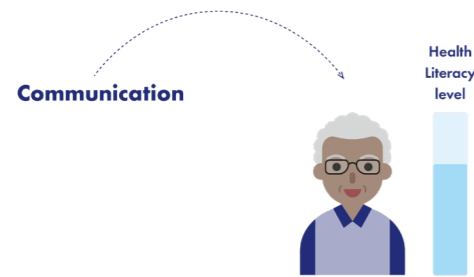


2.3 Communication

As mentioned in chapter 2.1, the sum of interactions is an integral part of patient experience. This chapter goes more in-depth on one of the aspects of interaction, communication, especially communication with elderly.

Communication is defined as the exchanging of information by using different mediums. (Merriam - Webster). The type of communication used is mainly dependent on who the receiver is. Therefore, in this project, this is relevant to know how to convey information best.

An essential factor to take into account is health literacy. Health literacy refers to "the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions" (Berkman et al.,2010).



Communication comes in different forms, and it is vital during different interactions of the TAVI procedure. Therefore, it is important to know how to optimize the communication flow to improve interactions. The touchpoints are minimal, as seen in the TAVI patient journey; therefore, communication should be adequate.

Effective communication

Often a knowledge gap originates between the health care professionals (HCP) and the regular citizen.

In order to shrink this gap, the information should be communicated in a different 'language' than the medical one spoken between the health care professionals. The 'language' that should be used has to be understandable by the more significant part of the country's population. Six language levels are distinguished in the ERK (Nederlandse Taalunie, 2008). Rijksoverheid (n.d.) writes that the majority of the Dutch population can understand text written in 'B1 language' in Dutch.

Consequently, any written communication to patients should mainly be done at B1 level. An example of the difference in word choice is: 'voltooid klaar'. Furthermore, sentences should be short and contain one message per sentence (B1teksten.nl,2021)

During consultations, verbal communication is primarily used, making it difficult for patients to visualize what is explained by the clinicians. Therefore, some doctors use a 3D heart model to explain.

Besides the written language, visual communication should be used because it is universal. This supports the patient in understanding medical information (Pratt & Searles, 2017)

Currently, the role of animations in the medical industry is becoming more present. It has been shown to be an efficient medium to communicate to patients (Meppelink et al.,2015).

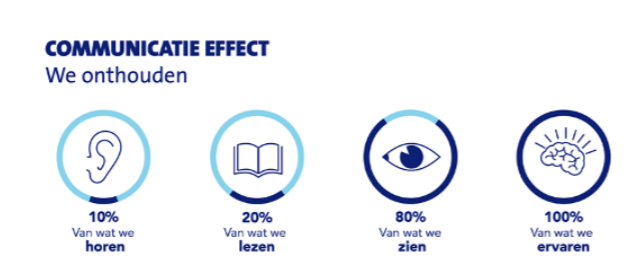


Figure 13: Erasmus MC communication effect.

Figure 13, shows the effect of different means of communication as presented by Erasmus communication team. Emphasizing, the different types of communication.

Information loss

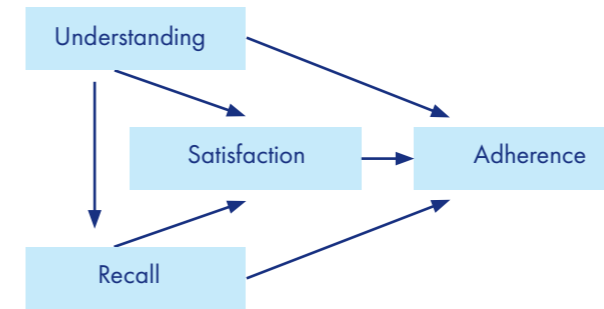


Figure 14: Ley's model of effective communication (Ley, 1988)

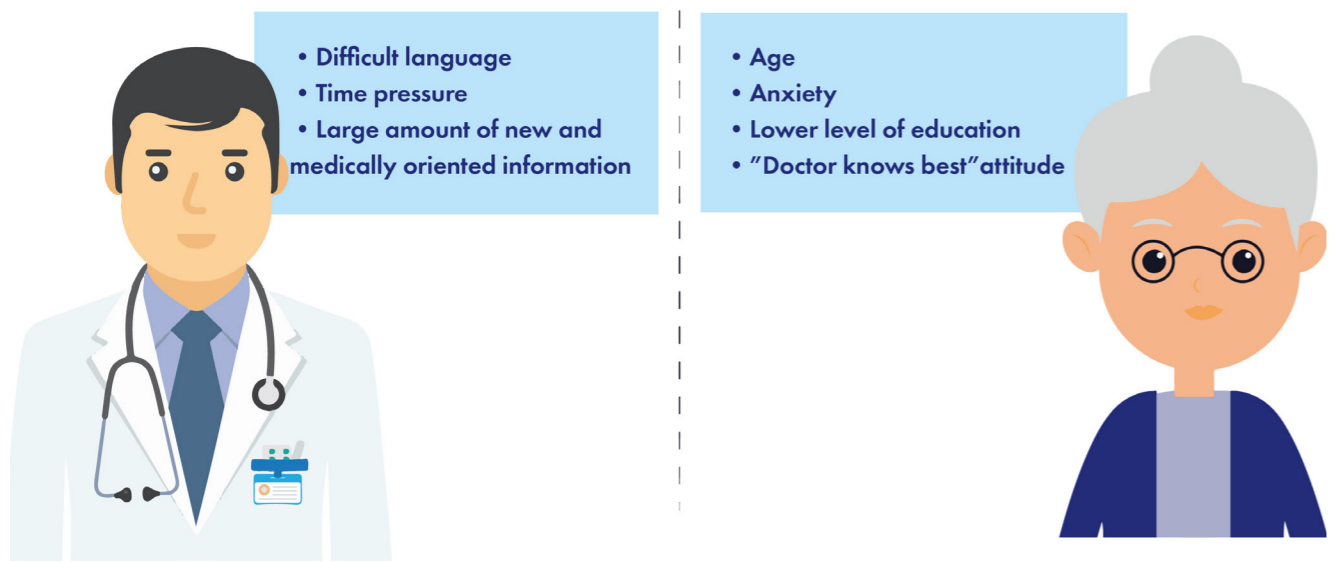
This model emphasizes the importance of understanding information to remember the information for the long term. 40-80 % of the medical information provided is immediately forgotten (Kessels,2003). Furthermore, almost half of the information remembered is incorrect (Anderson et al., 1979). A geriatrician confirmed this at EMC; she stated that the patient recalls only about 20% of the information after the consultation (personal interview, De Beer, 2021)

The explanation for the information loss is described in Kessel's paper as having 3 influential factors - first, due to the use of medical terminology; second, the mode of communication (e.g.spoken not written); and third, factors related to the patient such as education level or their expectations (Ley, 1979). When a patient is in a stressful situation, attentional narrowing (Wessel et al., 2000) can occur. Attentional narrowing results in the patient only focusing on one central message and not processing other information communicated around this. Memory for medical information is susceptible to becoming poorer with increased age and anxiety levels (Kessels). Pictographs supported with written information were found to be the most effective communication method (Houts et al.,2001). Also, repetition increased the amount of information recalled.

Ingeborg Griffioen, a service designer, analyzed her personal patient experience from a service designer's point of view. Something which she noticed was: "Each form I received was different, with a different layout and a different choice of words." (Interview Ingeborg, convergence alliance,2020) about all the information folders and sheets she had received during the trajectory. This is a concrete example of how important communication is: structure and terminology can cause misunderstanding or hinder finding the relevant information.

During COVID-19, communication has also been critical. "They should have integrated visuals since the beginning of COVID, to communicate the measures. The use of visuals would have helped many people to understand" (interview, T. van der Cammen, 2021)

Ernst Kuipers, the new minister of health, has now integrated visuals as a support tool to communicate the information about the coronavirus. (Persconferentie, 2022)



Another study that supported this theory is 'timely information,' conducted by Thomas Timmers. (Timmers, 2021) Figure 15 summarizes the factors which hinder the patients to process information in medical settings.

figure 15: Patient factors health literacy

Conclusions

- Use B1 level language in the communication towards patients or ensure you explain extensively.
- Use different means of communication: (E.g., visualizations, written, verbal) and combine them.
- Consistency is crucial
- Repetition helps
- Increase access to information
- Timely information



2.4 Design for Elderly

The elderly population is increasing; therefore, there is an increase in elderly care in the medical sector.

As previously mentioned, patients who undergo a TAVI are on average 80 years old. Therefore, designing for the elderly involves considering certain factors especially: ergonomics and technology savyness. In figure. 16 a few general aspects of the elderly are mentioned.

Use of Technology

Central Bureau of Statistics (CBS, 2021), presents data on the use of technology in the Netherlands. For example, in 2018, 32% of the population above 75 had never used the internet before.

There is also a big gap between a person who has used the internet before versus someone who frequently uses it and is comfortable with it. According to the statistics, more than half of the population above 75 use the internet daily. CBS conducted another research on the internet for health and lifestyle aspects. There was concluded that the population above 75 was the one to look up health-related information least online, only about 39%. They prefer asking for health-related information directly with their physician.

The population group aged 65-74 tends to use the internet and eHealth applications more often (CBS). Therefore, the assumption can be made that there will be a shift, and the percentages of active technology users will increase over time.

Intuitive
in use.

Contrasting
Colours

Font
size minimum: 14
Type: Sans

Minimum size of
the product and its
elements

Sources (discovereye,2015)

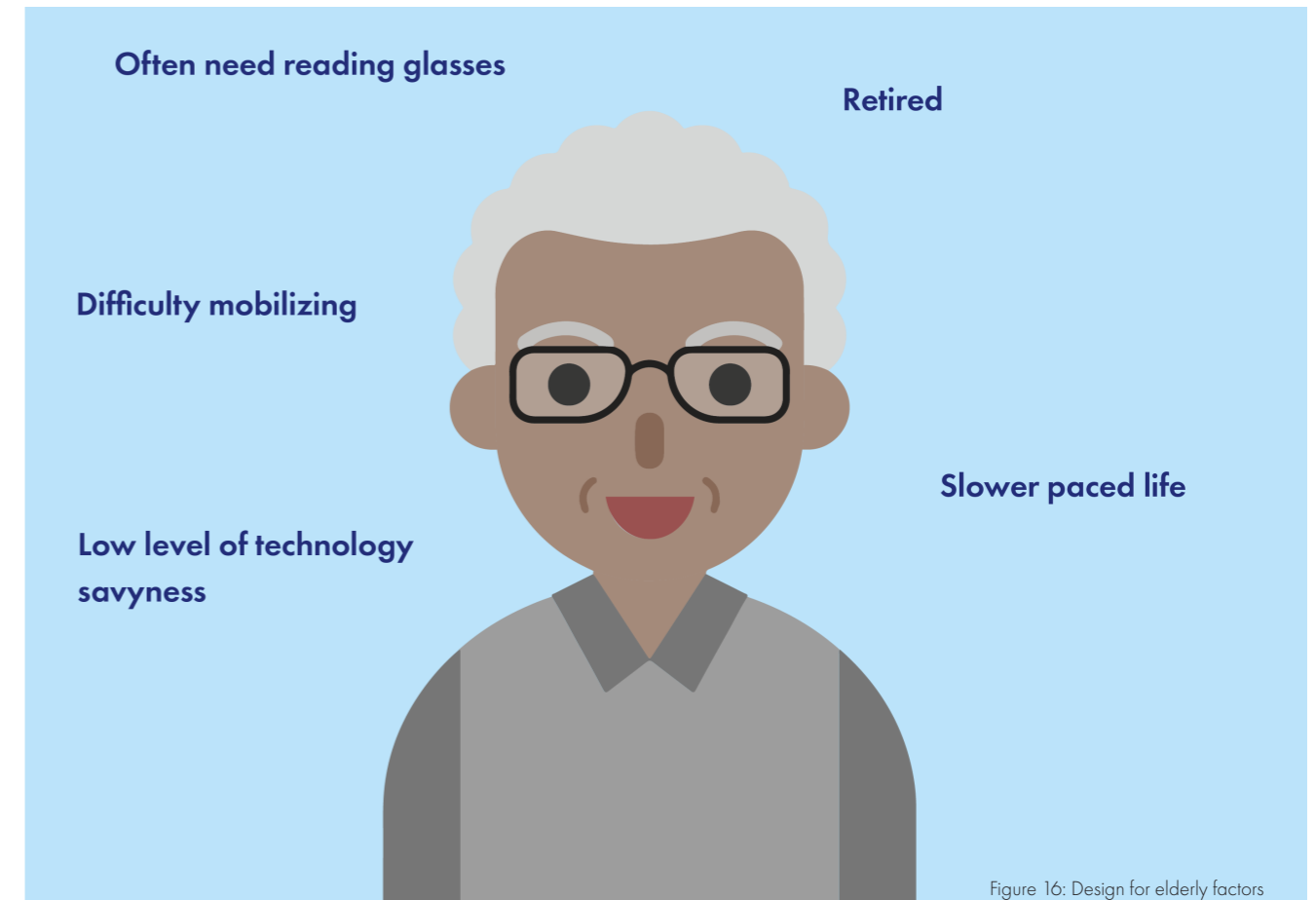


Figure 16: Design for elderly factors

The elderly who have close contact with children and grandchildren tend to be more adapted to using technology. This is because they are helped and taught about how it works by their family members, neighbors or friends, also referred to as the inner circle (Interview, van der Cammen, 2022). Also, COVID-19 influenced technological devices as some elderly were forced to use the internet to stay connected with family during quarantine. During this time, phones and tablets were commonly used for video calling.

An exciting insight found about the adaptation of technology was:
 "Technologies appear to have a higher degree of acceptance when they have limited functionality but are fully developed."
 (EPTA report,2019)
 Implying that the fewer functions a new digital product might have, the easier it is for the elderly to learn how to use it and therefore accept it. This is relevant for this project because the concept should have a focused functionality and not be in combination with too many different elements.

Similar to this, elderly also have challenges when banking. As this is also continuously being improved and digitalizing. During an interview ABN AMRO shared that they noticed that the elderly are often assisted by their inner circle (Interview, M. Bos, 2022). Besides this, they mainly make use of physical appointments.

Conclusions

- It is crucial to consider the patient's inner circle (family, neighbours, friends, caregivers)
- When using technology it is important to guide elderly while using it.

Chapter conclusion

The following topics were analyzed: patient experience, pre-operative anxiety, communication and designing for the elderly.

Patient experience

The four pillars of patient experience are interaction, perception, patient-centered culture, and continuum of care. It is important to ensure all four pillars are taken into consideration during the TAVI patient journey.

This literature review emphasizes the relevance of applying an interaction which is focused on the patient and has an effect on the whole continuum of care.

Pre-operative anxiety

Many studies have been conducted on lowering pre-operative anxiety, therefore serving as inspiration and knowledge for this project. Besides being an unpleasant feeling for patients, this anxiety can affect the processing of information, patient dissatisfaction, and the post-operative recovery process.

Communication

Communication is a vital topic throughout the whole healthcare sector, as it influences the interaction between patients and health care professionals. This interaction is where the road to recovery and treatment always begins. Therefore, it is essential to use different mediums of communication patient language and apply elements such as repetition.

Design for elderly

Lastly, a challenge within this project is the design for the elderly. The literary research serves as a basis to make design decisions for this population group.

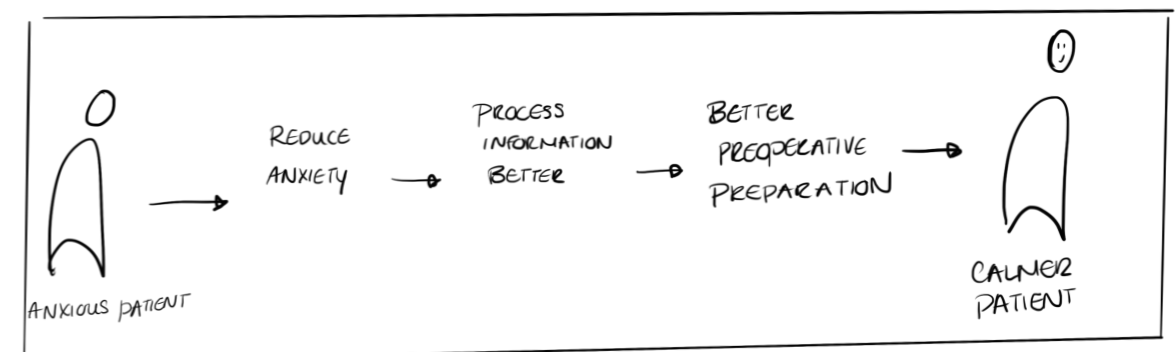


Figure 17: effect of anxiety (Cammen, T,2021)

3.0 PATIENT JOURNEY

This chapter presents the current patient journey of a TAVI patient. First, as it currently is setup by the cardiology department with pictures of the context to support it. Secondly, the journey is zoomed-in on and the takeaways from the TAVI procedure and the literature review are applied to the journey. Also, the stakeholders involved are presented.

3.1 Current Patient Journey

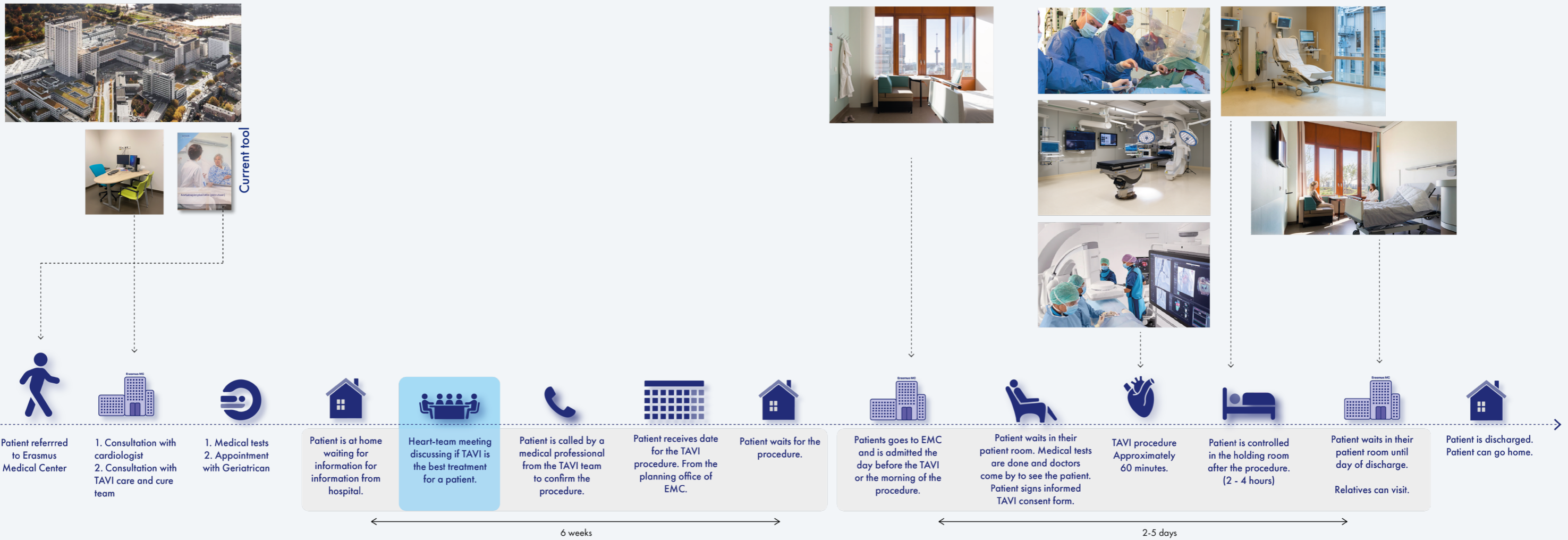


Figure 18: Current patient journey

TAVI journey

This patient journey visualizes the general steps a patient goes through prior to, during and after the TAVI treatment process. This is the journey EMC strives to have for every patient. The visual also introduces the context.

The heart-team meeting is the only moment in the journey which does not directly involve the patient, however it is a crucial point as here they define whether a patient is suitable for the TAVI procedure.

Current tool

The current intervention used to inform patients about the procedure and phase of the journey is a brochure. Patiënten brochure '(Percutaan) aortaklepipplantatie.

This brochure consists of textual information of both the percutaneous and surgical aortic valve implantation. Furthermore, it communicates information about the pre, peri and post procedure phases. Lastly, explaining the risks of the procedure.

Context

Erasmus medical center (EMC) is one of the largest hospitals in the Netherlands. In addition, the cardiology department has its own building.

All patient rooms in the EMC are private and have their bathroom. In line with the vision of Erasmus, they are designed with a focus on the comfort of the patients. The rooms are spaciouly designed with a table where the patient can sit and have food. Besides this, there is also room for relatives or friends.

The procedures take place in an intervention room in the operations complex. This department is the coronary suite, where all tools are available for Percutaneous Coronary Interventions (PCI). The main medical devices in this room are C-arm, X-ray patient table, Flex-vision screen and control room. These are relevant because they are the most prominent in the room and visible for the patient.

3.2 applying insights to patient journey

To conclude the chapter, the insights are applied to the current patient journey.

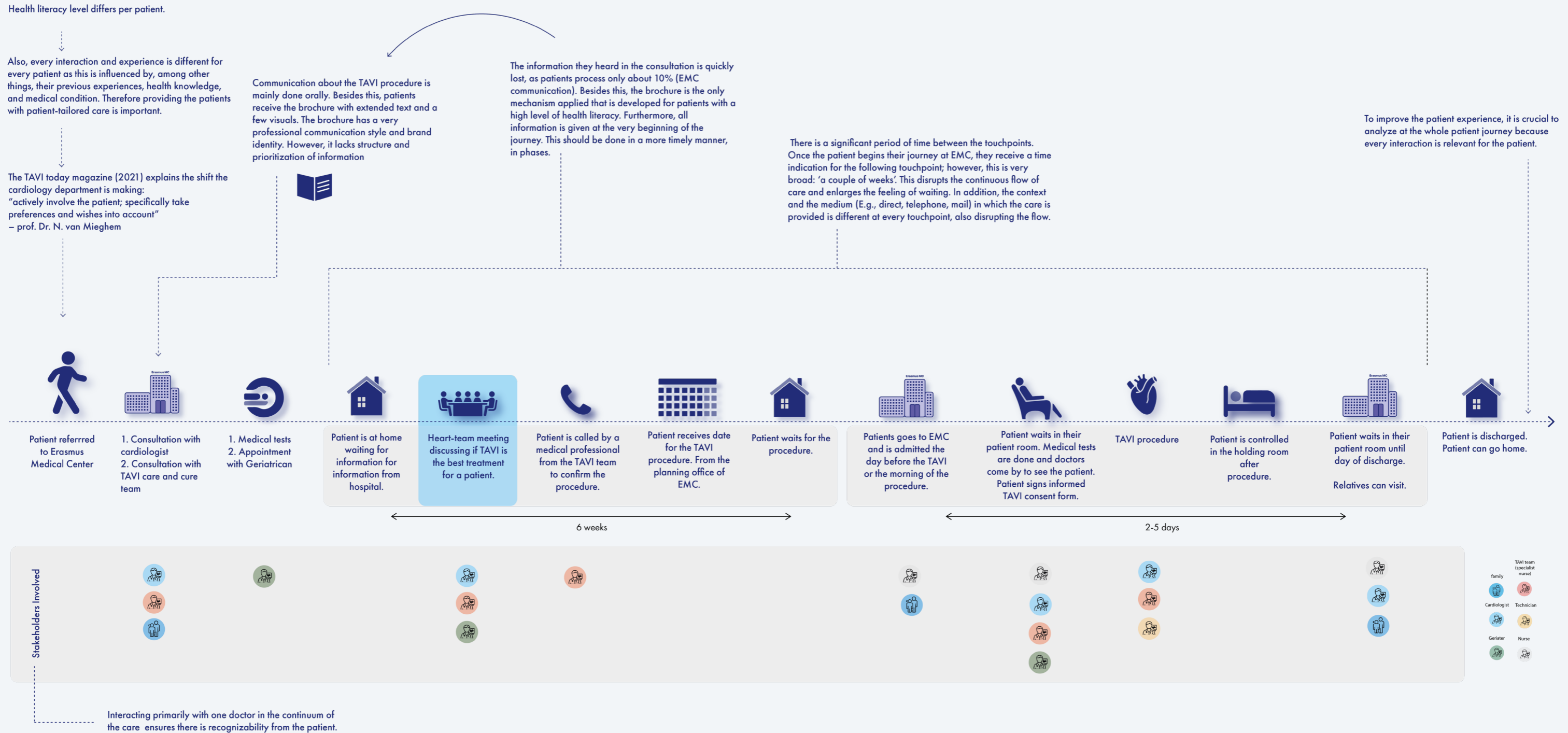


Figure 19: Current patient journey and insights

4.0 USER RESEARCH

In continuation of the discover phase, a user study is conducted in the Erasmus MC. This is done to identify the patient journey as perceived by the patient and within this the pain and succes points.

4.1 User research setup

In continuation of the discover phase, a user study is conducted.

How is the current patient experience?

What factors influence this?

How do patients feel prior to the procedure?

This chapter describes the user study results executed at the Erasmus MC. The outline of the user study is briefly explained within this chapter, and the conclusions are thoroughly explained. The setup and results can be found in Appendix D.

User data

Data that has been collected by the TAVI team (TAVI care and cure program) is analyzed in combination with the data from the patients participating in the user study. This data is collected because medical history, socio-demographic characteristics, and psychological anamnesis are all factors that can influence anxiety levels (Berth et al., 2007). Therefore, the data was analyzed to find any correlations between these factors and the patient experience.

User Research Outline

A user study was set up with TAVI patients. This user study aims to plot a patient journey map of a TAVI patient from the moment they receive a referral from their general practitioner to the day of discharge after the procedure. This patient journey map visualizes an experience curve, showing patients' emotions during the journey, the pain points, and the success points. This is used to identify the influence of specific touchpoints and perhaps where the touchpoints are missing.

In figure 20 an overview is shown of the moments where each methods is applied. In appendix D, explanation of the method, full set up and direct results per method can be found. In addition to the user research, observation and interviews were conducted with the health care professionals. For example observations during the heart-team meeting, with the goal of understanding what is important to decide whether a patient is suitable.

Goal

The goal of the user study is to identify the overall current experience of the TAVI patient journey and the factors that influence their experience. In addition, to determine the current interactions, what works positively and what does not. Nine patients were followed during their journey (baseline), an additional nine were interviewed after the procedure (follow-up), 10 consultations and 2 TAVI procedures were observed.

This research has given insight into the TAVI patient journey. Furthermore, health care professionals were also interviewed (cardiologists, nurse specialists, geriatricians, and medical students) to understand the interactions with the patients. The advantage of interviewing baseline patients was asking direct questions about their feelings and expectations. However, a limitation with the follow-up patients was that the procedure's outcome biased them.

Research methods

Observation

TAVI procedure, consultations and heart-team meeting

Interviews

(Appendix D.1 and D.2)

Patients, Experts and Medical specialists

PrEmo

An emotion tool (Desmet, P.M.A.(2019))

Sensitizing booklet

(Appendix D.3)

Filled in at home by patients.

Validated questionnaires

SUS, STAI, APAIS, VAS.

System usability scale
State trait anxiety inventory
Amsterdam preoperative anxiety and information scale
Visual analogue scale

Analysis

Photo analysis of context
Interaction analysis

Qualitative analysis and clustering based on themes

PrEmo curve plot per event
(Appendix D.4)

Clustering per question

Data analysis and comparison

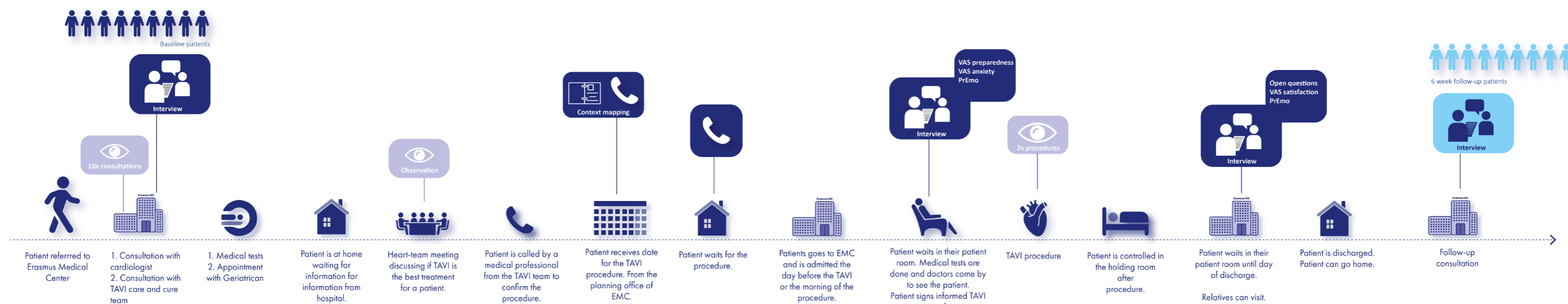


figure 20: research methods



“Patiënten zijn vaak angstig en gespannen en weten vaak niet zo goed wat ze kunnen verwachten. Ik probeer hen gerust te stellen en ze er doorheen te loodsen. Het contact is heel intensief en dat onthouden patiënten. Dat patiënten wakker zijn tijdens de behandeling maakt het aan de ene kant angstig voor hen, maar vaak vinden ze het ook prettig om precies te kunnen horen wat we doen. We proberen de sfeer zo ontspannen mogelijk te houden op de interventiekamer, dat geeft hen een gerust gevoel.”

– Linda Joziasse

verpleegkundige specialist (EMC)

4.2 Key Takeaways

The findings per research method can be found in Appendix D.8.

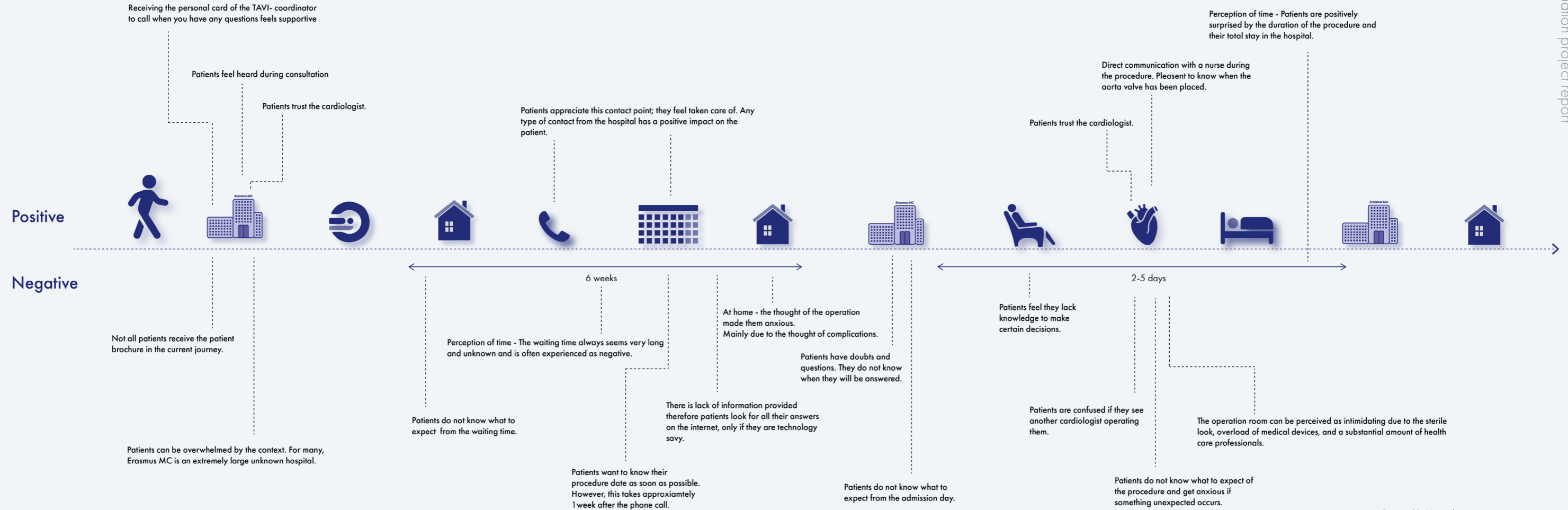


Figure 21: Key takeaways

Continuum



- Open communication during the journey and questions from patients are answered honestly

"It used to be much more authoritarian and now everyone is very open and honest about the surgery and the risks, which I really like" - Patient

- Recognizability of the doctor during the continuum of the care

- If the flow of the a patient's journey goes smoothly (faster than expected and no complications) the patient is very satisfied.



- Patients feel there are a limited number of touchpoints; this was noticeable both when calling with the patients, patients had several questions they wanted to be answered, often about the date of the procedure. This was also visible in the sensitizing booklet, where several patients wrote down their questions or doubts. As seen in appendix D.3.

- Patients tend to get anxious and level of trust lowers when the patient journey goes differently than expected. (E.g. Expectations of time, doctors, interaction, pain, discharge)

The patient journeys differ per patient

Patients enter the EMC TAVI journey from different routes, depending on the severity of their aortic stenosis and where they come from. Therefore, patients receive the information brochure at different points in the journey. Some receive it from their referring hospital, some at the outpatient clinic at Erasmus MC, and some read the online version. This results in inconsistency, and also that some patients do not receive the booklet, as seen in figure 22. The patient booklet with analysis can be found in Appendix D.5.

In Appendix D.6. a flowchart can be seen of the routes of the patients and where they receive an information brochure.

Current tool

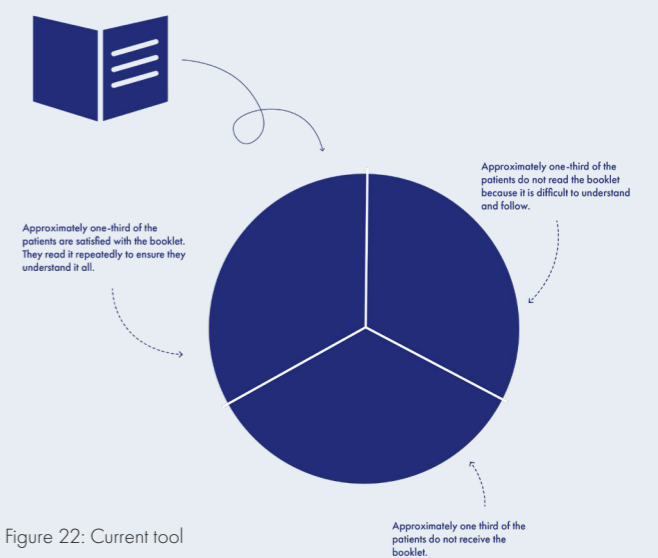


Figure 22: Current tool

4.3 Patient Profiles

TAVI	Demographic	Characteristics	Communication of information	Medical details	Use of technology	Patient profiling (700 dossiers, 65+, Bob Groeneveld)
Anxious for the procedure. Would have liked the option to have general anesthesia, don't want to be awake	Smallest social network	High importance of emotionally supportive communication Poor level of critical communication (posing questions and expressing doubt) Patient's believe they have a poor level of self-efficacy for health information	Use positive feedback, emphasize patient experience and affective care story-telling approach with scenarios Both generic and specific information Show a face - doctor	I want to know as few medical details as necessary "Ik hoef het niet te weten, begrijp er toch niks van" "Het liefst zou ik een roesje krijgen"		Modest
I just want to feel better	Majority female	High importance of emotionally supportive communication Find open communication very important (effective, direct and honest even if it is negative)	reassuring tone and positive stories provide information in steps emphasize that information is up to date	I want to be partly informed in terms of medical details - essential information "Ik denk er het liefst overna als of het nog een hart-katherisatie is"		Managing
Very interesting, amazing that this is possible.	Majority highly educated and employed	Patient's believe they have a high level of self-efficacy for health information (succesfully find and understand health information)	Positive but strict tone provide only essential information Information should come from someone with medical authority	I want to be well informed in terms of medical details "ik heb een filmpje op het internet gezien, ik wil graag weten hoe het werkt"		Optimistic

Modest

- Highest level of anxiety
- High importance of emotionally supportive communication
- Poor level of critical communication (posing questions and expressing doubt)
- Patient's believe they have a poor level of self-efficacy for health information

Managing

- Majority female
- Search for coping mechanisms
- High importance of emotionally supportive communication
- Find open communication very important (effective, direct and honest even if it is negative)

Optimistic

- High pre-operative health status
- Low anxiety
- No preference for personal and emotional communication
- Good communication skills

(Dekkers & Groeneveld, 2020)

Figure 23: Patient profiles

Introduction - Discover - Define - Develop - Deliver - Evaluate - Implement - Conclude

With the insights from the user study and the patient data collected, knowledge is gathered to segment the TAVI patients and their needs and wants during the journey. This is relevant to determine how to reduce their anxiety prior to the procedure.

Profiling of patients is, among other things, based on socio-demographic characteristics, medical history, and education level. Specifically for TAVI patients, the severity of the symptoms and other comorbidities that the patient may have can affect their experience. In addition, their living situation and support group also influences this.

In the data set (appendix. D.7), a correlation is found between patients who have had several heart-related procedures and lower anxiety levels. This confirms the fact that unknowingness can increase anxiety. (Warner et al., 1992). Another correlation was found that the most anxious patients were also the ones with high information requirements (Moerman et al., 1996).

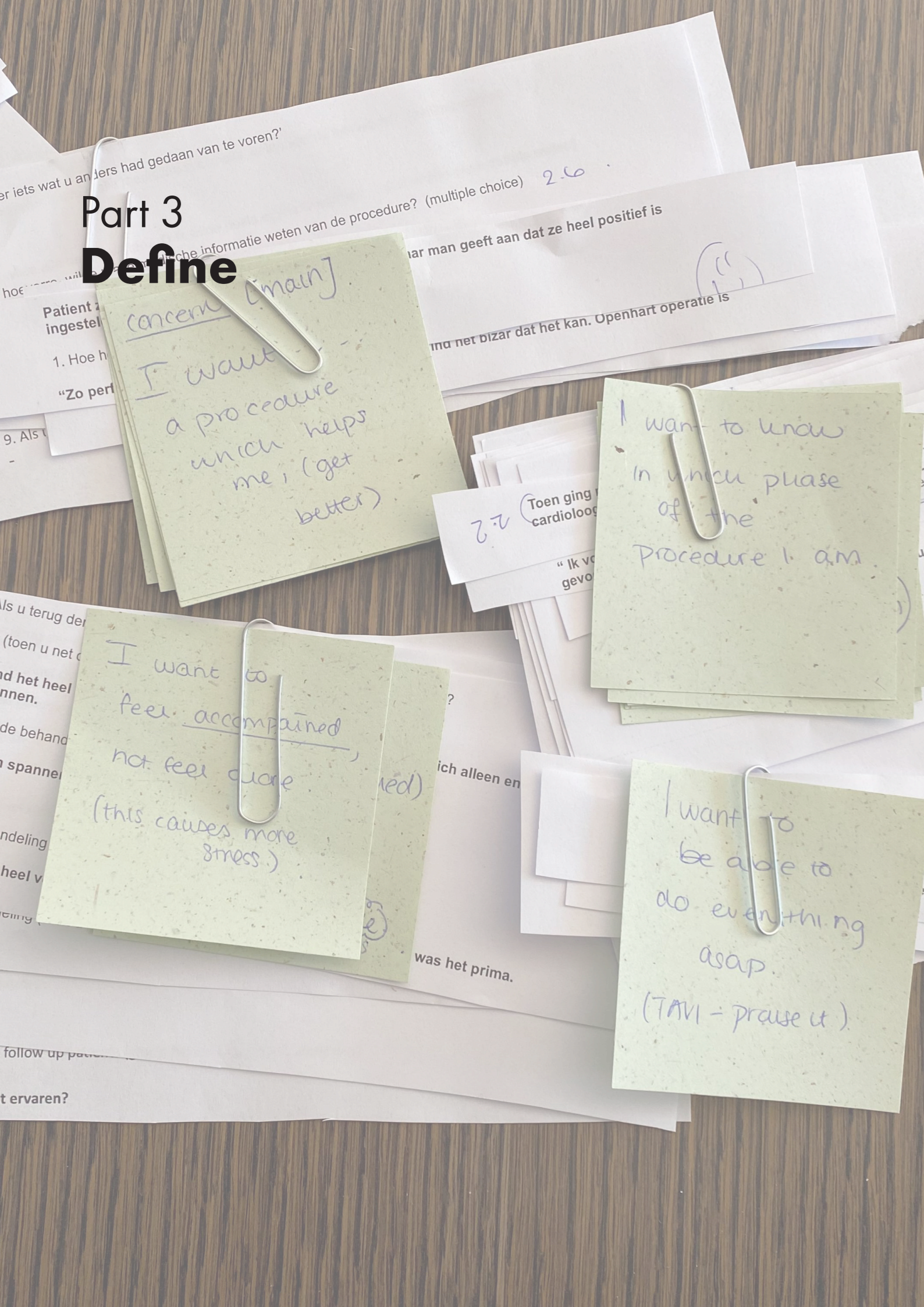
In order to use these profiles in the context of this research, TAVI patient characteristics are combined together with the patient profiles developed by Groeneveld and Dekkers (2020).

The patient profiles are integrated into this project to segment the patients in a graspable way and simultaneously ensure the different groups of patients are considered in the design process. Patient profiling uses the individual's preferences to tailor the content, context, and delivery model of care to improve the care experience and health outcomes (Dekkers & Hertroijs, 2018).

These profiles are developed based on hip replacement surgery patients aged 60 - 70 and had a required technology level. Due to this, the differences between TAVI patients and hip replacement patients need to be considered. (v.der Cammen, interview, 2021).

- Factors that differ:
1. Social & Economic
 2. Educational level considering the period the current TAVI patients were born
 3. Understanding Technology
 4. Multimorbidity - Most patients above the age of 75 years have two or more conditions.

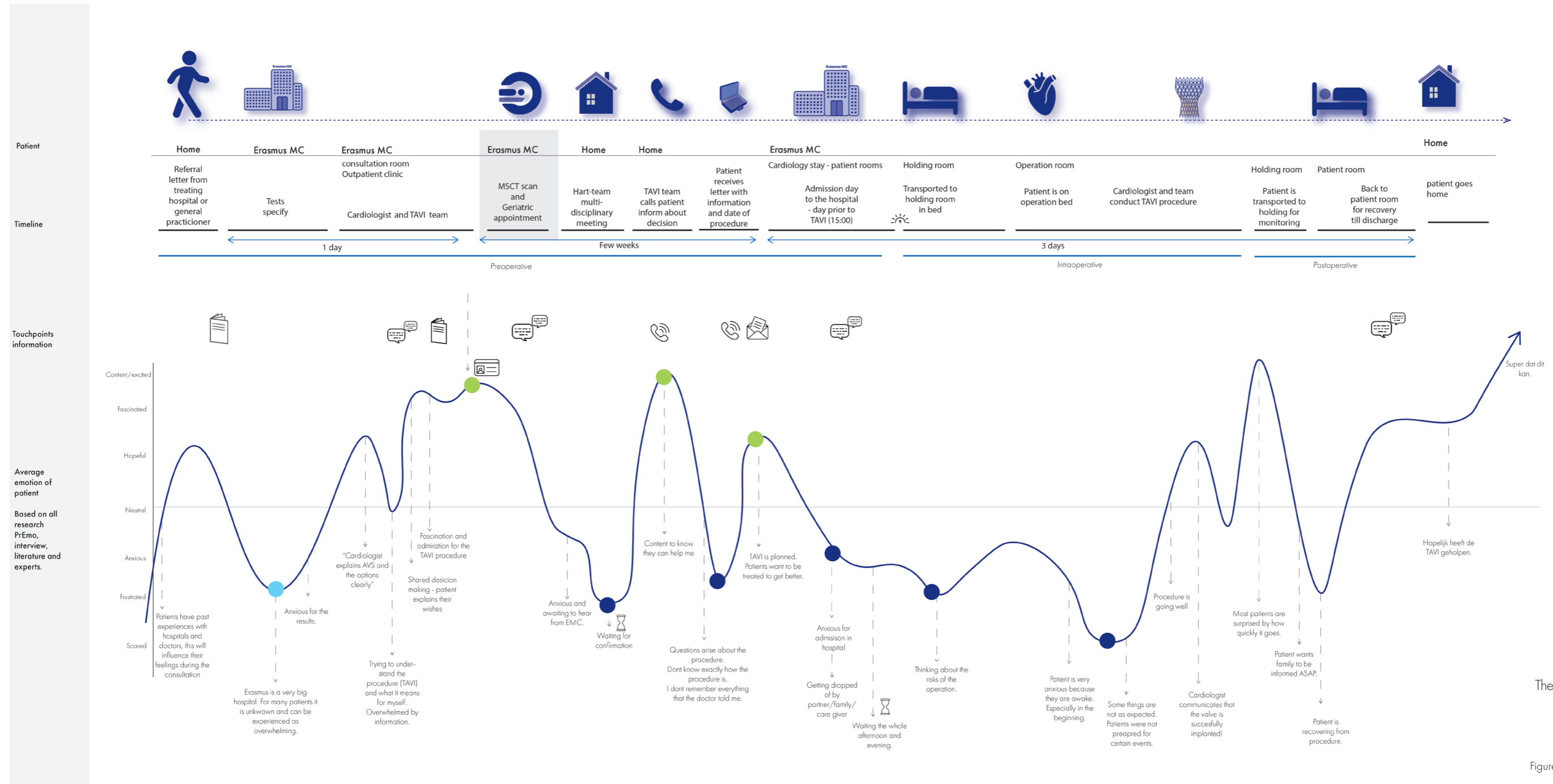
Part 3 Define



5.0 MAIN INSIGHTS

The patient journey map was developed by combining all the information from the 'discover' phase. The goal of this is to be able to visually see the pain and success points and the moment in the trajectory they occur. This map also illustrates the touchpoints in the current journey; this will help to identify whether it is important to change a touchpoint or add one. This visual also provides insights on the effect of a touchpoint, whether direct and short-term or long-term influence on the journey.

5.1 Patient experience curve



The full journey map can be found in Appendix D.9

Figure 24. Experience curve

This curve visualizes the average experience during the current TAVI patient journey. The curve is plotted based on the phases of the journey (x-axis) against the emotions they feel (y-axis). This ranges from anxious and scared to hopeful and content.

In the graph the touchpoints are shown, an example is sending a letter to a patient. An interesting finding is the positive effect of the experience curve during the touchpoints. A positive peak tends to develop at the moment the touchpoint is applied (●).

An insight taken from this experience curve, is that there are more touchpoints already in the process than those considered in the current journey. Previously not all interactions were regarded as touchpoints.

There is a large amount of fluctuation during this journey, which is expected during a pre-operative phase. For instance, a slight anxiety dip while waiting for medical results is inevitable (●). However, adding a design intervention should tackle the pain points the patient experiences (●).

For example, a pain point develops due to long waiting periods or when patients become anxious because they have many questions and doubts. Although, as can be seen, some pain points take place during the procedure. The goal is to improve these as well by applying an intervention in an earlier phase.

This journey also visualizes the underlying reason for the pain points. This is important to know in order to be able to tackle the problem.

On the contrary, the journey also visualizes important success points. Having positive fluctuations ensures the experience does not become dull and the overall experience remains positive. Therefore, they should be sustained.

The contexts where the pain points occur are at the patient's home prior to the procedure and in the hospital (patient room and operation room).

5.2 Patient profiles experience curve

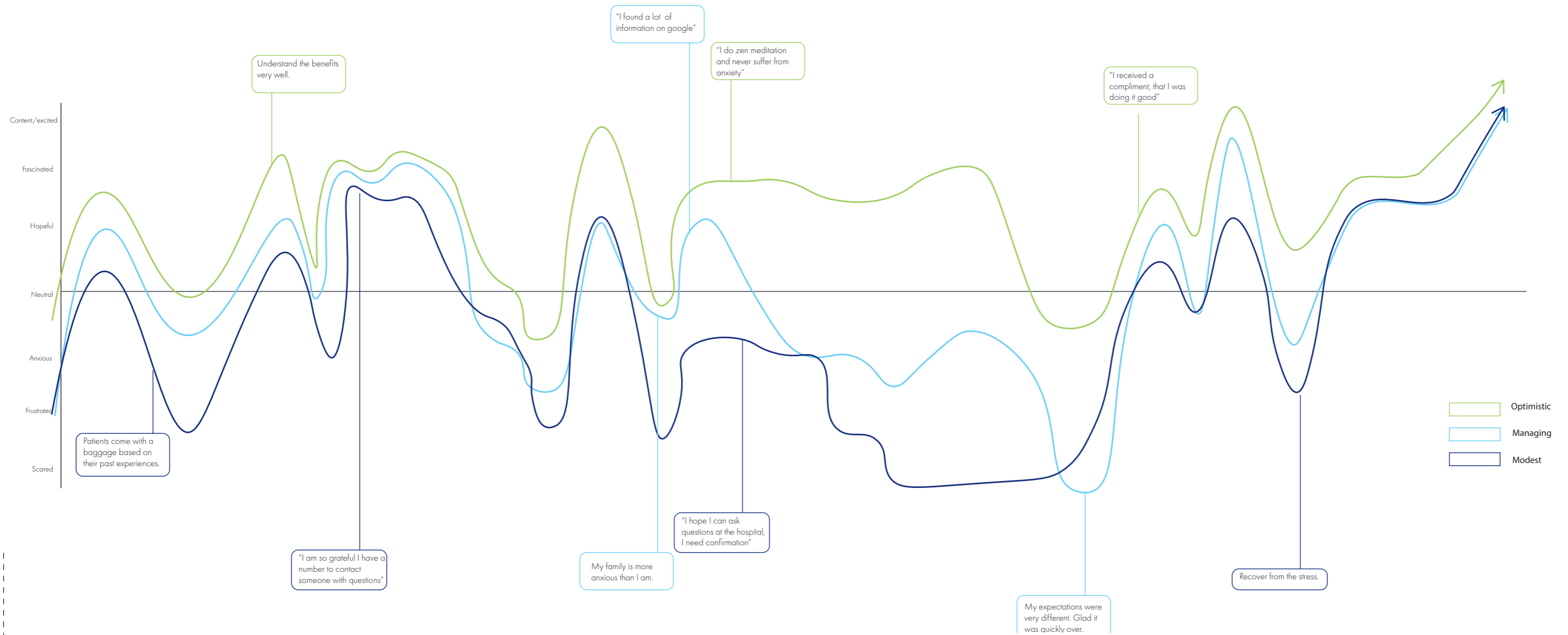


Figure 25: Experience curve per patient profile

Patient profiles

On the previous page, the average patient experience curve was presented. Using the patient profiles (page. 48) the curve was replotted. Each patient from the user research was classified into a profile based on their experience and characteristics (technological savvy, emotional support, education).

During the user research, personal questions were posed, and baseline information was collected to classify the patient into a profile. A limitation could be that the patient was not asked to confirm the classification, and therefore it could be seen as an assumption.

Analysis and Conclusion

The optimistic patient profile has an experience curve which can be seen as ideal. These patients have low preoperative anxiety and reflect on their journey as a 'success.' Therefore, this can be translated to a design goal, where all patients reach this curve.

These curves provide narrowed-down insights to identifying the pain points and the reason for these pain points. By concluding that the optimistic have quite an ideal curve, the focus of the target group can be narrowed down to '**modest**' and '**managing**' profiles. However, it is essential to ensure the 'optimistic' experience remains positive and, to some extent, still stimulates their fascination.

5.3 Main insights

The insights from the patient journey map, patient profiles, literature review, and fundamental needs (Desmet & Fokkinga, 2020) are clustered together. These clusters are divided in 3 pillars: Preparation, expectations management and Interaction.

Challenges

There is a lack of structure and overview of the procedure and the patient journey towards the TAVI procedure. During the consultation, patients receive verbal information of the next steps in the process and general information about the technique behind the procedure. However, there are still many 'if's' in the journey, mainly not knowing if the patient is eligible for a TAVI. Therefore resulting in the information not yet being relevant at this moment. Besides this, the time indication of the phases is vague and leads to a long waiting time.

The consultation with the cardiologist and the patient brochure is currently the only direct source of information from EMC to the patient. Resulting in a shortcoming of information and also understanding of information. By emphasizing the preparation, patients can process the benefits and risks of the TAVI procedure and translate this to their circumstances.

Establishing the right expectations is very important to give the patient a sense of comfort and limit any unforeseen situations. However, patients follow the TAVI trajectory for the first time, making it difficult to form the right expectations. This is increased due to the limited amount of information touchpoints prior to admission day, and anxiety patients have. Therefore, extra guidance is needed to manage the expectations of patients. Expectations in this situation are relevant for, among other things, the time and duration, the context and location, and the phase after the TAVI procedure.

Opportunities

Ensure patients are aware of the advancements of the TAVI procedure and the high level of professionalism. This increases the patients trust and confidence in the medical skills and high-quality devices. Having trust in the health care professionals results in the patient being at ease. Creating a medical yet personal basis is crucial to building a trusting relationship.

Providing personal care ensures that the patient feels recognized. Therefore, it is essential to consider the patient's circumstances or past experiences. Many patients have a clear goal for why they want to receive the operation, primarily to reduce their symptoms and live longer, but these goals tend to go further than the practical aspects and are related to their own life.

Elderly patients rely on their support group physically and emotionally. Therefore, they should be closely involved when information is communicated to help each other when processing and understanding this information. Therefore, it is very meaningful to integrate the family/caregivers throughout the patient journey.

Clear, structured and timely information

Advancement of the TAVI procedure

Benefits and risks of the TAVI procedure

Expectations management

Trusted relationship with health care professionals.

Recognition throughout the continuum of care

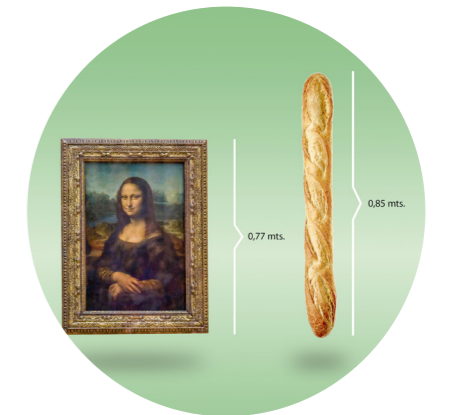
Integrating family and caregivers

Preparation



Collecting the ingredients

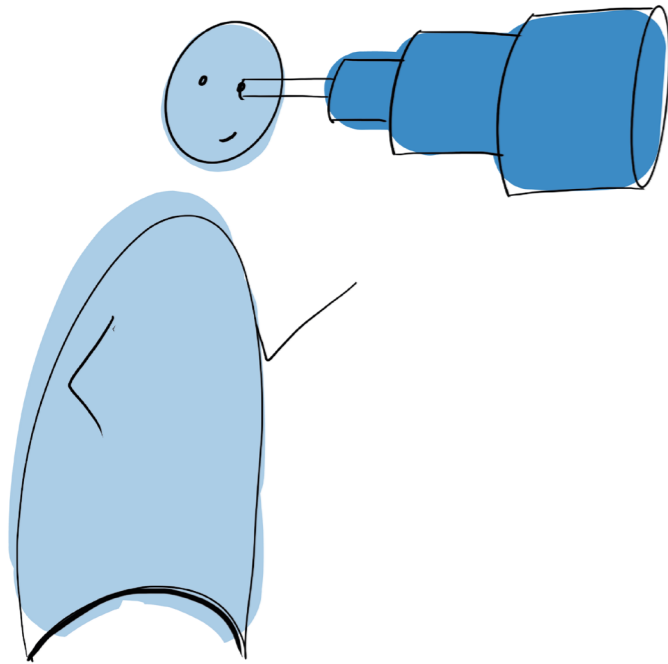
Expectations management



Interaction



5.4 Designer's vision



The designer's vision describes my personal view of the analyzed context. It explains my idea of the direction which should be taken to improve the patient experience.

The TAVI procedure is a highly advanced intervention, which gives patients a chance to extend their lives and improve their quality of life, especially those who cannot undergo an open-heart surgery anymore due to their frailty.

However, it still is a medical intervention, and patients still experience high anxiety levels.

Therefore, it is essential to support the patient during their journey, both directly and by providing them with tools to help them feel at ease.

I believe it is crucial to develop a concept that emits a high level of professionalism and is innovative. Innovation can come in all forms. It can be applying the newest technologies or using a simple solution to reach the same goal. For example, a TAVI specialized nurse gives a few patients her card with her phone number. This is a simple gesture that enlightens the experience of the patients. It is a direct invitation to ask any questions when needed. Even if they do not use it, it gives the patient a sense of trust and security that the hospital is attentive.

Virtual Reality

The original direction Erasmus MC wanted to head towards with this project was using virtual reality to familiarize patients with the operation room and the procedure. After doing research, my current view of the effectiveness has changed. VR technology is very new for elderly patients; some might be interested in these innovations, while others find it overwhelming.

Using this technology in this context would mean providing the patient with the VR glasses and controller to travel through the space to explore this virtually. Giving the patients the controller is essential to ensure dizziness is prevented. However, moving through this virtual world takes getting used to something the patient does not want to spend time on to learn during their journey as a patient. Without the controller, virtual reality has the same effect as watching a video and therefore VR has no added value. On the contrary, it isolates the patient and does not allow the family or caregiver to view the information with the patient.

However, I do think integrating photos or videos of health care professionals and the environment is effective, especially for the recognizability.

5.5 Design goal

The aim is to translate the insights into a design opportunity.

Goal:

My goal is to improve the overall patient experience throughout the continuum of care of a (modest or managing) patient who undergoes a TAVI procedure (for the first time) by reducing preoperative anxiety.

Design goal:

I want to create a **communication tool** that ensures patients have **trust** in the procedure and the health care professionals, resulting in the patient **feeling at ease** prior to the TAVI procedure. This new touchpoint in the patient journey provides both patient and family/caregiver the necessary information to shape the **right expectations** of the procedure.

Wish:

I want the patient to feel recognized throughout the continuum of care.

Continuum: before, during, and after the procedure.

Touchpoint is a point of contact or interaction.



Figure 26: Picture of a sensitizing booklet filled in by patient.

5.6 Main requirements

To conclude the research and analysis phase, a list of requirements is developed. The main requirements are listed here below.

The communication tool must:

Interaction:

- Be intuitive to use and also self-explanatory. The modest and managing profiles should feel supported and guided by the tool. The optimistic should feel challenged.
- Facilitate the patient to set the right expectations.
- Integrate the relatives in the whole TAVI journey.
- Provide all the necessary information.
- Communicate the information in a timely manner.
- Use different means of communication.

The communication tool should:

Experience:

- Help the patient feel at ease.
- Make the patient feel recognized during the continuum of care.
 - Be experienced as personal.
 - Be experienced as trustworthy and honest.
 - Support the patient throughout the journey.

These criteria are tested with open interview questions, Likert scale questions to measure the degree of accomplishment and observation to establish the interaction with the design. This test is conducted with participants in all three profiles.

Feasibility:

- The concept must be implementable within 6 months.
- The concept must be logistically feasible at the cardiology department.
- The concept must not require extra direct contact with the doctor.

Conclusion define

The conclusion of the define chapter are a set of design requirements.

The requirements summarize the criteria the final design must meet to be succesful. The list is used to evaluate ideas and concept proposals.

The full program of requirements can be found in Appendix E.

Part 04

Develop

6.0 IDEATION

This chapter describes how the insights, design goal, the designer's perspective and the guidelines are translated into a concept proposal. In addition, the existing interventions are presented and used as inspiration.

6.1 Idea generation approach

Figure 27 visualizes the full idea generation process. This phase is an iterative process with continuous feedback loops. The brainstorm session, the ideas, and design directions can be found in the indicated appendix.

Methods

During this creative process, different techniques are used: brainwriting, a creative session using analogies and 'How-to's?' (Tassoul, 2009), individual brainstorming, storyboards, roleplaying, and feedback sessions. These are techniques taken from the Delft Design guide (Boeijen, Daalhuizen, Schoor, & Zijlstra, 2014). In addition, existing design interventions were analyzed and used as inspiration.

This phase began with a broad approach of exploring as many solutions as possible. This was done by organizing a creative session with fellow design students. This was done by analyzing a similar experience (analogy) in a very different, yet more relatable context. The analogy was "taking a flight to a dream destination while having flying anxiety" and sketching ideas to improve this experience. In addition, the How-to technique was applied to generate as many ideas as possible.

Converging

The idea selection occurred in phases. Some ideas were filtered out because they fell out of the scope of the project. Other design choices were made during discussions with the stakeholders, evaluation phases with elderly participants and fellow students or analyzing based on the requirements.

Result

The final proposal is mainly focused on the zorgpakket and TAVI animation. Other elements of the new patient journey will also be presented.

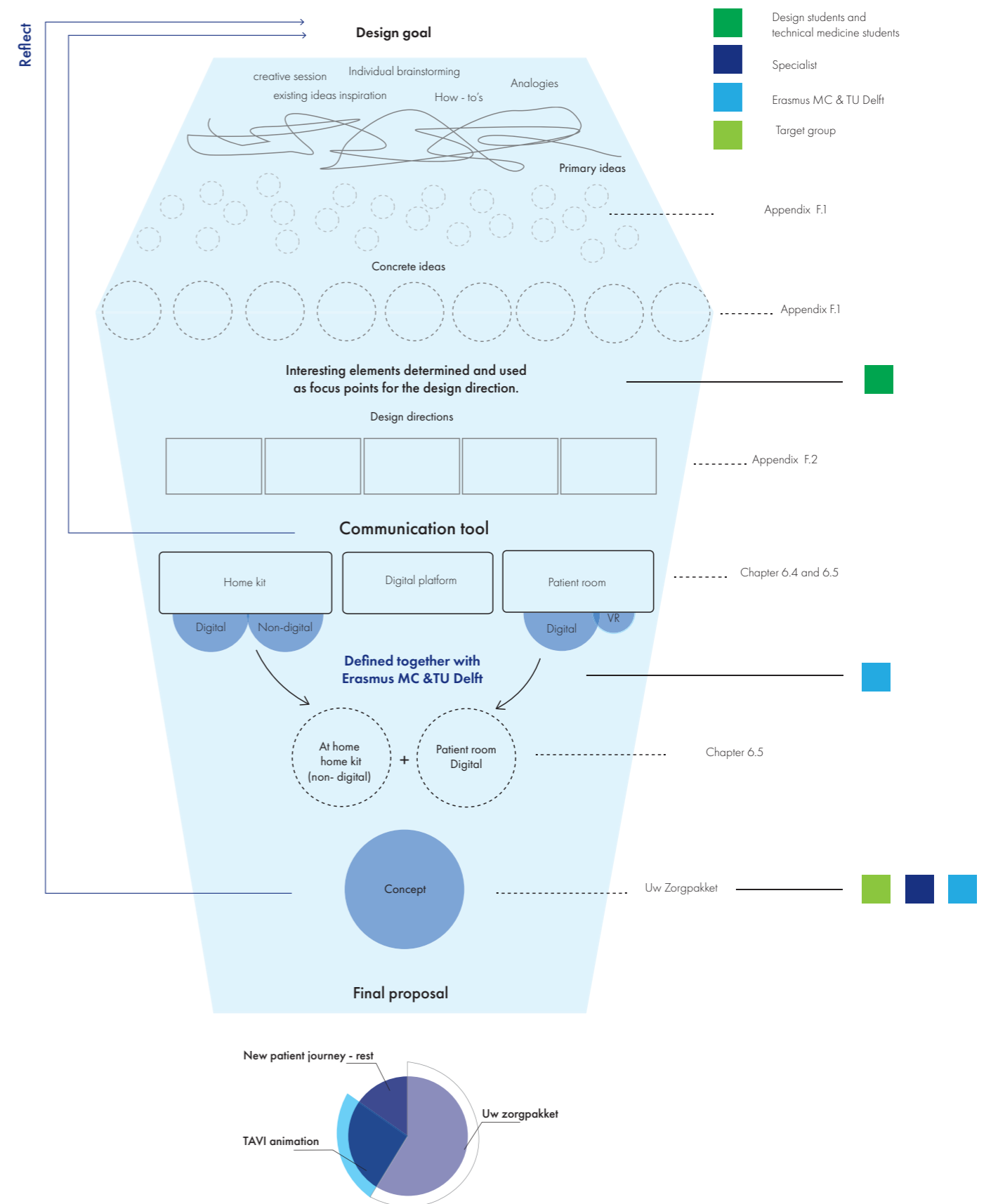


Figure 27: Idea generation process.

6.2 Existing Interventions

An overview has been created of existing interventions and their advantages and disadvantages. The goal of this is to gain inspiration in terms of design opportunities.

Physical solutions



Figure 28: Kitten scanner, Philips

Philips has developed a kitten scanner to prepare children for an MRI scan. The goal of this design is to experience an MRI from the doctor's perspective by using a stuffed animal as the patient.

Advantages:

- Teaches in a fun way about the procedure.
- It is a physical interaction.

Disadvantages:

- Can only be done on location.



Figure 29: Virtual reality EMC

Erasmus MC has developed a virtual reality animation to show children the pre-operative steps of a procedure.

Advantages:

- It shows the context and the role of the health care professionals.
- Tailored in Erasmus style.
- From the perspective of the patient.

Disadvantages:

- Can only be used on location at the hospital.
- Very realistic - could be scary for children.

Nondigital solutions



Figure 30: Bevolkingsonderzoek pamphlet

The population screening organisation created a flyer with a step-by-step description of the process of the medical test. This is then combined with a digital solution, where an animation is shown of the continuation of the medical tests.

Advantages:

- Use of steps in a chronological order
- Clear visualisations

Digital solutions



Figure 32: AUMC TAVI

AUMC created a digital platform for TAVI patients. In this platform they see a step-by-step overview of the process of admission to the hospital and the procedure itself.

Advantages:

- Shows all the preparatory steps.
- Patient can look at this at home with relatives.

Disadvantages:

- Does not have a warm feeling.
- Real pictures of a patient can be perceived as unpleasant by some patients.



Figure 31: Bevolkingsonderzoek Informed animation

The goal of this animation combined with a digital intake is to inform the patient about the tests which will need to be done (Colonoscopy) and the statistics of getting cancer.

Advantages:

- Patient can review this as many times as they want at home and whenever they want.
- A mini quiz is added at the end to know how much the patients understood.

Disadvantages:

- Replaces human contact.



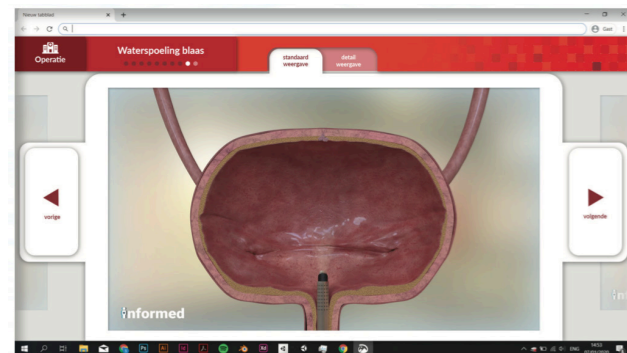
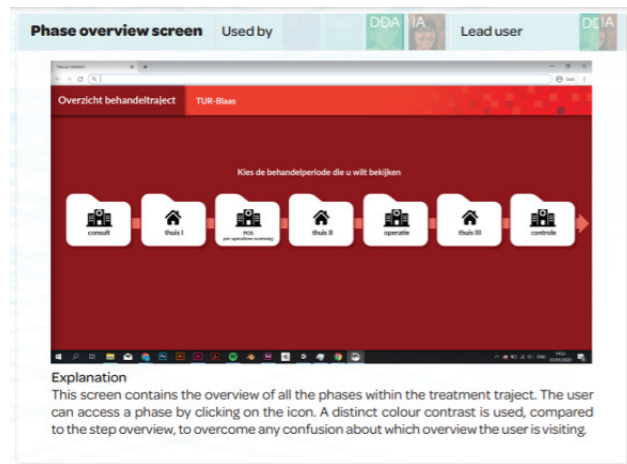
Figure 33: Websites

Hartstichting website and Radboud UMC website.

Advantages:

- Use of visuals.
- Segmenting the information per topic in a very clear and structured way.

Digital solutions



(Steenbergen, 2020)

Figure 34: Graduation project

A student from TU Delft developed a tailored 3D interactive animation journey. This solution provided the patients with animations per phase in their journey.

Advantages:

- Interactive
- Overview of the phases in the journey
- Several 3D animations

Disadvantages:

- Fully digital
- Some older patients needed technical support



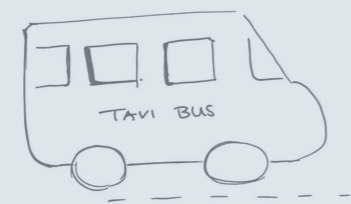
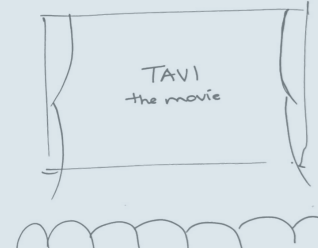
Figure 35: KLM video explanation

KLM uses another type of animation to inform passengers about the safety protocol in the airplane.

Advantages:

- Very friendly way of communicating
- Easy to understand





PREPARATION

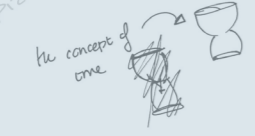
Cinema with other patients or at home or

Patients room PLATFORM.

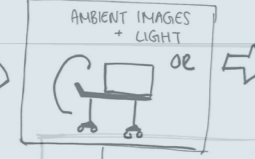


direct stories from other patients - expectancy WEEE TAVI

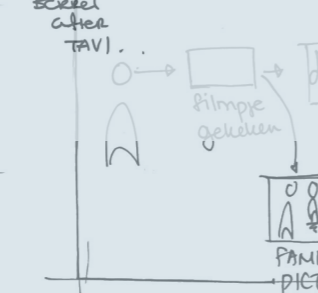
Let genoot.



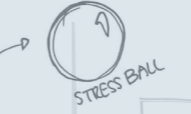
Focus on the positive experience



Reward system: Bikes after TAVI



MINDFULNESS MEDITATION



direct stories from other patients - expectancy

IDEATION.

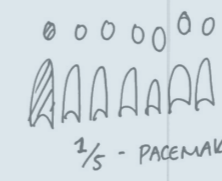
TAKEN TO DO list

visualize your 'life' after TAVI

positive music

Stemsystemen

COMFORTING



FACTS + FIGURES

success!

PLATFORM.



SHOW-FUTURE

'HET KOMT GOED'

PATIENT IN DE TOEKOMST

Tijd Machine



COMPONENT 'Je doet het goed'

Vertrouwen

TRUST



TRUST FALL CATCH YOU

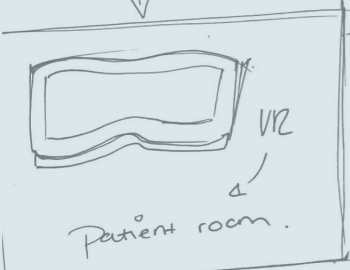
Dimey/VRIENDEN BOEKJE

GOAL.



wie je bent wat je doet open-stellen.

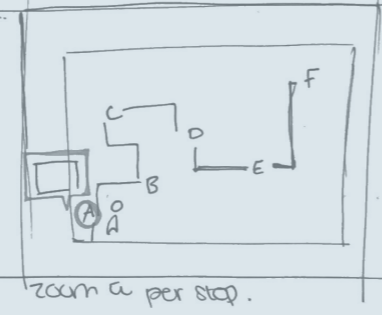
video: medical stuff -> different rooms patient goes to.



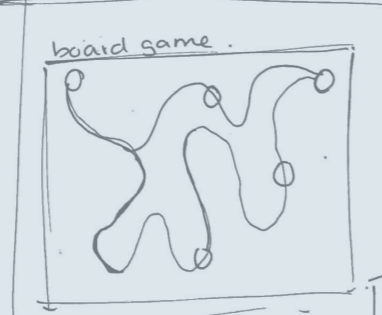
patient room



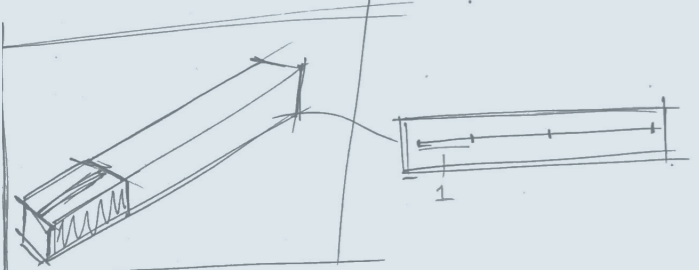
BEHIND THE SCENES?



zoom in per step.



board game.



(Physical product)

some partners side RE = low

production project report

Human touch

TRUST

Human touch

Human touch

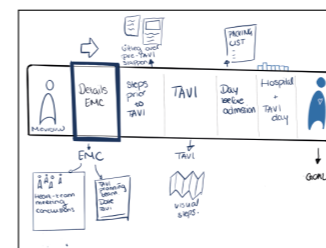
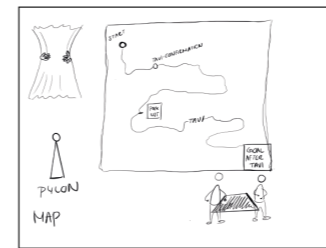
Human touch

Human touch

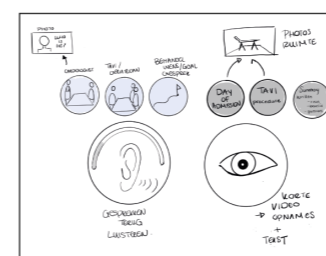
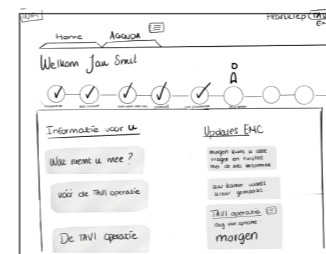
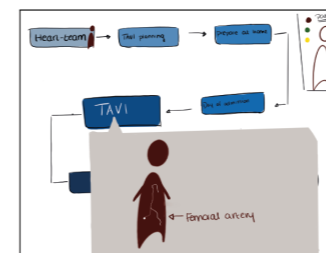


6.3 Clustering

NON-DIGITAL



DIGITAL



The ideas were clustered based on certain recurring themes. The clusters can be found in Appendix F.I. Besides the themes, the different contexts were challenged as to where to apply the design. For instance during the baseline consultation, at the patients home, in the hospital day before the procedure or even during the procedure. These core themes and the different contexts were used as starting points to create concrete ideas. These were presented to the stakeholders and led to the decision of the solution space. Having concrete examples helped to make a substantiated decision about the design direction.

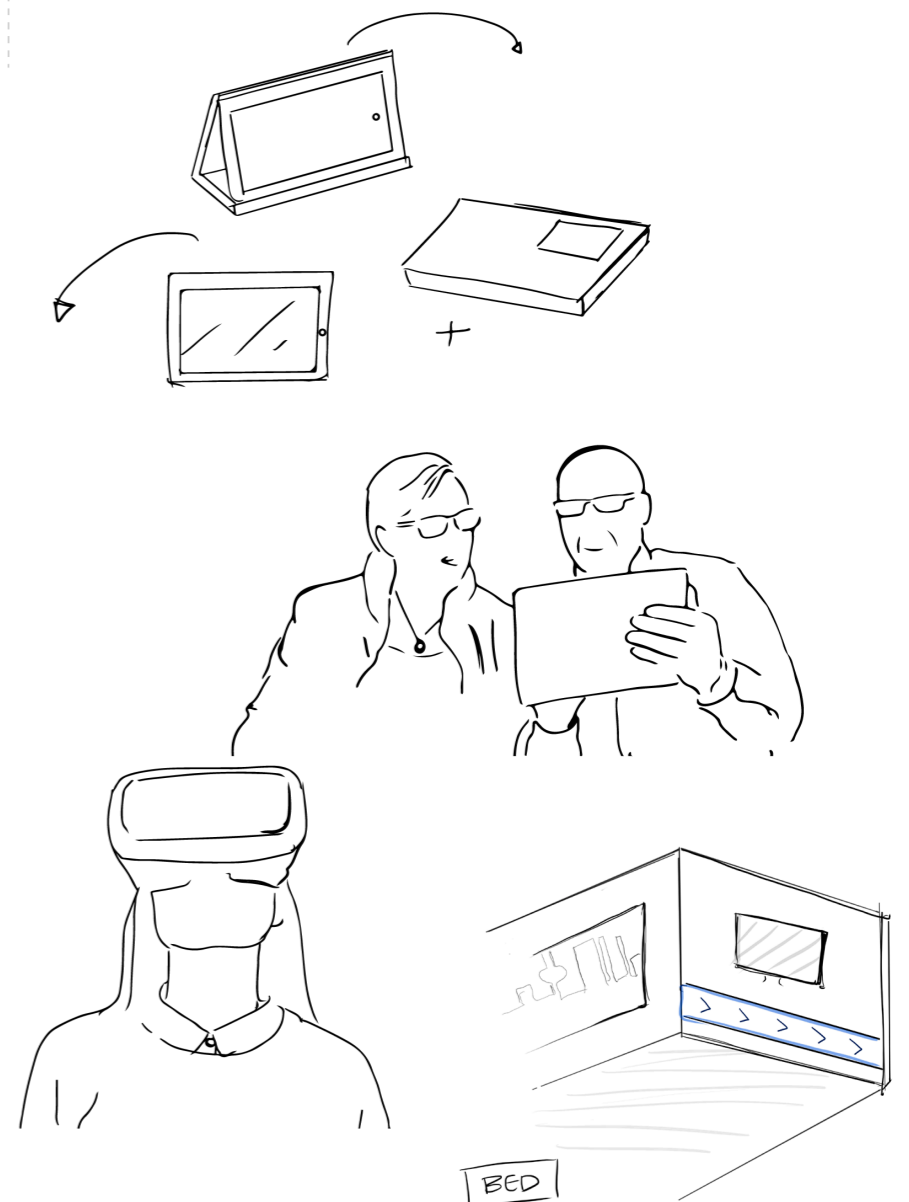


Figure 36: Ideas and design directions

6.4 Solution space

The direction chosen to develop further was a nondigital application for the patients at home, combined with a digital solution in the patient room prior to the procedure, as seen in figure 37.

This was decided together with Erasmus MC based on the level of feasibility. As for them it is important to develop something implementable and sustainable within the cardiology department.

Furthermore, the key elements of the design directions were taken and combined into the concept proposal. This was done mainly based on the criteria formulated in the define phase to ensure the design focus lies on improving the patient experience.

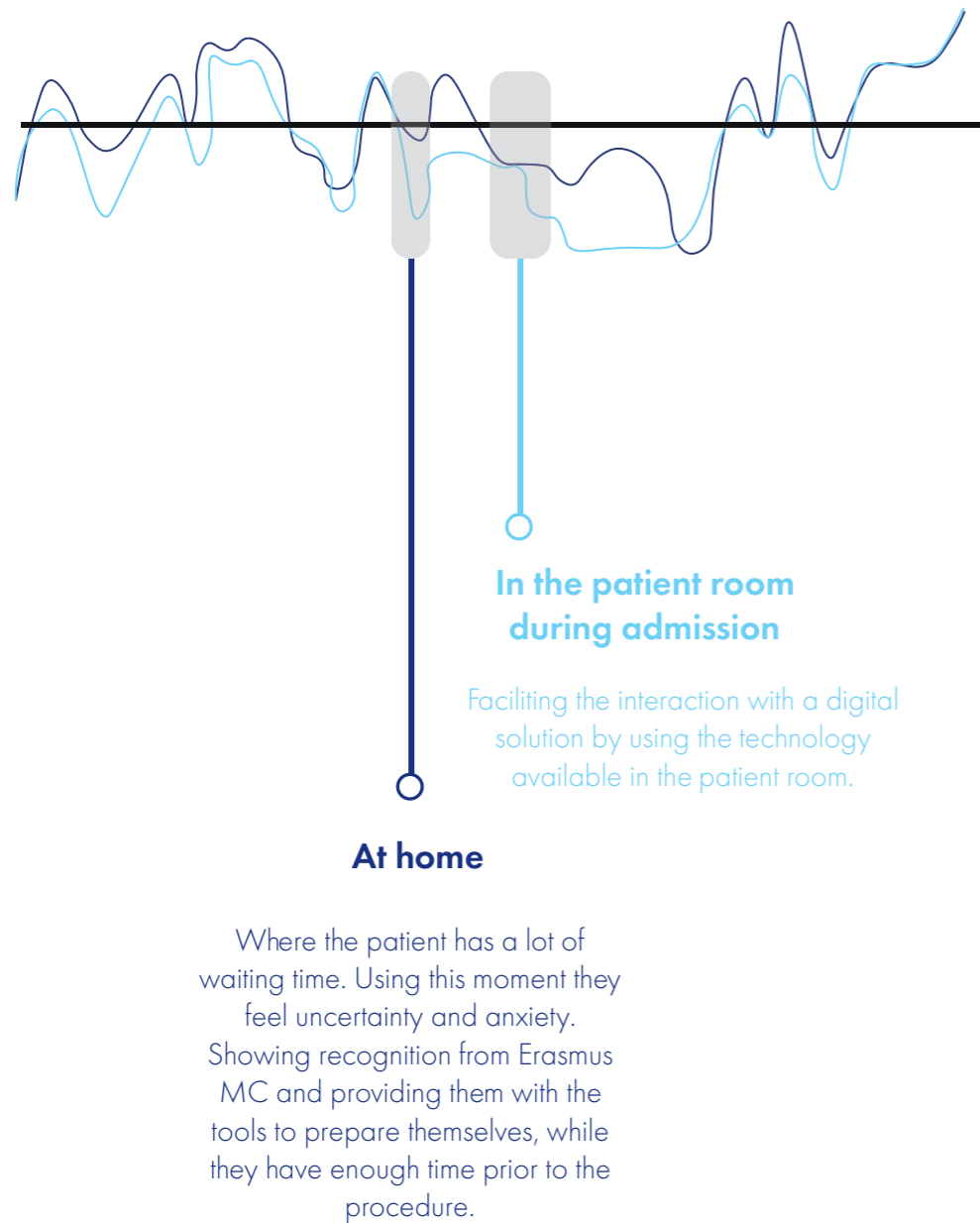
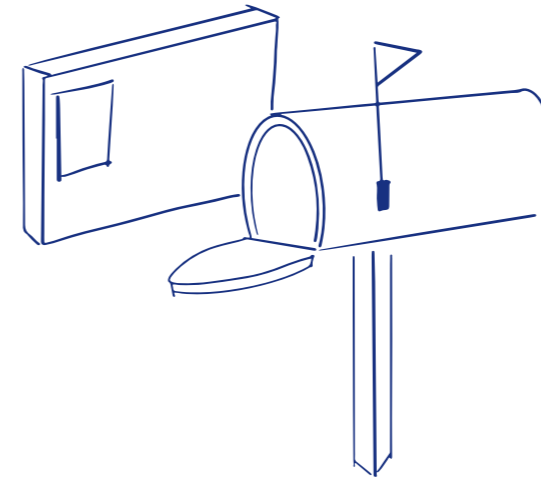


Figure 37: solution space

6.5 Build - Measure - Learn Loop

This direction led to a more concrete concept direction:



A nondigital concept for the patient at home in the form of a home package and a digital intervention in the patient room. This digital concept is applied using patient tablets.

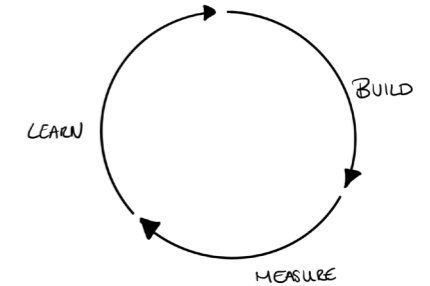
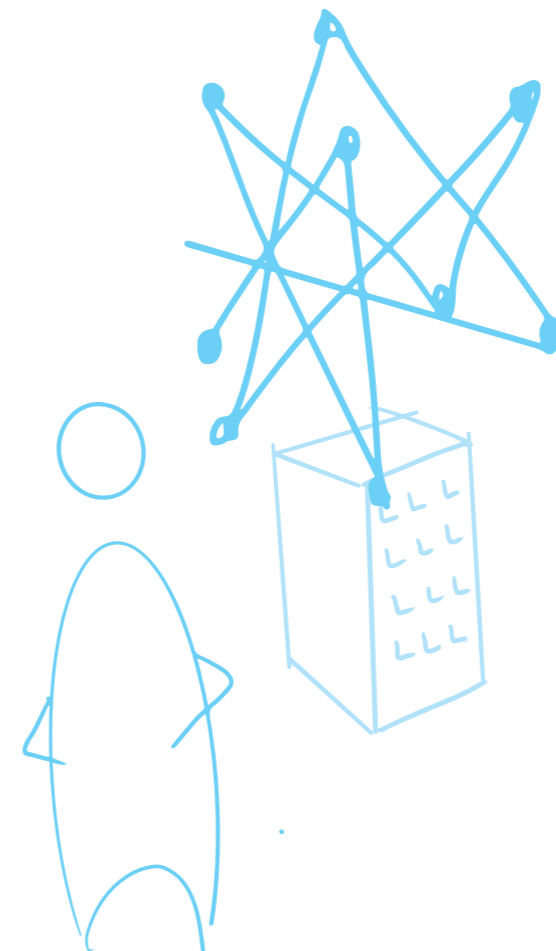


Figure 38: BDL loop

The build-measure-learn loop's (figure 38) goal was to test different elements of the concept and apply the insights by iterating.

Different participants of both the target group as well as outside the target group were used to test elements. Unfortunately, it was not always possible to include participants around 80 years of age because of COVID restrictions.

The next four pages show a brief example of the iteration process and a glimpse of how certain decisions led to the final design.

Narrowing down the solution space leads to concrete criteria:

- Maximum dimensions: letterbox (380 x 260x 32mm)
- The home package must be fully usable in the patient's home and is seen as a gift for the patient.
- The nondigital concept must provide information in a timely and chronological manner.
- The design must stimulate interaction with the patient.
- The digital concept must be usable without the help of a nurse or doctor.

6.5.1 Physical Patient Journey



Figure 39 and 40 : User test during iteration process. Two participants 75+.

Several user tests were conducted to test the usability, functionality, overview of information and desirability of different elements of the concept.

The physical patient journey was tested with 3 elderly (75+) in combination with a simple brochure

Main conclusions:

- Icons were understood
- Logical order of phases was improved
- Interaction with the journey was tested in several ways and advent calendar tabs were the best solution.
- The colours used were difficult to distinguish and did not grasp the attention of the user. Then a analysis was conducted on the use of colour (Hill,2008).
- The large QR codes (at two points in the journey) frightened two out of three of the users.
- Important information was missing (E.g. Duration of stay in hospital)



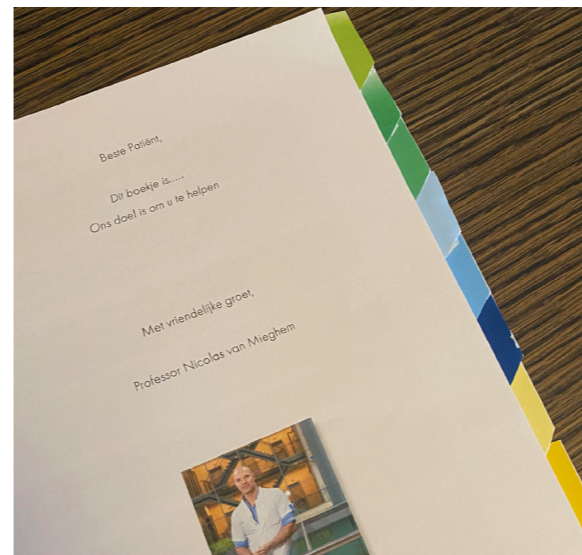
Figure 41: Iterative process physical patient journey based on insights from user test

6.5.2 Information Booklet



Figure 42 and 43: User test during iteration process.

A B1 language test was conducted by asking a participant who is not a Dutch native speaker to read the information booklet. In addition, a few questions were asked to test the comprehensibility of the booklet. This led to improvements in vocabulary choices and sentence structure.



The connection between the brochure and zorgpad was not always directly clear. Therefore an adjustment was made by adding numbers to identify the relation easily.

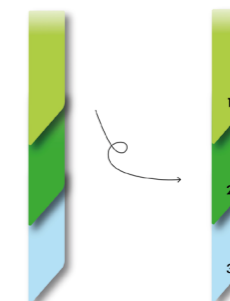


Figure 44: Iterative process Information booklet

6.5.3 Home Package

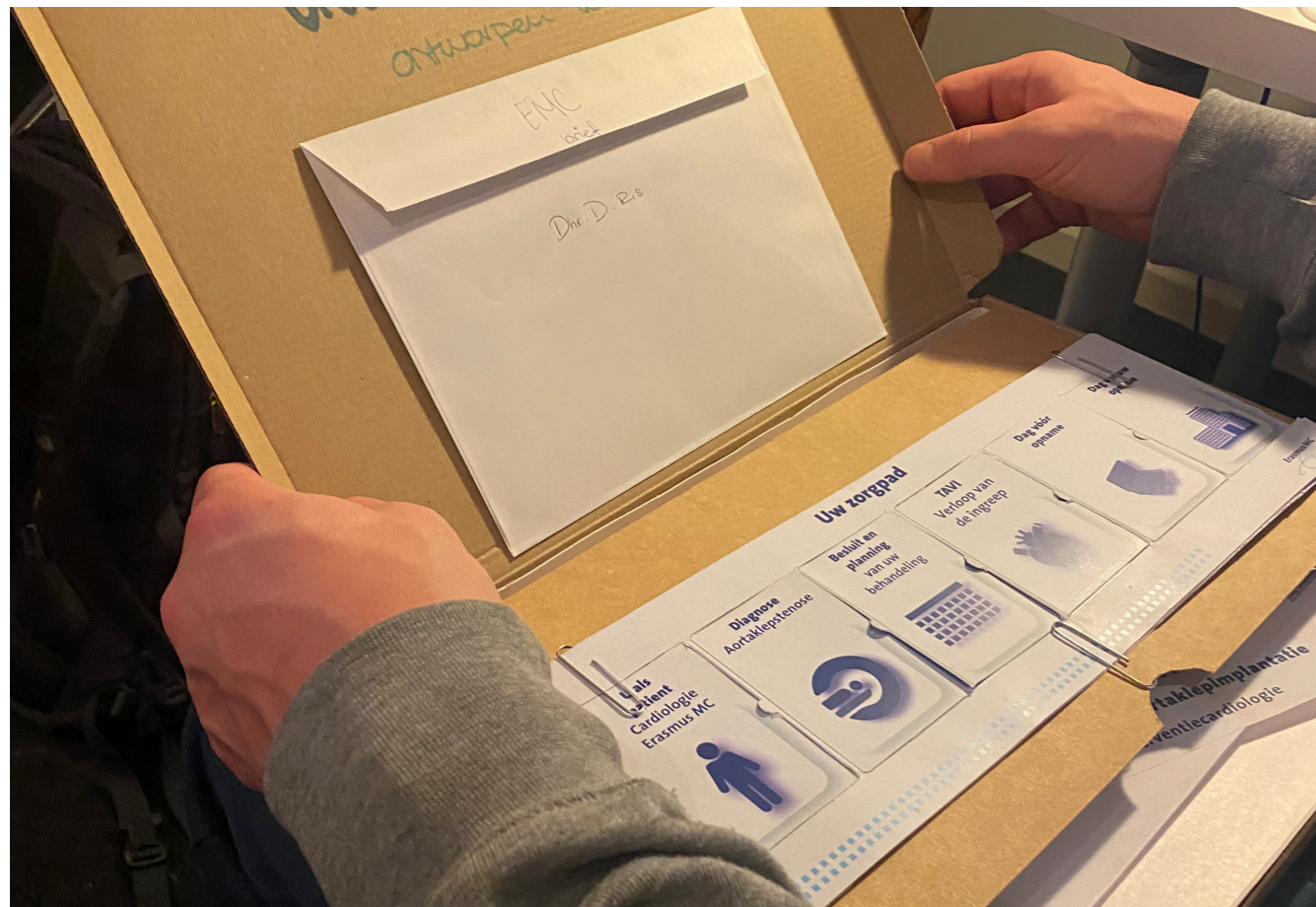


Figure 45: User test

Packaging needed to guide the patient in unboxing the elements. One element at a time. To ensure the desired unboxing is achieved a few iterations were made. 'It should not feel like LEGO' - participant

The letter had a very prominent position and was the first thing read by patients. This is very important in order to explain the purpose of the package and its elements.

To simplify the packaging process for the cardiology department, the envelope was attached on the outside of the packaging. A test was conducted to evaluate the effect of this on the interaction. The conclusion was that the participant was triggered to read it first; however, they placed the letter aside and forgot what they had read while opening the box. Participants who had the letter inside the package could directly see what the letter was referring to when opening it. This is key to process the letter and identify the elements in the zorgpakket.

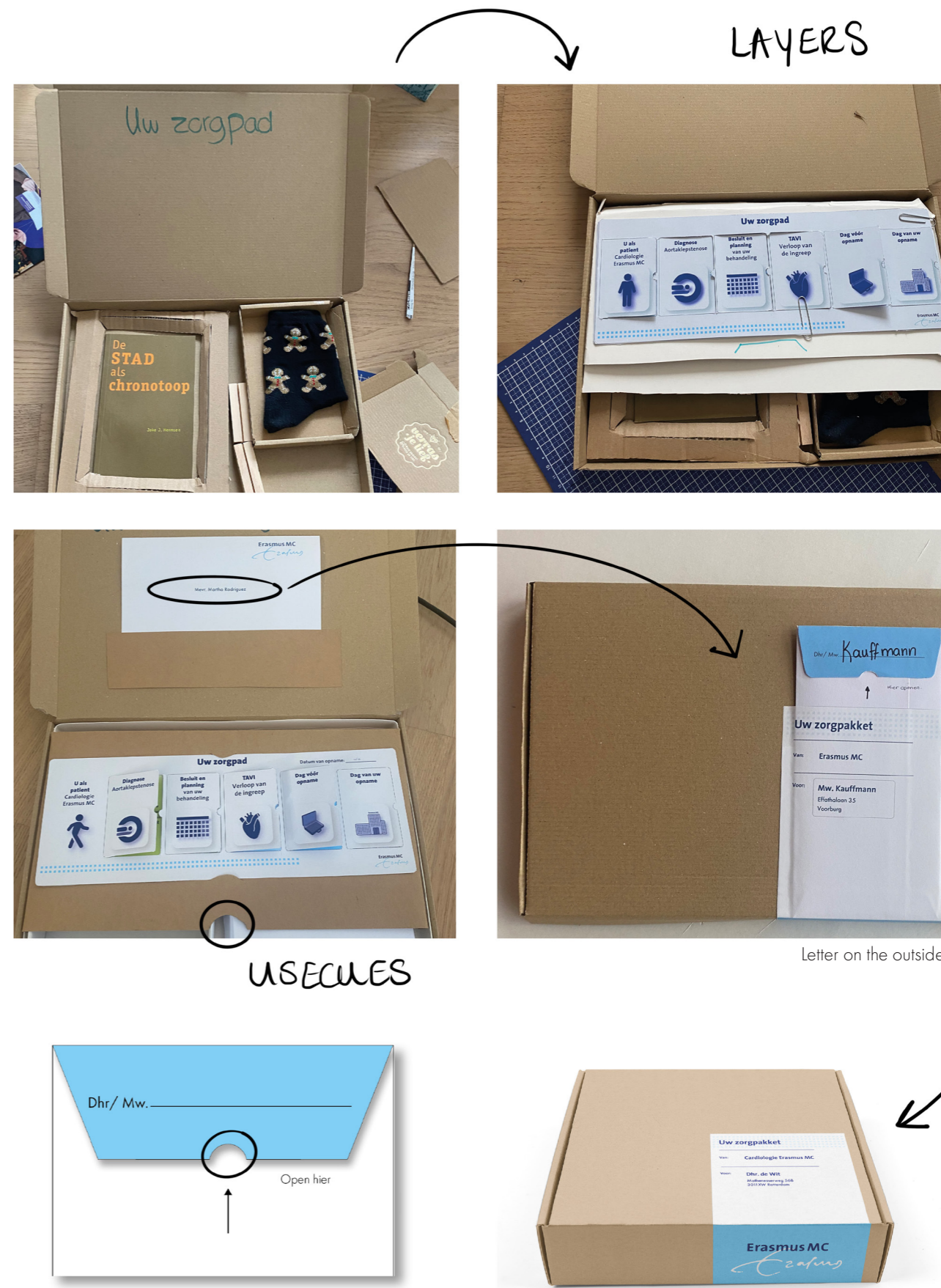


Figure 46: Iterative process packaging

6.6 Concept evaluation

After separately testing and iterating the elements, the full package was put together. This was tested with two participants (60+) and two (25+). The package included a letter, the physical journey, information brochure and socks. The tests main limitation was the age difference with the target group.

Besides the iterative process, the effect of the concept was also evaluated. To evaluate the effect on the users a likert scale questionnaire was used (figure 47). These results were used to improve the design to ensure the desired effect and interaction is achieved. Also, this gave an indication where the focus should be to improve the final design.

Average scoring:

The questionnaire and results can be found in Appendix G.

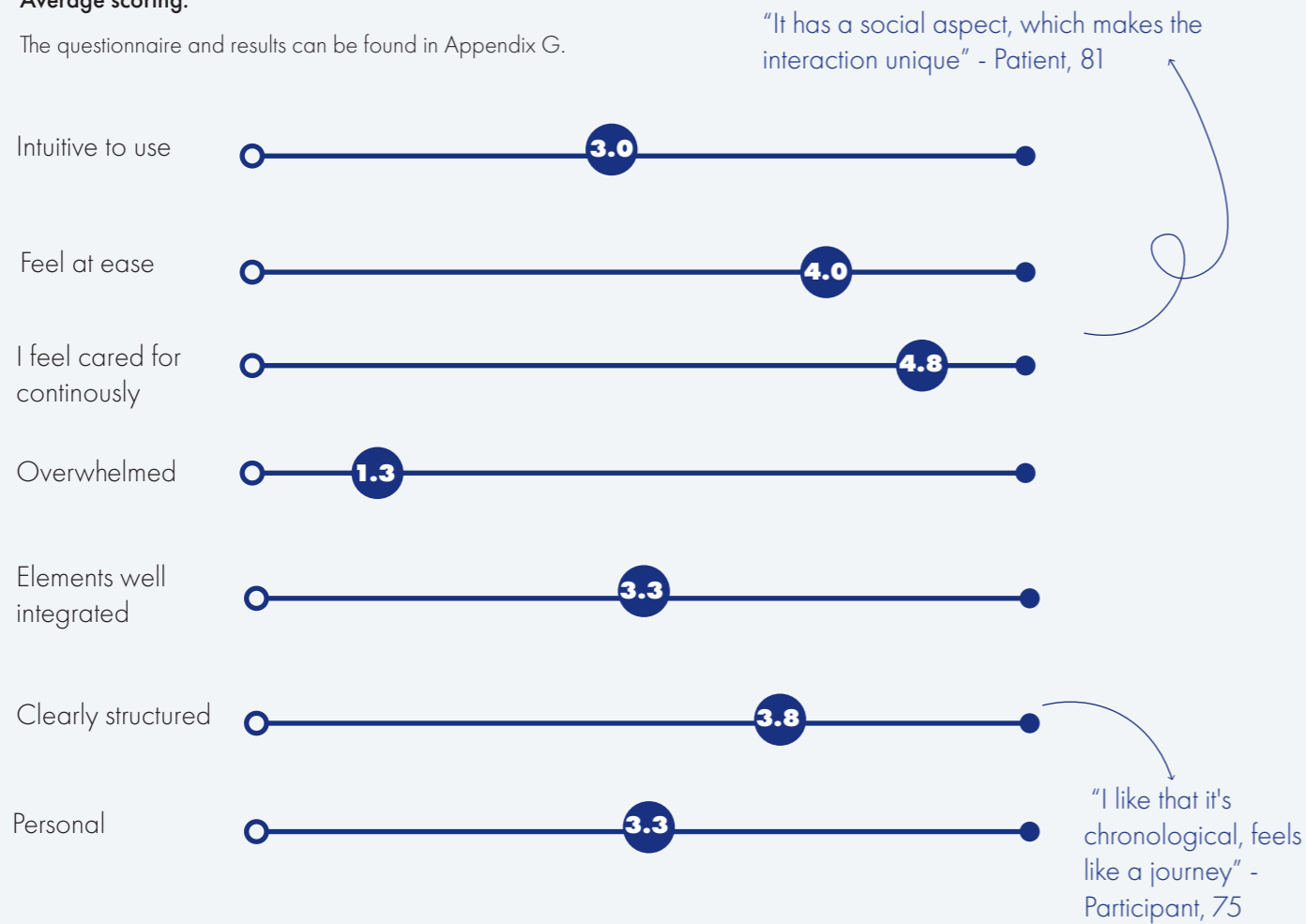


Figure 47. Results user likert scale test

Focus points

Based on this evaluation, that was conducted with a different age group than the target group, there is room for improvement in:

- The use of the concept.
- The integration of the different elements.
- Making it more patient-tailored and personal.

Part 05

Deliver

The design will be presented in phases.
First, the whole new journey is presented and then the different design elements are presented in chronological order.

7.0 FUTURE PATIENT JOURNEY

After various iteration cycles and having processed the feedback, the concept was finalized. As mentioned previously, the intervention is designed to be applied at two points in the patient journey. Applying this intervention into the current patient journey involves adapting other elements of the journey as well. This is important to ensure the flow of the journey is smooth and in the same form language. Consequently, the new patient journey should be seen as a whole.

7.1 Current vs. Future Patient Journey

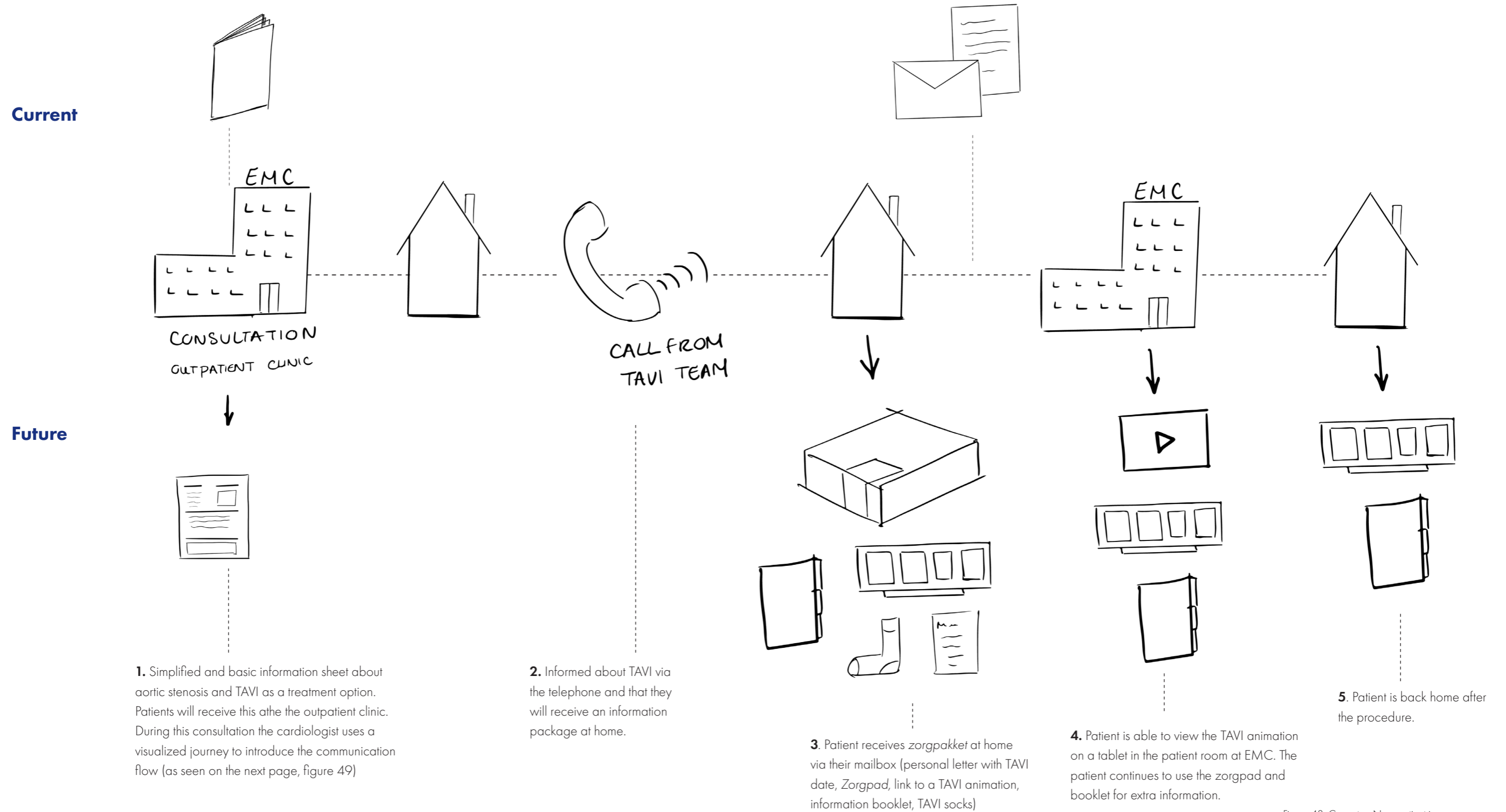


Figure 48: Current vs New patient journey

The journey

The journey is a continuity of steps where all interactions are important. It is important to communicate all the steps clearly to the patient to ensure they understand the communication flow. The zorgpakket is applied after the patient has received confirmation about the procedure.

However, during this call, the patient should already be informed about receiving this package so that they know to expect it. Furthermore, the rest of the communication towards the patient during the journey should be integrated into this new TAVI form language. This also implies a new outpatient clinic booklet. This journey also visualizes that the patient takes the elements of the zorgpakket with them during the continuation of the journey.

7.2 Communication flow

This journey is used to show the communication flow to the patient. This is used as a tool to facilitate the conversation about the next steps in the trajectory.

Aimed effect: stimulate and help processing of information by introducing the patient to the journey. Also, ensure they feel more involved in the journey instead of merely a spectator.

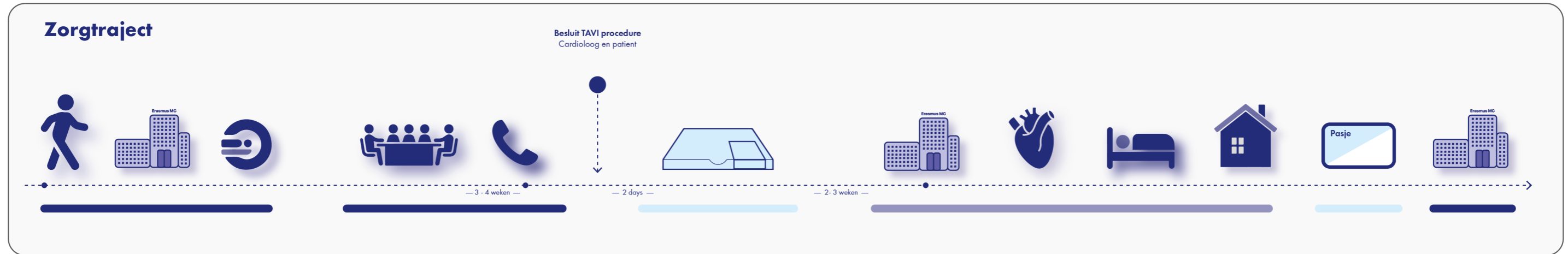


Figure 49: Communication flow during baseline appointment

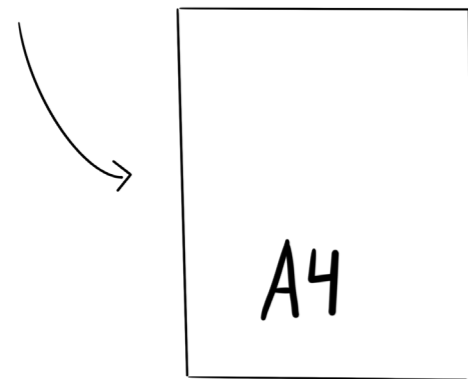


Baseline consultation

7.3 Consultation summary

This is a simplified and basic information sheet about aortic stenosis and TAVI as a treatment option. Patients will receive this at the outpatient clinic. Figure 50 shows the information sheet.

Aimed effect: With this summary the patient can review the basic information of the TAVI procedure. Also, this will help the patient to recall the conversation with the cardiologist. Lastly, it will give the patient the necessary information to agree or disagree on the procedure.



Aortaklep behandeling

Cardiologie afdeling

Erasmus MC
Erasmus

Poli-klinische afspraak

De cardioloog heeft uw diagnose en de mogelijke behandelopties uitgelegd.

Er is gesproken over extra onderzoeken, als die nodig zijn. Eventueel wordt er een afspraak gemaakt met een geriatr.

De artsen gaan nu in overleg met elkaar om de beste behandeloptie voor u te bepalen. Na ongeveer 3 - 4 weken zult u gebeld worden om het besluit te bespreken.

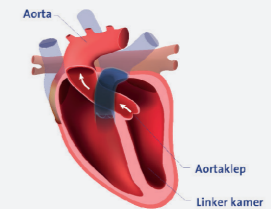
Als u samen met uw arts heeft besloten voor een TAVI ingreep, dan ontvangt u thuis een TAVI zorgpakket. Dit is een pakket speciaal voor u samengesteld met informatie over de ingreep.

Wat is aortaklepstenose?

Aortaklepstenose wordt ook aortaklepvernauwing genoemd.

Met het ouder worden kunnen de aortaklepblaadjes verdikken en kan er verkalking optreden. Verdikking van de hartklep komt voor bij 25% van de mensen boven de 65 jaar. Meestal heeft dit geen nadelige gevolgen voor het openen en sluiten van de aortaklep maar soms begint de klep te vernauwen.

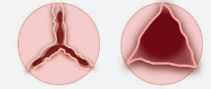
De vernauwing kan zo ernstig worden dat de aortaklep onvoldoende opent tijdens het samentrekken van de linkerkamer. Als gevolg hiervan kan het hart moeilijker bloed wegpompen, verdikt de hartspier en kan de patiënt klachten ontwikkelen.



Gezonde aortaklep



Aortaklepstenose



Behandeloptie TAVI

U heeft een vernauwing in uw aortaklep. Een van de behandelopties is een aortaklepimplantatie. Tijdens de ingreep wordt er een nieuwe aortaklep geplaatst. Deze ingreep wordt TAVI genoemd.

Hierbij is het niet meer nodig om het borstbeen open te maken; wij plaatsen de nieuwe klep in de oude klep via katheters in een slagader. De nieuwe klep neemt gelijk de functie over van de oude klep. De nieuwe aortaklep zal er voor zorgen dat u klachten verminderen.

De ingreep vindt plaats onder plaatselijke verdoving en duurt ongeveer 60 minuten. Het gemiddelde ziekenhuisverblijf is 2-5 dagen.

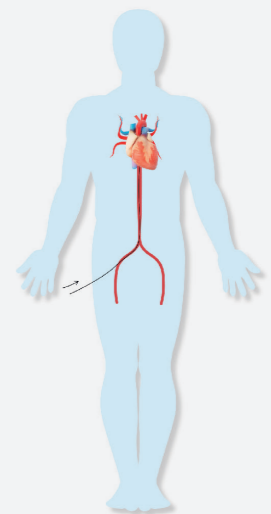
Erasmus MC heeft al meer dan 2000 patiënten geholpen door middel van deze ingreep.

Risico's

Een TAVI blijft een serieuze ingreep. Mogelijke complicaties zijn:

- Hartritme stoornis waardoor een permanente pacemaker nodig is.
- Infectie in de lies.
- Kleine kans op hart of herseninfarct.

In principe kunnen de meeste complicaties adequaat verholpen worden.



Zorgtraject

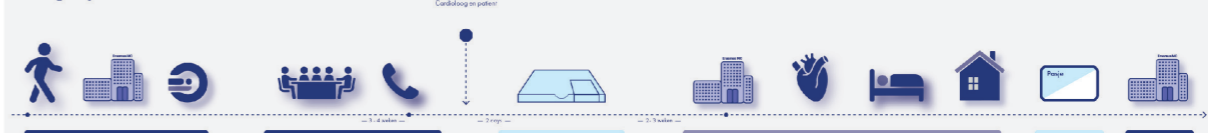


Figure 50: Information sheet A4



Figure 51: Uw Zorgpakket

8.0 Uw Zorgpakket

The zorgpakket is a mailbox package received by TAVI patients after they have had approval for the TAVI procedure.

8.1 Zorgpakket elements

The zorgpakket is developed to ensure the patient receives the tools at home to be able to form the right expectations. These tools are combined into a mailbox package. This page shows the different elements included.



Figure 53: Outside Zorgpakket



Figure 52: Zorgpakket elements organized inside mailbox packaging



Figure 54: Booklet, socks and wooden holder in the 3 compartments



Figure 55: Zorgpad positioned in the wooden holder.



Figure 56: All the elements outside of the box

At the hospital

The zorgpakket is delivered to the patient's home, however one part of the journey is not known at this point of the trajectory. This part has to do with the location and length of the patients aftercare. Erasmus MC classifies the patient in three possible routes:

- **Expres:** early discharge patient. The patient has no other comorbidities and is relatively fit. Therefore will likely have a quick recovery.
- **Referral hospital:** The patient will be transferred to their referral hospital after 24 hours.
- **Standard:** 2-5 days at Erasmus MC.

Whether the predicted route is taken depends on the outcome of the procedure.

Figure 57 shows the stickers of the three 'routes' a patient can take after the procedure. When the patient is admitted to the hospital, the expected route is clarified with the patient by giving them a sticker for their zorgpad. Nurses from the cardiology department will give them to the patient to add to their zorgpad. This tailors the patient's zorgpad and tells them what they can expect for after the procedure.

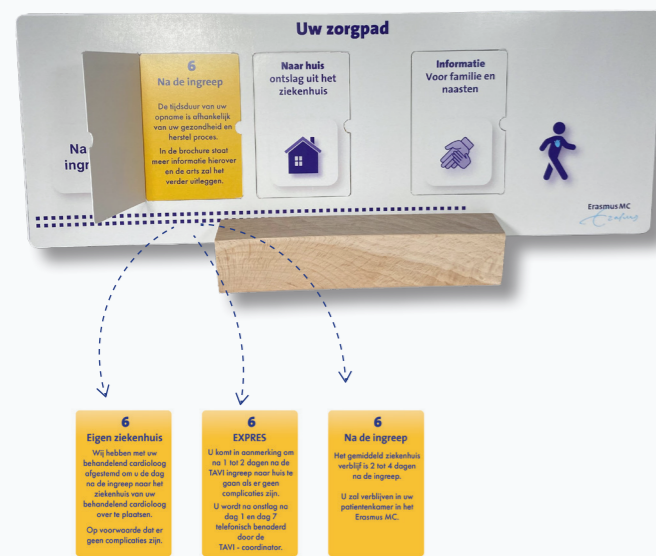


Figure 57: Stickers added to the patients zorgpad at the hospital, depending on the route they will take after their procedure.

8.2 User scenario

Martha is diagnosed with aortic stenosis. Yesterday the TAVI-team called to inform she will have a TAVI procedure. Martha is informed she will receive a package. Today in her mailbox the TAVI zorgpakket arrived.



1 Martha receives the package in their mailbox at home.

2 Martha sees it is personally addressed to her and is curious as to what is inside.

Aimed effect: The package is mailbox size to ensure the patient receives it and does not have to leave their house to pick it up.



3 She unboxes the package and sees a letter with her name on it.

4 She reads the letter. The letter informs the patient about their date of admission. It also informs about what is included inside the zorgpakket and the function of every element.

Aimed effect: The envelope is attached to the top of the box to ensure the patient sees it immediately. Furthermore, the envelope has an EMC logo for professionalism and the patient's name is written by hand to make the package more personal.

Aimed effect: The patient receives everything at once and is not waiting anxiously for another letter. It increases the importance of the zorgpakket and therefore the patient will take more time to use it. Level of trust will go up. Also, for the planning desk there is only one intervention they need to prepare for the patient.



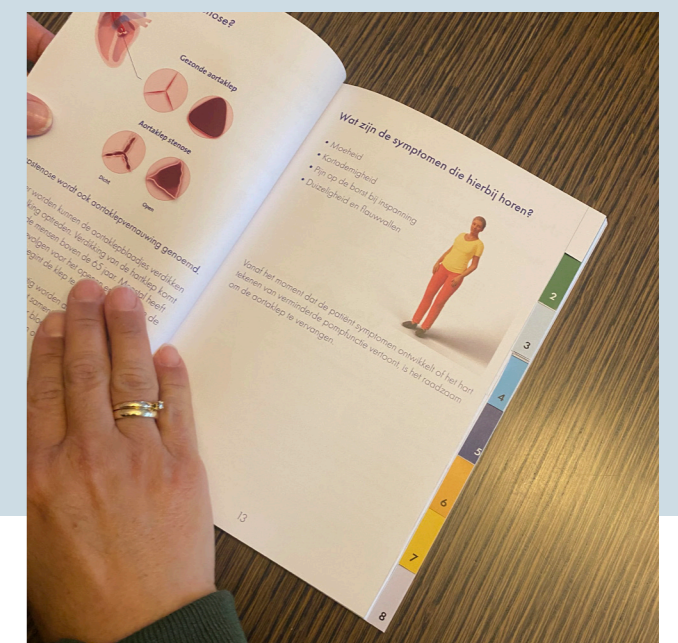
5 Martha then continues to explore the content, beginning by the patient journey (Uw Zorgpad).



6 Martha opens the first tab on the journey and is surprised to see more information inside.



9 Martha opens the booklet and reads the cover letter written by the professor.



10 Martha notices the different tabs

Aimed effect: The patient feels recognized and experiences this as personalized and attentive. Also, the patient recognizes the professor.

Aimed effect: Create structure and ease of use.



7 Martha then continues to unbox the rest of the package: a wooden holder for the Zorgpad, their own TAVI socks, an Erasmus MC pen and a TAVI information booklet.

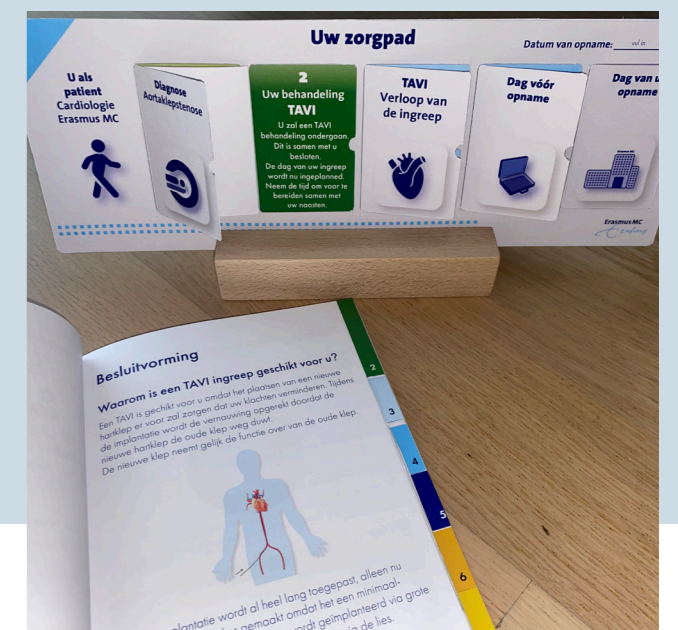


8 Martha places her Zorgpad in the wooden holder.
Aimed effect: Facilitates viewing the patients journey. The appearance is simple and calm, hopefully avoiding any negative connotations the patient might have with the procedure. As it is built up of phases, it also simulates a calendar where the patient can find important information addressing their procedure. When relatives/friends/caregivers visit it perhaps draws their attention and facilitates the conversation about the procedure.



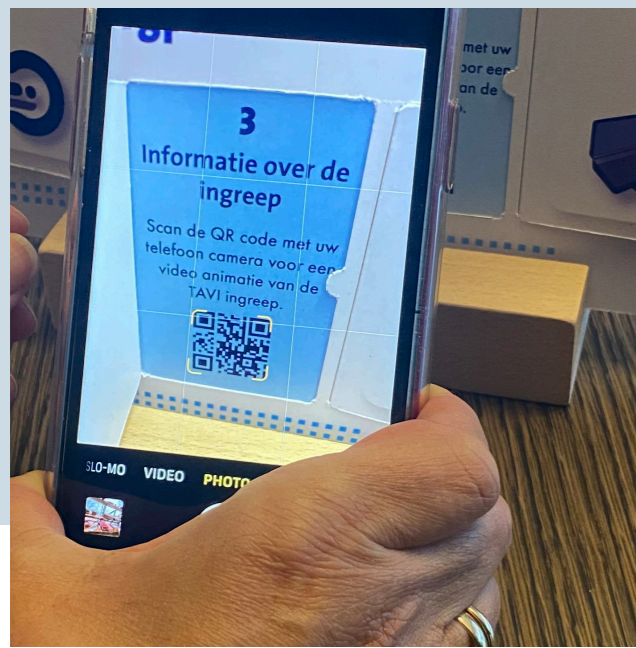
11 Martha notices the link between the information in their patient journey and the information booklet.

Aimed effect: The Zorgpad communicates important and relevant information per phase. The booklet works as an extra communication tool to explain the information further in detail. Referred to as 'Timely information'



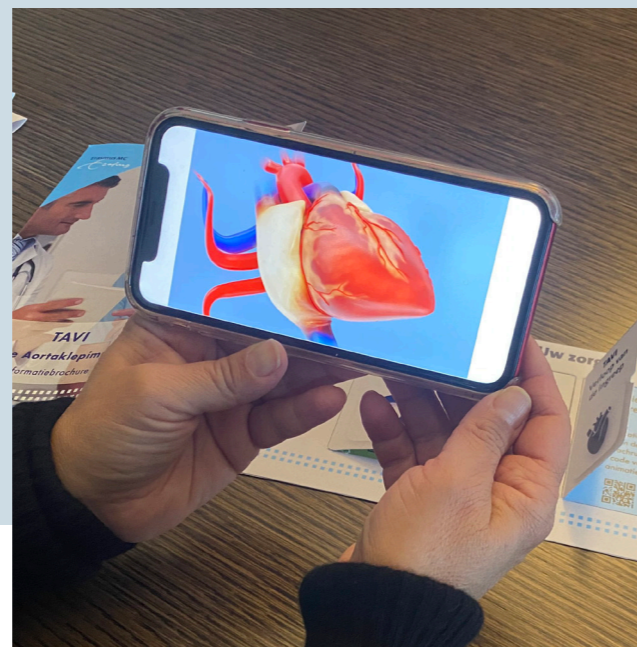
12 After reading the information on the Zorgpad, Martha wants extra explanation and reads the information provided in the booklet.

At the hospital



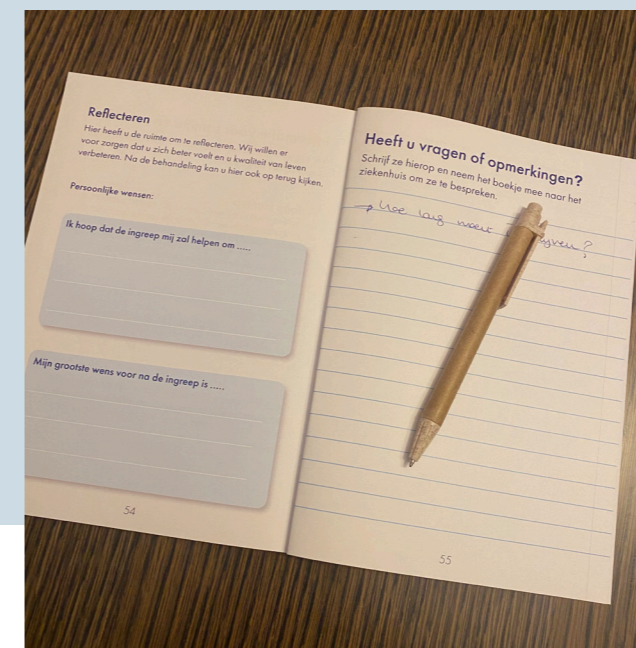
13 Martha sees there is a QR code to see the TAVI animation. She scans it with the camera of her telephone.

Aimed effect: Make the patient curious to watch the animation and simultaneously provide them with enough guidance to scan the QR. This gives the patient the possibility to watch the animation at home (as many times as they wish) and together with their family or caregivers.



14 The link to the QR then appears and she watches the animation.

In the information booklet the URL-link is written for the patient to be able to use it on their laptop if they wish to see it there.



17

As mentioned in the letter, Martha can write down any questions she has in the back of the booklet. She writes them down and takes the booklet with her to the hospital. At the hospital there is time created specifically for her to ask her questions to the doctors.

Aimed effect: The patient has the space to write down their thoughts and questions. With this zorgpakket they have the information and time to process the information. Therefore, the questions which are left unanswered will be specific and concise. This will facilitate the conversation at the hospital with the doctors.



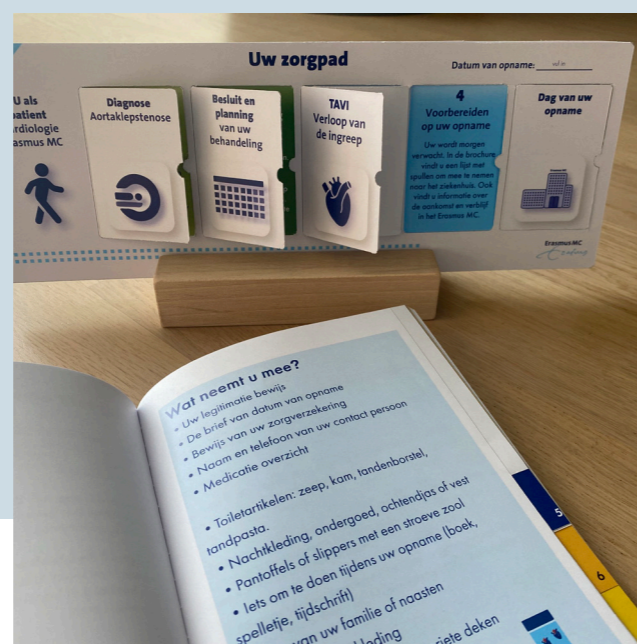
18 At the hospital Martha receives a sticker with specified information about the steps after the TAVI procedure.

Aimed effect: The patient receives patient tailored information. At this point there are three routes the patient can take after the procedure and during admission in the hospital this is communicated with the patient. Now the sticker can be used and it can directly be integrated into their Zorgpad. This is done to ensure the same tool is used, a tool that is familiar to the patient.



15 The letter informs Martha about the date and time of admission. Martha writes the date on the Zorgpad.

Aimed Effect: Personalize their Zorgpad and use it as a calendar.



16 When Martha is packing and preparing for the procedure. She goes to the fourth section of the booklet to see the packing list and reads the information about how to arrive to EMC.

Aimed effect: Provide the patient with the necessary information in one booklet. Guiding them through every step.

DESIGN CHOICES *zorgpakket*

8.3 Product communication

Overall communication style

The communication style of Erasmus MC is clear and professional. Simultaneously with a pleasant surprise and cheerful appearance. (Erasmus MC merkguids,2021). This is important in both visual and verbal communication. The design of the elements within the zorgpakket fit into the Erasmus MC guidelines, ensuring the patient recognizes it. They must recognize this because patients tend to have a high level of trust for Erasmus MC and take any communication from Erasmus MC seriously.

Prior to the implementation, it is advised to run all the elements by the communication team at Erasmus MC.

The concept is developed in the Dutch language. This is done because the larger part of the patients speak Dutch. The language level used is B1, which 80% of the population speaks. (Paktaal,2019)

It is recommended to create an English language version of the information booklet.

Explanations of use

In order to inform the patients well, a letter which is personally addressed to them is included. The letter is written and printed in the same layout as all Erasmus MC letters, to convey a high level of formality. Elderly patients appreciate clearly written letters (Participant,2022). This letter clarifies the zorgpakket and the items which are included. The information is repeated in the introduction of the information booklet.

Furthermore, there is a QR code in the concept which leads to a video animation of the procedure. Due to the age of the target group, it is important to include instructions on how to use the QR. From the user tests, it was noticeable that some patients could be scared off due to the QR code; however, with instructions, the goal is to support the patient and guide them while scanning the QR code. In many situations, TAVI patients have people around them who can help.

Colours and icons

A study by Drs. Morton Walker, Gerard, and Faber Birren, have identified the link between color and physiological response (Hill,2008). It is an important element to consider in the design because it can influence anxiety levels. In this paper, blue is identified as a tranquilizing colour. Also, brighter colours, such as vibrant gold and citrus greens, are vital therapeutic tools. The colours used in Uw zorgpakket are primarily the brand colours from Erasmus MC (Appendix H.1); dark blue and light blue are used in different gradient values. The icons created are also primarily created using these colours to create a recognizable form language.

Besides the blues, other colours are applied in the zorgpad and coincidingly in the tabs of the information booklet. These colours have been chosen and tested to ensure patients distinguish them from one another and have a positive association with them.

They were chosen based on the feeling they emit:

Green: Is the colour of development. It stands for renewal and healing. It has the link with nature which is known to lower stress levels.

Blue: is a very common colour for hospital settings because it emits responsibility, trust, loyal and stability.

Yellow: Is a positive colour, the colour of the sun. Luck and self-esteem.

The colours are applied in a slight gradient to soften their effect.

The font colour used is white and blue, depending on the background. For the readability of the information, there is a high contrast between the background colour and text.

8.4 Packaging

Mailbox packaging

The zorgpakket is delivered in a mailbox package folded out of corrugated cardboard (Figure 51). The dimensions of this box are 350 x 250 x 28 mm. This is within the maximum allowed size of mailbox packages in the Netherlands (Post NL). Inside the box, two inlays are placed as dividers (figure 58). These are placed to guide the patient while unboxing and ensure all elements are correctly positioned. The mailbox size was chosen for several reasons: the postage costs are low, the package arrives faster, and the patient does not need to collect it at a postage office.

The box used is a very simple brown cardboard mailing box. The inside of the box is printed with "Uw TAVI zorgpakket" to present to the patient what it is. Following this, the patient sees the letter (as seen in de user scenario). The letter is attached to the box's lid with a small sticker, ensuring it is easy to add the letter when the package is being prepared to be sent. It is placed here to ensure patients see it immediately.

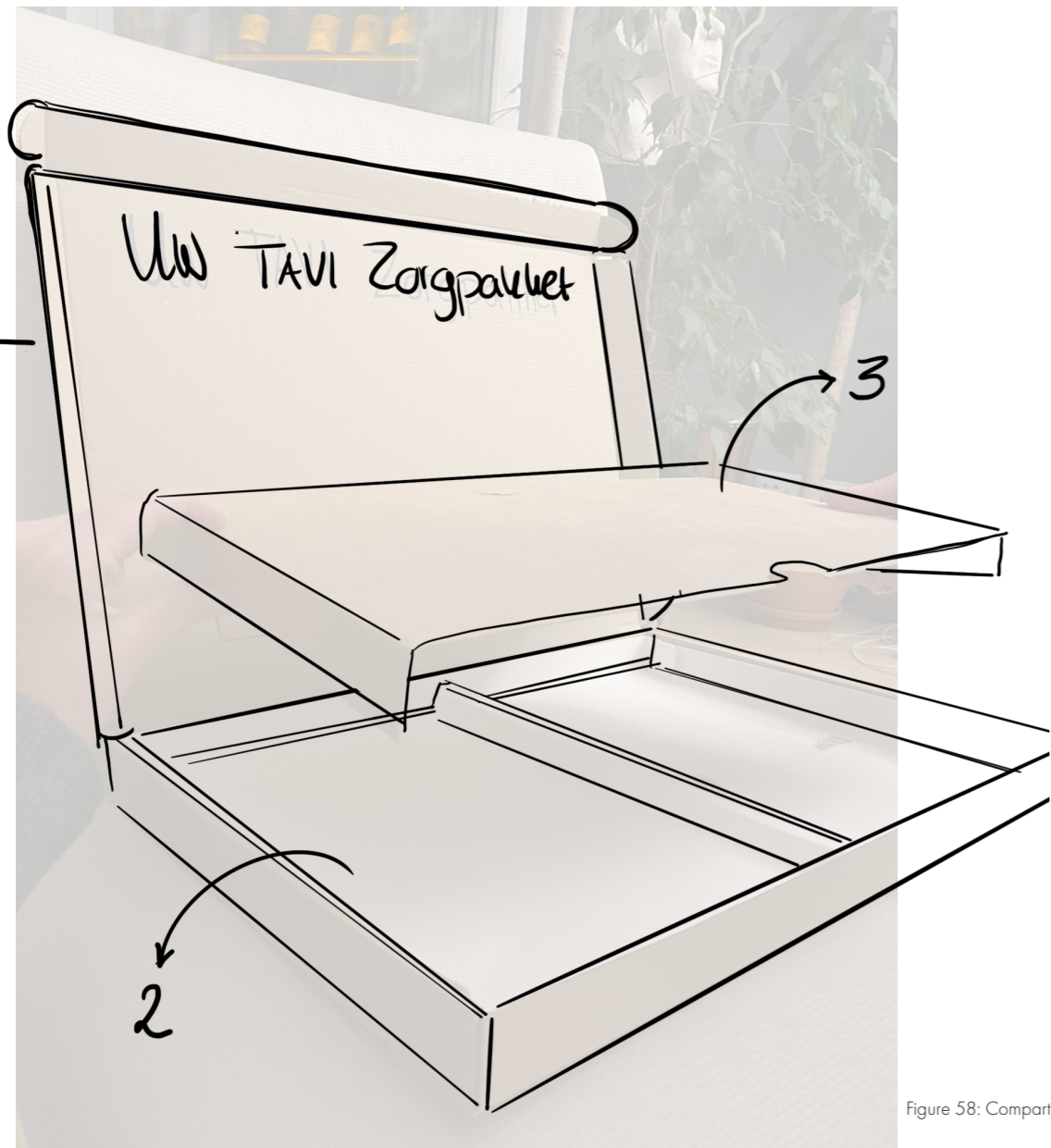


Figure 58: Compartments packaging

Style

A very clean and simple style is used. The sticker on the outside is developed in Erasmus MC brand style to ensure the patients recognize it directly and it looks trustworthy.

Letter

The letter inside the zorgpakket is addressed to the patient as it is a personal letter informing the patient about the date of admission to the hospital and the medicine which they must stop using prior to the procedure. This information is communicated in the letter as it is patient specific and critical. Furthermore, the letter describes the zorgpakket and the elements it has. Adding this letter to the zorgpakket ensures the patient receives all the information at once and does not need to wait anxiously for another letter. Knowing the date will help the patients and relatives to prepare themselves.

Figure 59 shows the front side of the letter to the patient. The full letter can be found in Appendix H.2.

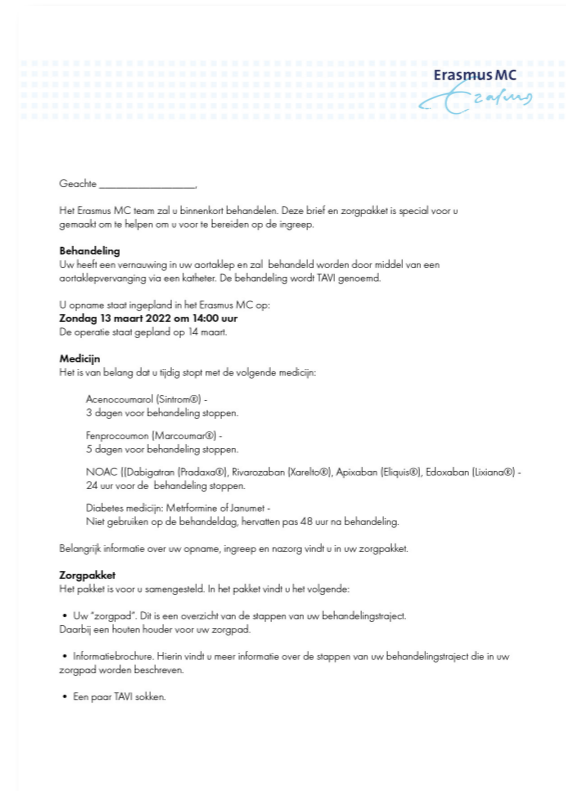


Figure 59. Letter to patient in the zorgpakket

Envelope

The patient's name is written on envelope by hand, as seen in figure 60. This is done to make the communication more personal. The patients name will be written with a black fineliner



Figure 60. Envelope

Sticker

The sticker is a standard template where another sticker with the patient's address can be placed on (figure 61). The size of the standard sticker which closes the package is 140x 290mm. The labels for the address are from standard sticker sheets.

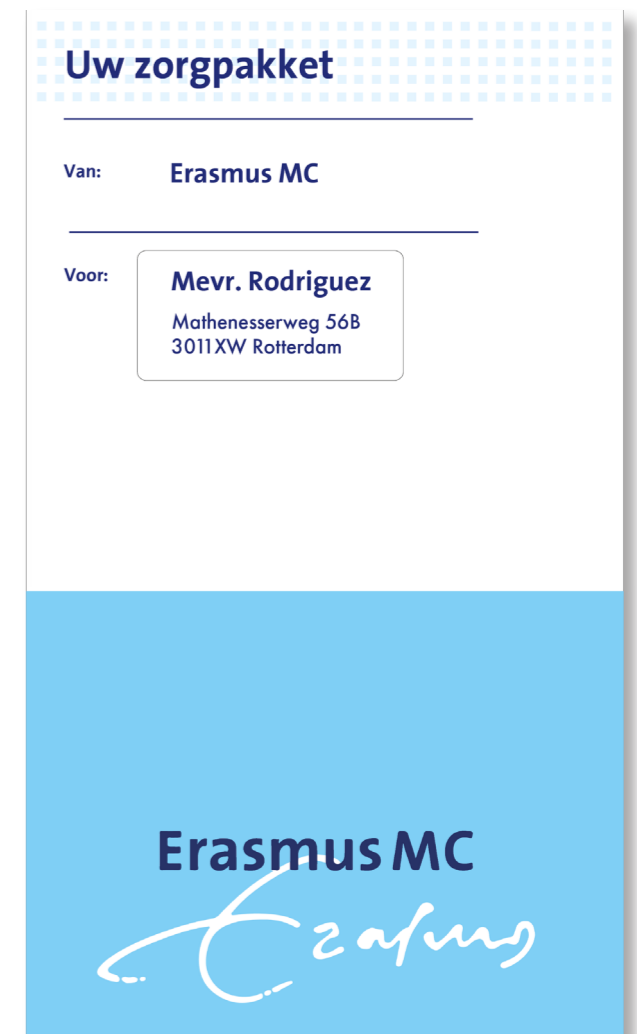


Figure 61. Sticker zorgpakket

8.5 Uw zorgpad

front side



back side



Timely Information

This is a physical patient journey. It is created specifically for the patient to see the steps in their journey visually. Besides presenting the phases of the TAVI journey, it communicates certain information to the patient per phase. This ensures only relevant information is communicated and prevents the patient from being overwhelmed. This concept is referred to as 'Timely Information' (Timmers, 2020).

This concept has been translated into a non-digital design based on the function of an advent calendar. Therefore, the zorgpad has the effect of: 'Opening the door to more information'.

Behind every tab, there is a colour and a number that links the patient to the information booklet. The tabs function as chapters, representing phases in the journey.

Interactions

The zorgpad stimulates a couple of interactions. First, the indents created in each tab are a hint for the patient to open the tabs. Also, the outline of the tabs is perforated, which serves as a usecue for the patient.

Furthermore, the QR code on the zorgpad and the added instructions encourage the patient to scan the QR and watch the animation.

Lastly, the patient is asked to fill in the date of their admission on the zorgpad. This is done to personalize their zorgpad and to have all the TAVI information in the same location.

The patient receives a sticker in the hospital that will be stuck on top of this tab. This sticker specifies their 'route' after the procedure. Specifying this ensures the patient journey is more specific and tailored to the patient. Furthermore, it helps the patient with setting the right expectations. A future goal for Erasmus is to send all the TAVI patients after 24 hours back to their referring hospital or directly home (early discharge). The benefit for the patient is that they will be close to their relatives which makes visitations possible.

General information

The Zorgpad is printed on 300-gram sulfate cardboard to ensure the effect of opening it as an advent calendar is feasible. The outside dimensions are 342 x 123 mm. Each phase in the journey visualized with a tab is approximately the size of a playing card. This was done to ensure the patient could read it and the size was manageable.

Icons

The icons created for the zorgpad are very simplistic to ensure all patients understand what they signify. The colours used for the icons are the Erasmus MC dark blue and its gradients. A slight drop shadow is applied to create more dimension in the design, inspired by apple design and their icons for apps.

Wooden holder

The whole zorgpad can be placed on a holder. It will serve as a visual calendar for the patients prior to the procedure. Also, it will indirectly facilitate the conversation between patients and relatives or caregivers about the procedure. The holder is made of wood because this material is known to be a stress reliever as it lies close to nature. Wood can have a positive impact on a person's mental state (Hill, 2008)

Figure 62. Uw Zorgpad

8.6 Information booklet



Figure 63. Information booklet cover

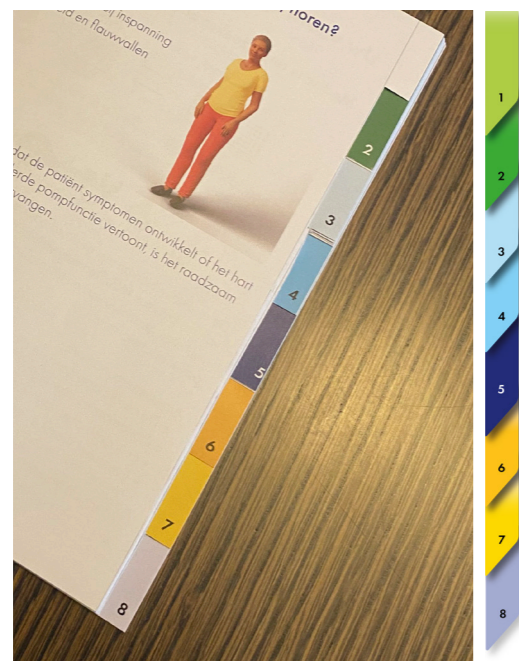


Figure 64. Information booklet tabs

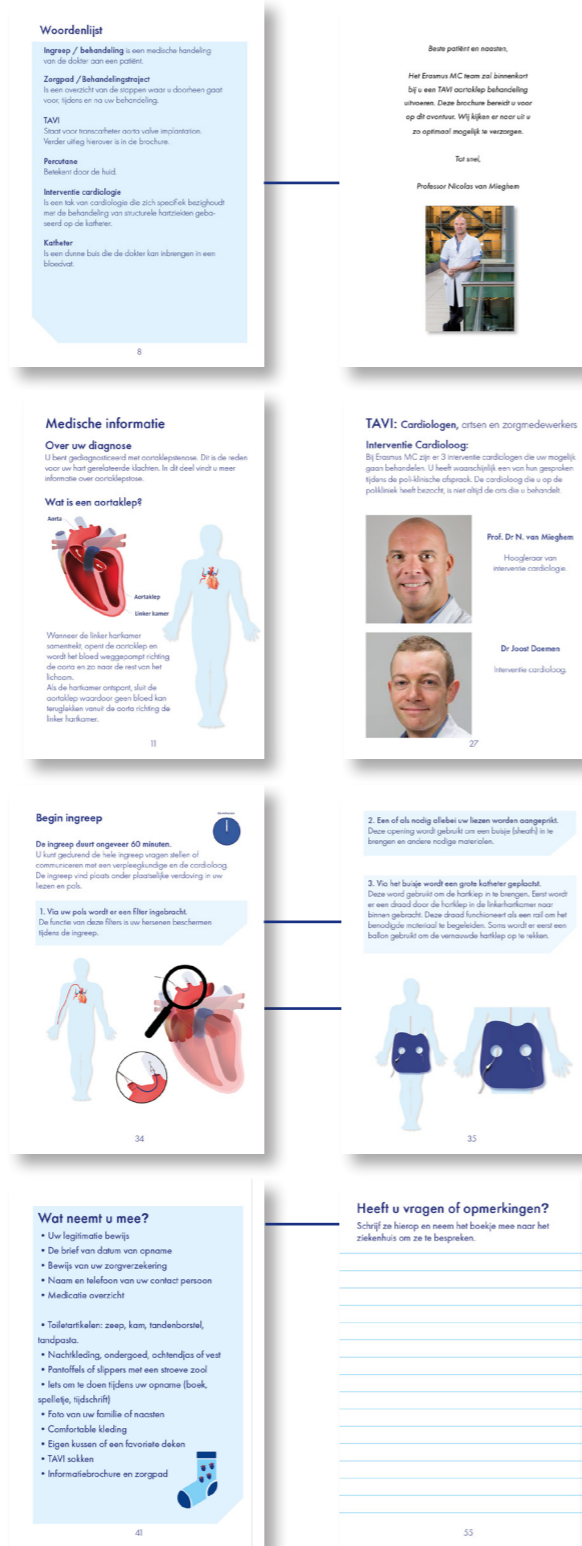


Figure 65. Information booklet

Separate document pdf booklet.

Booklet

This booklet contains all the information for the patient. It is created in line with the communication style of Erasmus MC and in line with insights found in the research phase. Namely, focus on visual communication and language use directed towards the patient. Moreover, it includes the relevant information from the whole trajectory. The whole trajectory includes the diagnose, the admission to the hospital, the procedure and the recovery phase. In order to fragment the information and link it back to the zorgpad, tabs are created to identify the segments of the booklet visually, as seen in figure 64. Elderly patients are familiar with paper medical dossiers and dividers (Interview elderly, 2022). With the use of the tabs patients can find information easily.

Language

Most of the language used is B1 to ensure the larger part of the population understands it. However, some medical terms and specific TAVI information are not B1 level. Instead, they are thoroughly explained. There is a word index for words that are often repeated in the booklet. Word choices have been made based on the connotation they have, for example, *operatie* versus *ingreep*. Operation could be experienced as frightening.

Visual style/ graphics

The graphics are created with the goal to communicate in a simplified version the effects of aortic stenosis and the steps of the TAVI procedure.

Interaction

While the patient is at home and using the zorgpakket, different thoughts and questions will arise. Therefore, they can use the back pages to write them down and later discuss them during admission to the hospital. In this way patients are also aware there is a possibility to ask questions.

Furthermore, there is room for the patient to reflect on their own situation and feeling. This will help patients to process their thoughts.

Photography

The TAVI procedure chapter introduces the patient to the cardiologists and other health care professionals with photos. This is important to ensure the patients recognize the doctors.

In addition, photos are included of the different rooms the patient is in (patient room and operation room) and the hallway prior to the operation room. These pictures are taken from the point of view of the patient.

The photos included in the booklet are professionally taken by the audiovisual team at Erasmus.

Chronological information

The whole booklet is set up chronologically, the same as the zorgpad. Therefore dividing the information until the moment it is relevant, for example, the day before the admission to the hospital, information about what to bring to the hospital is relevant. Furthermore, information about how to get to the hospital and where to go inside the hospital is divided into the tab about the admission. Lastly, the information relevant for after the procedure is placed in the last tabs of the brochure.

Also, within the chapter about the TAVI, the procedure is chronologically explained and divided into 9 steps.

Positive tone

Professor van Mieghem, wrote a few words for the preface of the brochure, this has a warm and positive tone.

In addition, at the back of the booklet is a 'Did you know' page, telling the patient fun facts about the zorgpakket which makes the reading less loaded.

General

The booklet is a soft cover booklet made of 120 gram paper and glued on the side.

8.7 TAVI socks



Figure 66. TAVI socks

Warm feet

The socks are designed for TAVI patients as a gift. The socks intend to make the patient feel cared for and part of the Erasmus MC Cardiology community. Furthermore, the socks have the extra purpose of keeping the patient's feet warm during the procedure. Patients experience the operation room as cold because they only wear an operation robe.

Figure 67 shows the tags attached to the socks. This is done to show it is a gift from Erasmus MC to the patient.



Figure 67. TAVI socks tags



9.0 TAVI ANIMATION

In this chapter, the animation of the TAVI procedure is explained. This chapter presents the reason why it will be developed and used in the TAVI patient journey and the process of developing this animation.

9.1 TAVI animation



Figure 68. Platform where the TAVI animation will be presented on .

Design choices

The TAVI animation has been integrated for the following reasons:

- Animations can convey highly complex medical information by using voice-overs and visuals.
- Able to show anatomy, technical details, and patient contexts in a simplified but informative manner.
- Research has concluded that spoken animation is the best way to communicate complex health information to people with low health literacy (Meppelink et al., 2015).
- The animation is tailored to the Erasmus MC context and house style.
- A 3D animation is used to show a realistic depiction of the procedure while still avoiding unnecessary details and ensuring it is pleasant to watch for the patients. This is done because the procedure is not with general anesthesia and the patient experiences everything.

Patient accessing the animation

- The animation can be accessed via a QR code by scanning it with the camera of a telephone. This is done to ensure patients can view the animation from home with relatives and friends. In the brochure instructions are repeated to support the patient in scanning the QR code. In addition, QR codes are increasingly used worldwide and a assumption can be made that patients can also be helped by their inner circle.
- A URL link is provided in the information brochure to give patients the opportunity to see the animation if they are more comfortable with using a computer.

Script and storyboard

The full version of the script and storyboard can be found in appendix I.1.

The script is built upon the insights from the research phase, showing the general steps of the procedure. The goal is to familiarize the patient and the relatives/ friends with the TAVI procedure. An essential element of the animation is that the patients see the operation room from their perspective. Additionally, patients see the working principle of the catheter entering the body with the aortic valve. The animation will be approximately 2 minutes, equivalent to about 250 words and 20 scenes.

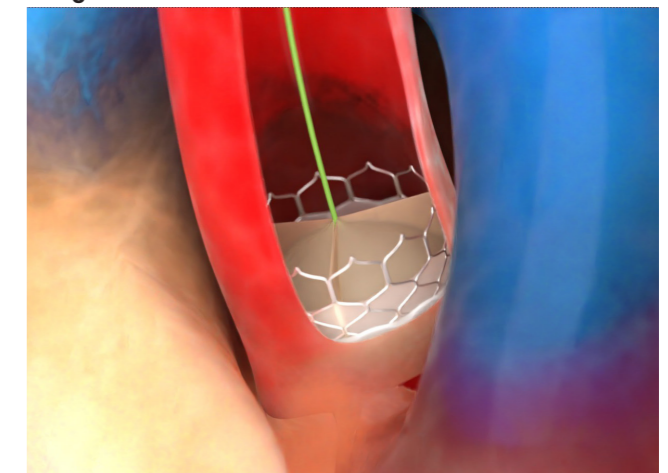
Further development of this animation is done by Informed. This is an animation company specialized in 3D animations for medical purposes.

Implementation

Erasmus MC has invested 10,000 euro in the development of this project and plans on implementing it both on the Erasmus MC site server as well as the patient tablet. Once the animatin is on the server a QR code and a link can be generated from where the patient is able to view the animation at home.

The platform where the animation is integrated is designed inspired by the Erasmus website style (Figure 68). Furthermore, it is very basic to ensure the focus lies on the animation video. The exit, play and pause buttons are clearly positioned to avoid any usage problems.

Images of the animation



Aortic valve being placed



Patient in operation room with nurse and cardiologist. Further the big screen is seen and the C-arm.



Patient is guided through the hallway to the operation room. This will be tailored to the Erasmus MC house style.

Figure 69: Images of the TAVI animation



Use of tablet

This design is based on the existing tablet's layout (Appendix I.2), which is currently used in the patient room at Erasmus MC.

The current function of these tablets is to order food, browse the internet, look into the patient's medical dossier, and request help. By integrating an icon on the homepage, the patient can watch the TAVI animation freely.

When the patient is admitted to the hospital, the nurse explains the use of the tablet. At this point, the nurse will also explain the animation.

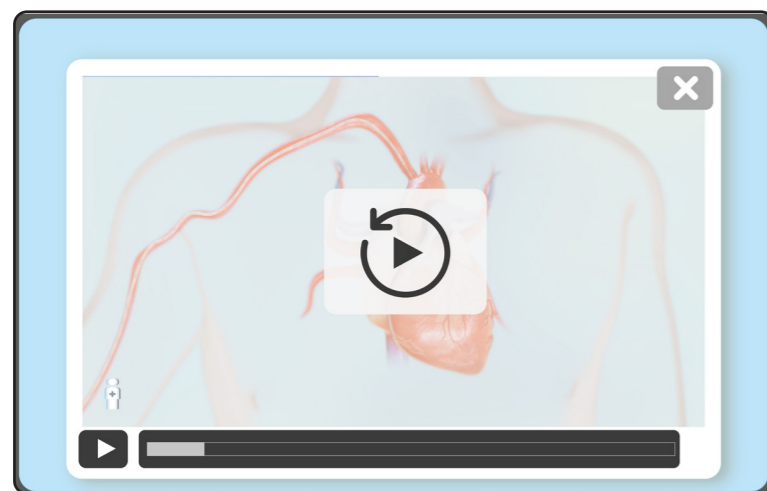
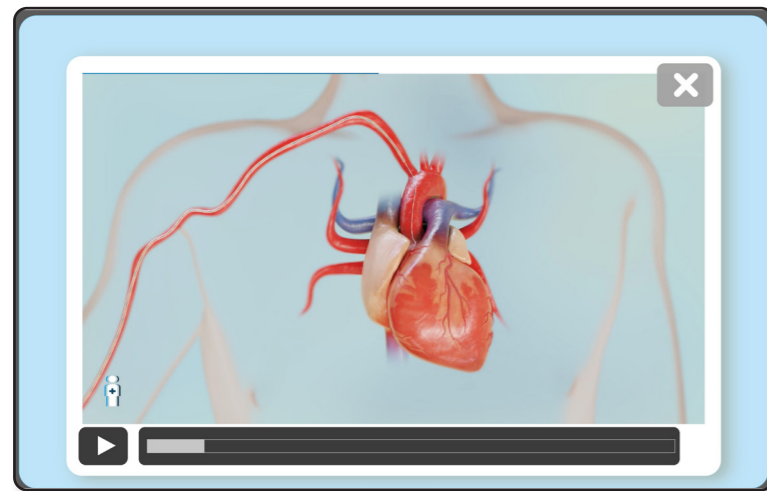


Figure 70. TAVI animation on the patient tablet at Erasmus MC.

Design choices

It is essential to be clear in the tablet's functions, especially for the elderly. To ensure the level of acceptance is higher (EPTA report, 2019). Furthermore, the buttons should be clear, such as play, pause, and exit.

9.2 User scenario



Figure 71. Interaction with animation on patient tablet.

Part 06

Evaluation

10.0 USER TEST

A user test is conducted with five elderly participants to evaluate the zorgpakket. In addition, the zorgpakket is evaluated with three TAVI patients during their six week follow up appointment.

10.1 Pilot Test



A user test has been set up to validate the designed intervention. The test is conducted with five different elderly participants, all above the age of 75 (three female and two male). The participants were classified in the patient profiles as follows: three managing, one optimistic and one modest. Three were with their partners and two without. The education level of the participants differed.

During this test, the scenario was sketched for the participants, and then the zorgpakket was given to them. They were asked to open it and think out loud while doing this. In addition, two tasks were given to test certain interactions.

Following this they were asked to fill in a likert scale questionnaire, where they had to rate certain statements from strongly disagree to strongly agree. Also some questions were added about specific elements to know the patients opinion on this. For example, the stickers in the hospital, the reflection page in the booklet and adding the date on the zorgpad. Lastly, the whole new patient journey was discussed to receive feedback on this flow.

The test setup can be found in appendix J.1.

Test limitations

- Participants are not anxious for a surgery, because they do not have one planned. This influences the experience they have with the concept.
- Participants assume they would feel at ease with the concept, however it is not fully validated.
- It is difficult to test if participants can set the right expectations because of a time limitation in the pilot test. Participants were asked a few questions about the procedure to verify this; however, this was not entirely correct as some had more previous knowledge than others about this specific procedure.
- The animation cannot be evaluated yet.
- The full pilot test was only conducted on five participants, this was due to time constraints as every test took approximately 1.5 - 2 hours and it was difficult to find elderly willing to participate during the pandemic.

Figure 72: Images of participants during the pilot test. All participants gave consent for the pictures

Main conclusions

These conclusions are taken from listening to the patients reaction and observing them while unboxing the package and using the elements.

- Photos of the rooms and the health care professionals have a positive effect on the patient and help with recognizability.
- QR code: It slightly startles most of the patient at first, as the larger part is not comfortable with the use of a QR code. However, with time many patients realize the benefits and know their family can help them to use this.
- Reactions differ per patient profile. Some focus on the warm and supportive feeling of the concept and wish to know mainly the benefits of the procedure. Others want open and direct communication to be able to manage their expectations.
- Three participants were not given the date of procedure in the zorgpakket. The conclusion was, that receiving the zorgpakket directly triggers the question 'When is the procedure? and when will I know the date?'. To ensure this does not cause another anxiety dip in the journey and leaves them waiting again, the date should be included in the zorgpakket. This was then tested with two final users, and had a positive effect. Giving them a sense of reassurance by providing them concrete information as to how long they have prior to the procedure.
- It is important for the patients to know that their questions will be answered in the hospital. Also, direct contact always remains the most valuable. This was seen from every participants opinion.
- Personalized care is very important. They found the concept personal and hoped to be able to create a personal connection with the medical staff in the hospital.
- Participants found the concept professional and attentive. High level of empathy.
- Icons work well to guide a patient and their relatives through the journey.
- It differs largely per participant if they will take the time to reflect and write the date on the zorgpad. Three out of five would take a moment to this. All participants said they would use the last pages to write their questions.

User evaluation

The participants were asked to evaluate the intervention based on a set of statements. These statements derive from the criteria which were formulated during the define phase. The five participants rated the different statements from 1 (strongly disagree) to 5 (strongly agree).

The standard deviation (σ) was calculated per statement to give a better overview of the results. In Appendix J.2, the full overview is shown per participant. It is visible that one participant had a very different opinion than the rest of the participants. He was very clear in not wanting to know anything and wanting the cardiologists to do their jobs. In contrary, his partner was very interested and positive about the concept. This shows the importance of taking the relatives into consideration in this context.

Average

4.0

I find this intervention is intuitive to use and I would use it.
 $\sigma = 1.09$

4.4

I find my relatives are well integrated.
5.0 I find I am integrated in this intervention.
 $\sigma = 0.49$

4.2

I find the provided information was easy to understand.
 $\sigma = 1.16$

1.8

I find the information to be overwhelming.
 $\sigma = 0.56$

4.0

When using this intervention, I feel more at ease.
 $\sigma = 0.63$

4.4

When using this intervention, I feel cared for and recognized by the hospital.
 $\sigma = 0.8$

3.4

I find the interaction with the intervention to be personal.
 $\sigma = 1.02$

5.0

I find the intervention to be honest, trustworthy and professional.
 $\sigma = 0$

4.4

This patient journey makes me feel supported and guided through the trajectory.
 $\sigma = 0.8$

Explanation

- Participants found the intervention easy to use and accessible.
- Partners of the participants found they were very well integrated. Some patients found it more useful for their relatives than themselves.
- Participants easily understood the icons and visuals used. They found it a pleasant way of receiving information about the procedure. Some patients however found some words still to difficult. Especially the medical terms (e.g. percutane, transcatheter, aortakleimplanatactie).
- The participants found the information segmented into phases which made it less overwhelming. Some stated they would read it all at once but due to the structure it does not feel overwhelming.
- The majority of the participants noted they first might find it confronting to see the date of the procedure and that the procedure is really going to happen. However, simultaneously they are relieved to have the information provided by the hospital. Also, most participants described it as a warm and social way of receiving information.
- The participants found the zorgpakket to be very diligently put together with special attention.
- Three participants were tested without providing the date and two with. The outcome to this statement changed by adding this. One participant did not want extra information, while their partner did. Different patient profiles could be addressed more personally (recommendations)
- Participants found the intervention to be very open and honest about the procedure. Receiving the zorgpakket resulted in the participant being more involved in their journey and that increased the level of trust. Because the information is tailored for Erasmus MC increases the level of credibility.
- Participants agreed with this statement after introducing the whole new patient journey and communication flow.

10.2 TAVI patients



Figure 73: Test setup at the outpatient clinic Erasmus MC

Three follow-up patients were interviewed about the zorgpakket concept at the outpatient clinic, as seen in figure 73. They were accompanied by relatives or friends. All three patients were positive about their experience as TAVI patients, as their procedures had been successful. The interview set up can be found in Appendix J.3.

The main insights:

- It is very important for family and relatives. Both, prior to and after the procedure to share the experience with them. Facilitate the conversation.
- Positive about having everything together in one package.
- Happy to see that those who are less technology savvy are taken into consideration in the design. One out of the three did not want anything digital, even no animation.
- Appreciation for visuals and images. As well as chronological information.
- After the procedure this information remains relevant. For example, when patients want to share information with relatives or friends.

- All three patients mentioned they would have found it very supportive to receive a zorgpakket.
- The less technology savvy focused on the booklet and zorgpad. While, one patient (70 years old), was mainly enthusiastic about the animation.
- Two patients mentioned they had looked up videos of the procedure online with the help of their relatives. However, they did not know if the information was reliable and accurate.

10.3 Healthcare Professionals

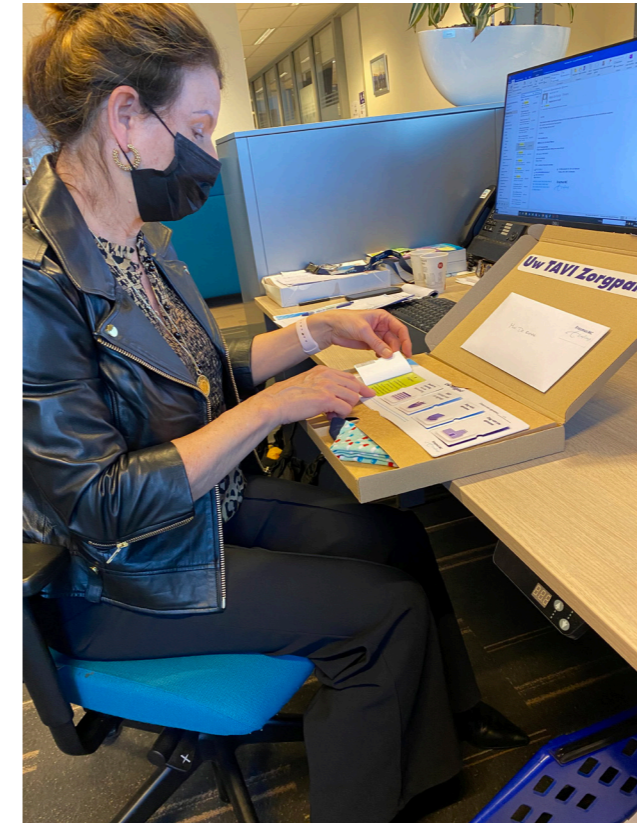


Figure 74: Reviewing zorgpakket



The zorgpakket was evaluated together with two healthcare professionals. They were asked to review the different elements and their content. The goal was to evaluate if the information that is provided is correct and the overall experience is in line with the vision of Erasmus MC.

The full design of the new patient journey and the zorgpakket were positively received by the healthcare professionals. They emphasized the warmth and caring effect the idea of receiving a package has. Furthermore, the look and feel is friendly yet professional. This is very important as it is a product sent under the name of Erasmus MC.

Throughout the process of this project, Erasmus MC was closely involved which ensured their input was always considered.

Conclusion

The evaluation of the zorgpakket by elderly participants (5+ 3 partners), TAVI patients (3), and healthcare professionals (2) is a validation of the positive effect the design intervention has on patients.

All participants, except for one, mentioned that they would appreciate receiving this zorgpakket when preparing themselves for a procedure. They all reflected on their own previous hospital experiences and concluded this would have been very helpful to have. Participants in the user evaluation explicitly mentioned they appreciated the balance between empathy and formal information. This is seen in that they find the intervention trustworthy, honest and professional (5.0) and the information easy to understand (4.2). While also being supportive (4.4) and giving the patient the feeling they are cared for (4.4).

The personal aspect scored the lowest (3.4). It is personal as it provides patient-specific information about the date of the procedure. The way the information is communicated can be personalized based on profiles. In this design, the three different profiles are taken into account, and different elements meet the needs of the profiles. Perhaps the design could be approached by adding this OR this instead of this AND this.

The overall goal of making the patient feel at ease by reducing their anxiety scored 4.0 by the participants. This is quite high; however, it is not fully substantiated as explained in the test limitations. It is a snapshot instead of a conclusion of their whole pre-operative journey (experience curve).

In the next chapter, the effect and value of the design intervention are presented.

11.0 VALUE

This chapter reflects on the added effect of the intervention of TAVI patients. To conclude this chapter reflects back on the design goal and whether the design intervention is suitable solution.

11.1 Value

The intervention consists of both the zorgpakket and the TAVI animation.

This intervention is evaluated based on the outcomes of the research phase. This intervention aims to improve a TAVI patient's overall experience by reducing their pre-operative anxiety (reaching the ideal experience curve). This section aims to conclude the intervention's added effect on patients based on the evaluation completed thus far.

Help the patient feel at ease and reduce anxiety.

Patients feel at ease when they can trust health care professionals. Therefore, adding a personal, honest, and professional intervention will create a trusting relationship with the hospital. Additionally, by adding this touchpoint, the perception of waiting time can be lowered as it occupies the patient and simultaneously reduces uncertainties (Worlitz et al., 2020).

The fact that it is packed in a box gives the patient the idea they are receiving a gift and evokes positive emotions. Because the zorgpakket is divided into Zorgpad and information brochure, it guides the patient to process information in steps ensuring they are not overwhelmed.

The zorgpakket is sent to the patients home. This is the patient's safe space and therefore it is a moment and place in the journey where the patient can process the information.

Guided in setting expectations

By looking through the zorgpakket and watching the animation, the patients feel they have the tools to understand the phases of the journey and set the right expectations. Throughout the intervention, different means of communication are used to support the different patients. Information is communicated via a 3D animated video with audio, written information, simple icons, and detailed visualizations. In addition, the intervention is set up chronologically to provide the patient information in the same order as to how it occurs. At the same time, the Zorgpad also nudges them to read the information in steps. Providing the patient with the essence of timely information (Timmers, 2021).

The animation shows a simplified version of the procedure and the photos shown are without actual patients during the procedure, nevertheless they give a real visualisation to the patient. This balance between simplified and realistic provides the patient with a preparatory tool that will avoid any unforeseen circumstances and therefore have lower anxiety during the procedure. These design choices are made because the patient is awake during the whole procedure, therefore ensuring they have a realistic preparation to establish right expectations.

Participation in their journey

By introducing the patient to their journey and the phases in the journey the patient is more involved from the beginning.

Recognition

The intervention is applied when the patient begins to have uncertainties. This is done to avoid the uncertainties and support them to do this. Furthermore, the zorgpakket and animation are developed purely for patients; this is shown in the language used and the chronological structure.

Receiving a package to your doorstep that includes relevant information, personalized information, and personal gifts is a pleasant surprise for the patient. Adding positivity to the patient journey while the focus remains to inform the patient.

"I feel cared for" - Participant, 81

In addition, the TAVI socks are developed to keep them warm during the procedure and make them feel part of the Erasmus MC community.

The intervention consists of several phases, ensuring the patient is guided throughout their whole journey. All elements are created with the same form language to avoid confusion.

Patient tailored

Patient-tailored care is an integral part of patient experience, especially when wanting to ensure the patient feels recognized. This was a challenging element, but by adding the animation to the zorgpakket, the optimistic profiled patients are addressed while the modest and managing are also supported.

Modest: Show emotional support by sending this zorgpakket to the patients home.

Managing: providing the tools to prepare themselves and use it as a coping mechanism.

Optimistic: are not necessarily anxious, rather interested. The animation and information booklet provides them with professional information from Erasmus MC. The animation triggering their curiosity and higher level of technology use.

In addition, the sticker given to the patient during the admission at the hospital makes their journey personal by indicating the route they will take after the procedure. This then specifies the relevant information for them and their situation, making it less generalized.

Furthermore, the zorgpakket is personally addressed to the patient and most importantly, communicates the date of admission and procedure, ensures it is patient tailored and provides information mainly relevant for that specific patient.

Communication

Communication is key in this intervention; communication is used to transfer information to the patients and also ensures all interactions go smoothly in the journey. Different means of communication are used, and by applying these different means, there is also repetition of information. This helps patients process information (Houts et al., 2001). All the information that is communicated is screened by Erasmus MC. With the use of the logo the patient knows this information is specifically directed for patients from Erasmus MC and is the most factual information in comparison to that found online.

Open and honest

The information is communicated in a personal yet professional way. The package gives the patient a warm and personal feeling, while the Erasmus house style ensures it remains professional. Furthermore, providing the patient with thorough information shows the patient that it is open and honest information. This increases the level of trust. Considering it is a highly advanced operation and with a high percentage of successful outcomes it is important that these statistics are communicated to the patient.

Health literacy levels

Using descriptive language in combination with visuals and an animation ensure patients with different level of health literacy can process the information. Therefore this reduces the knowledge gap between healthcare professionals and patients to a level where they can understand each other.

Reduce perceived waiting time

Sending the zorgpakket specifically when patients are waiting at home will be an informative distraction.

Design for elderly

An important element of this intervention is the considerations taken to design for the elderly. The intervention considers the patients' technological capabilities by making a largely non-digital design that everyone can use at home. The 3D animation is a digital element that can be seen either by using a QR code or a link for their browser. By repetitively explaining how to scan the QR code, the intervention intends to support the patient while using this technological element. The option stands that they can watch the animation in the hospital with the help of a nurse; however, the desired interaction is that the patient can see the animation at home.

Furthermore, the non-digital aspects are developed using larger font size and large visuals. Also, the use of colours is carefully chosen to ensure the colour contrast enough (Discovery eye foundation, 2015) yet, still having a positive connotation.

The instructions and introduction to the zorgpakket are written in the style of a formal letter addressed to them. This is done to ensure the patients read it first before unpacking the box. As seen from the user research and evaluation, this target group takes letters very seriously, specifically from EMC.

Other stakeholders

Integration of family and caregivers

The intervention integrates relatives, friends, caregivers by addressing them in the letter and by adding a section focused purely on information for them. Both the booklet and the animation can easily be viewed together.

Professional (EMC)

Erasmus MC is a well-known hospital; therefore, all interventions applied must be professional. Using the EMC brand guidelines, in combination with the developed TAVI style, the appearance is aesthetically pleasing and professional.

Value EMC

By applying this intervention, patients will have professional and reliable information from Erasmus MC. This will provide the patients with more certainty, giving the patients more confidence and reducing the incoming calls from patients with questions. Consequently, this lowers the workload of personnel. Also, the patient will be more prepared and informed; therefore, the admission process will be more efficient.

When referring back to the literature analysis, pre-operative anxiety can affect the recovery process (Yuzkat et al., 2020). Therefore, applying this intervention and ensuring that patients have lower pre-operative anxiety can also reduce costs for the hospital, as patients can leave the hospital faster.

Furthermore, the patient satisfaction score will increase when a patient-centered intervention is integrated into the journey.

Part 07

Implementation

12.0 ROADMAP

A roadmap (Figure 75) is developed to visualize this future implementation process. Both short-term and long-term plans are integrated into the roadmap. For Erasmus, it is important to have a long-term implementation plan to ensure it is in line with their future strategy. The roadmap is divided into the zorgpakket and the animation, as the process of implementation is different for each. Furthermore, it zooms in on the role of Erasmus MC and the cardiology department. After the roadmap, the implementation plan is introduced.

12.1 ROADMAP

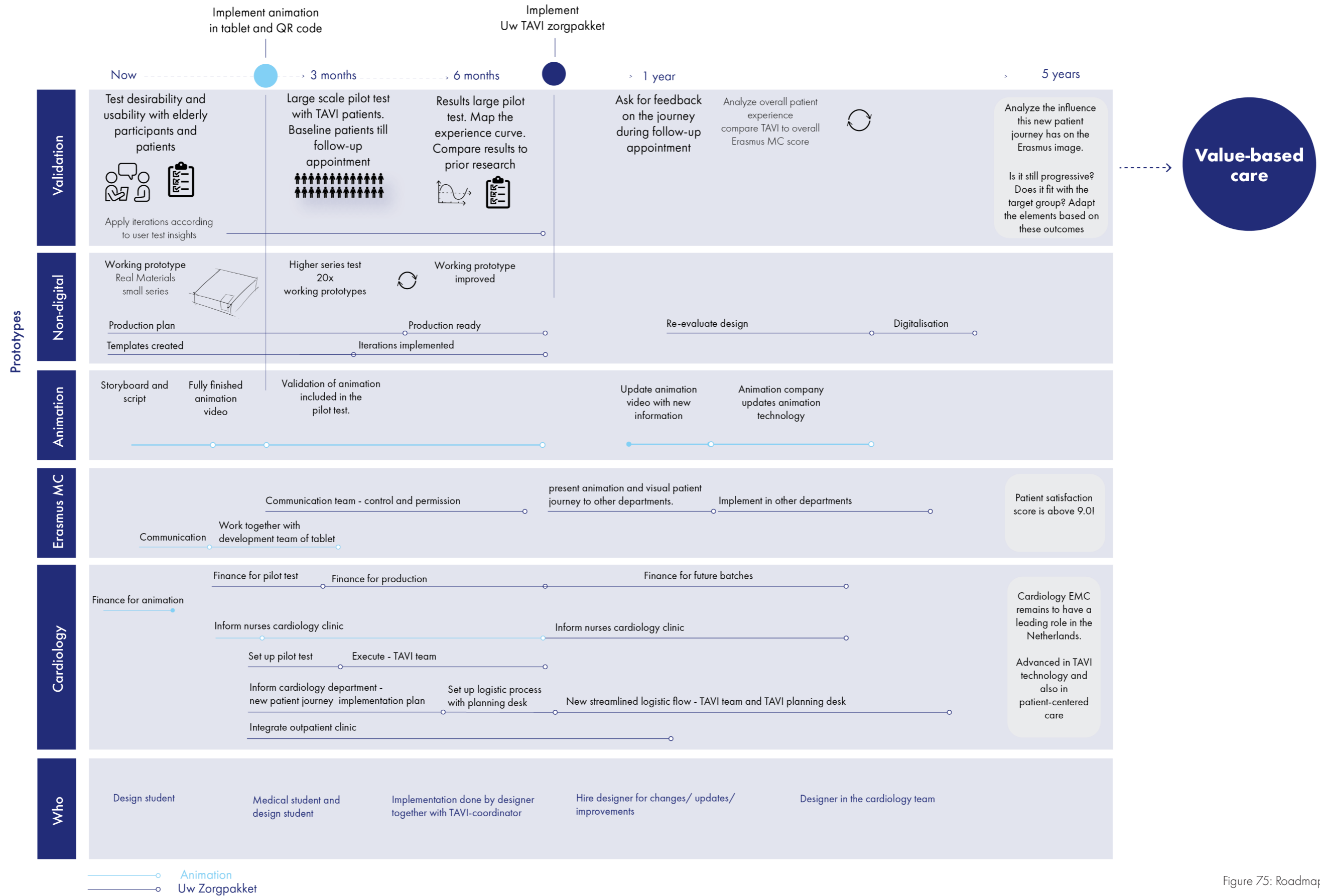


Figure 75: Roadmap

12.2 Implementation Plan

Textual check

Prior to pilot test and further implementation it is important to check the content of the zorgpakket by the communication team of Erasmus MC. During this check, the whole information booklet should be controlled on B1 language level.

Large scale pilot

Prior to the implementation, a large-scale test should be conducted. This should test both the effect of the zorgpakket and the animation.

The animation will already be implemented; nevertheless the insights from evaluating this can improve the animation or how it is applied.

The pilot should follow 20-30 patients during their trajectory as TAVI patients. Using the same tools as those that were used in this project.

Additionally, the patients should be asked to recall the information they processed to test what they know prior to the procedure. In conclusion, the results should be plotted in an experience curve to compare to the current experience curve. These results will be important to proceed onto the next implementation and investment steps.

TAVI animation

Erasmus MC has made an investment of 10,00 euros to develop the 3D video animation. This will be developed by the company Informed animation together with Erasmus MC.

Once the video is completed, the video will be embedded to the Erasmus server. This will allow the video to be streamed publicly via de Erasmus site.

The next step will be to contact the IT team, to integrate the animation into the tablets in the patient rooms. In addition, a dynamic QR code and URL link will be made to provide the patient with the possibility of viewing the animation at home.

Because the animation will be uploaded via the server it will be easy to update. This is important for changes within the procedure and improving the animation by applying new techniques.



Informed animation

12.3 Production Zorgpakket

Die cutting

Both, the zorgpad and the information booklet are produced using a technique called, die cutting. Examples are shown in figure 76 and 77.



Figure 76: Example foto taken from Behance, advent calendar.



Figure 77: Drukkerij Nederland example of tabs.

Both the brochure and zorgpad are made using a cutting die with the form as seen in figure 78.

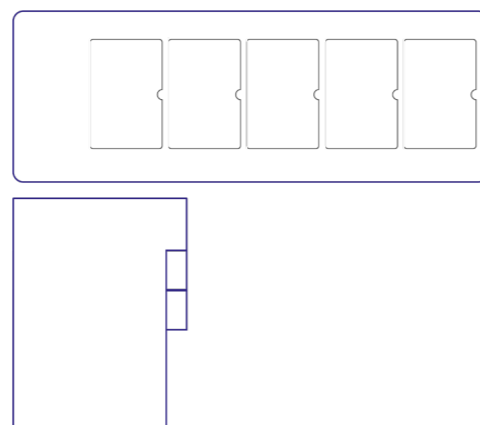


Figure 78: outline of the cutting die form.

Assembly zorgpad

Made of three layers glued together during the production process. In the same order as seen in figure 79.

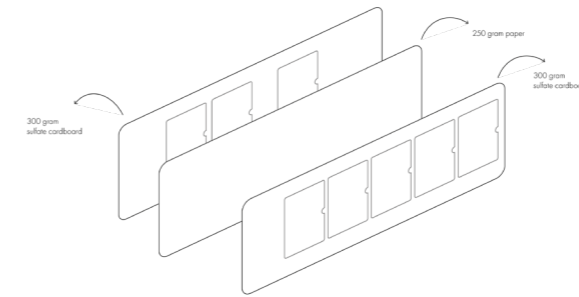


Figure 79: assembly zorgpad

Mailbox

The mailbox are standard size: 370 x 250 x 28 mm, made of brown corrugated cardboard. The inside is printed with the text 'Uw zorgpakket' and also two guiding lines are printed on the inside of the box to ensure the sticker is placed on the right spot. Furthermore, the components inside are produced by the packaging company and delivered unfolded.

Mailbox sticker

This is print and cut by the Erasmus MC printing house on a A4 sticker.

Socks

The socks and the label on the socks are produced by a sock development company. These socks are delivered in two sizes, and ready to be placed inside the zorgpakket.

Envelope

The envelopes are printed by the Erasmus MC printing house and ordered in a large batch. The planning desk then needs to add the patients name.

Costs

There will need to be an investment made to implement the zorgpakket. The investment costs are the die cuts that need to be made, costing 120 euros each. A total of three different ones are needed. These can cut thousands of sheets of paper, meaning it is a one time investment.

The cost for the total zorgpakket is 14.10 euro's for a series size of 300. This includes the packaging, information booklet, patient journey, the wooden holder, stickers and TAVI-socks. In Appendix K, the cost overview can be found, based on quotations provided by different companies.

Design considerations have been made with the different price quotations. For example, the compartments in the packaging of the zorgpakket increase the price of the box by approximately one euro. However, it is an important part of the desired interaction of the patient with the zorgpakket. Therefore, the choice has been made to keep them. The same goes for the tabs in the booklet. The user test shows that this is an essential element for the zorgpakket which ensures that the patient has a clear overview.

PostNL

Erasmus MC already works together with PostNL for medical letters. For the zorgpakket a new agreement should be made for the mailbox packaging barcodes. These pre-paid barcodes can be placed on the zorgpakket sticker.

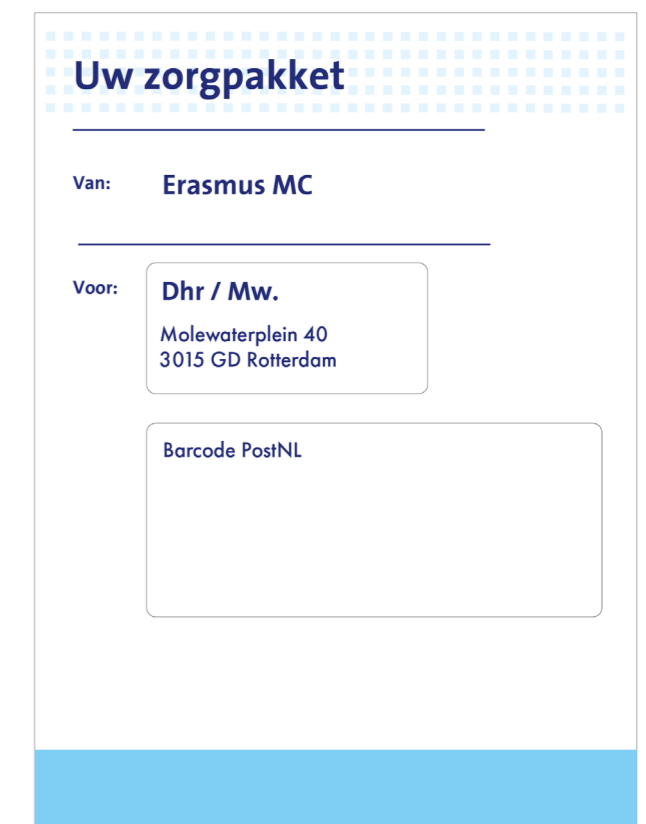


Figure 80: Sticker zorgpakket

13.0 ERASMUS MC IMPLEMENTATION

This chapter analyzes the 'behind the scenes' process of the TAVI patient journey. This is done in order to implement the new patient journey in a streamlined manner. Figure 81, Shows the current journey versus the new additions.

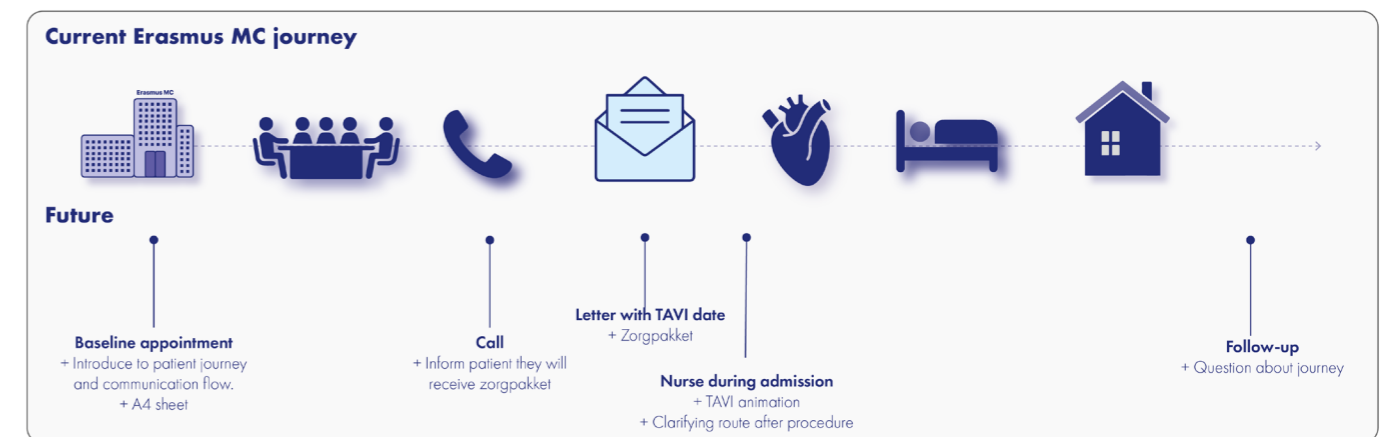


Figure 81. Erasmus MC journey, current vs future

13.1 Erasmus MC journey

In order to implement the final design in the new TAVI patient journey, the 'behind the scenes' process has to be taken into account. The goal of applying these new interventions in the journey is to improve the patients experience, without creating a burden in the flow of the cardiology department. This way the process can be streamlined for Erasmus MC.

A walk through the new journey for the Erasmus MC cardiology department, as seen in figure 81:

Baseline appointment

The advice is to introduce the communication flow to the patient during the first consultation. This introduces the patient to the communication style within EMC as well as the helps them to visualize the journey. Furthermore, the cardiologist provides the patient with a short printed summary of the consultation. This is to ensure that the patient can easily recall the appointment.

Zorgpakket and letter

In the next chapter the logistic process of integrating the zorgpakket is explained. This is a new intervention introduced in the journey and replaces the original letter the planning desk sent to the patient. The planning desk now sends the zorgpakket together with the letter with the date of the procedure, so that the patient receives a complete package. This happens within two days after the heart-team meeting. The heart-team meeting is on Wednesday afternoon and by the end of Friday this should be sent to the patient.

Admission to the hospital

Two elements are added during the admission process. The moment when the nurse takes the patient to their room and explains general information about the admission process, the nurse will be asked to explain two things further in detail. 1. The tablet and the animation 2. The route the patient takes after the procedure. Here the nurse will give the patient a sticker for their zorgpad.

Follow-up

Lastly, when the patient comes to the follow-up appointment and speaks with the TAVI student or TAVI coordinator the patient will be asked to share their experience of the TAVI journey. This will be done to stimulate the patient to reflect and to use the answer as feedback for the hospital.

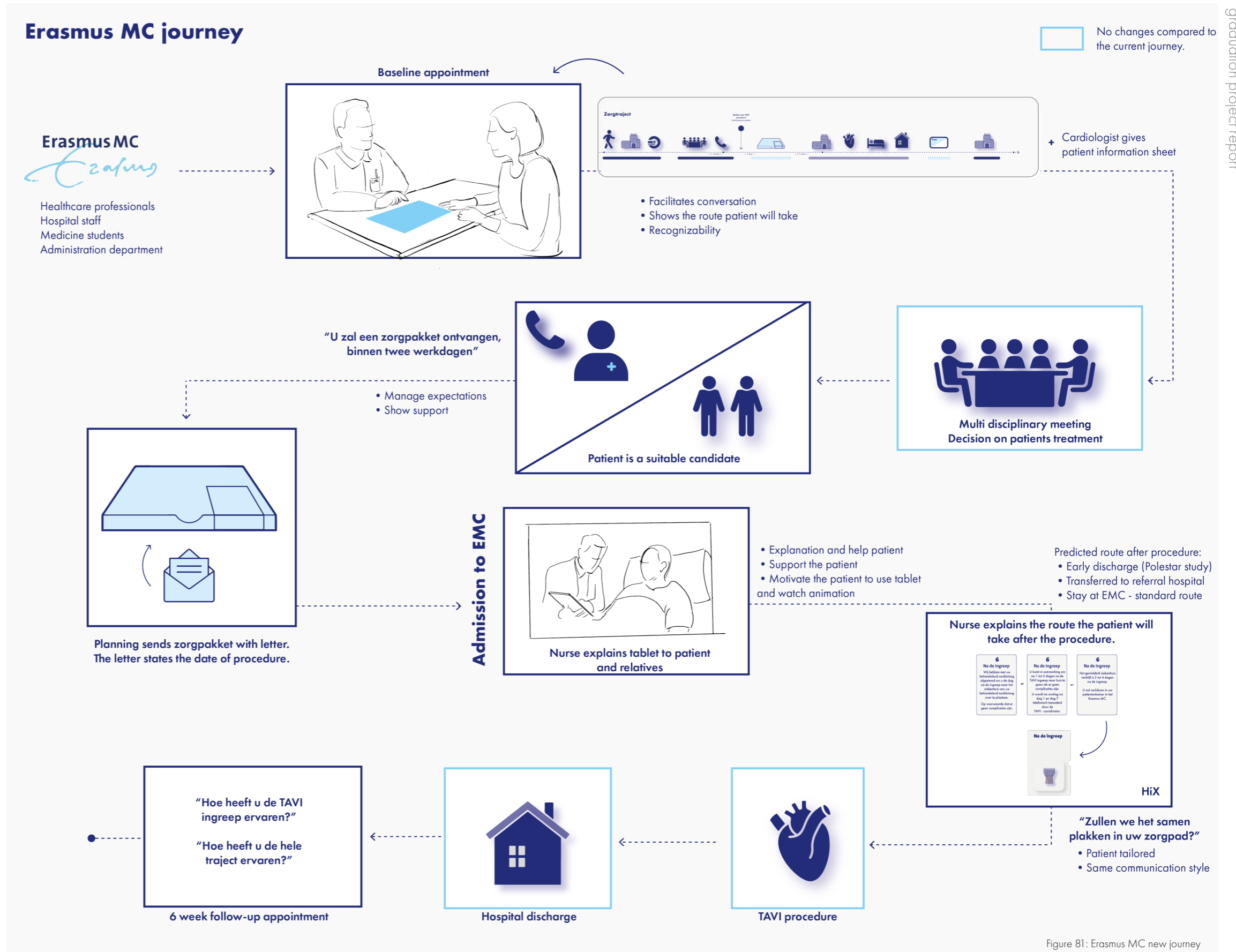


Figure 81: Erasmus MC new journey

13.2 Erasmus MC Logistics

In 12.4, the new patient journey is illustrated from the perspective of the cardiology department. To implement this new journey and make it successful some logistic changes need to be made.

Letter with date of admission

In order for the zorgpakket to be sent together with the date of admission, there needs to be an optimization of the administrative process within the TAVI team.

The current process begins after the heart-team meeting; the information is sent out about which patients are approved and can be planned. This communication is mainly done via e-mail or telephone between a secretary, Tavi-coordinator, and leading intervention cardiologist. The secretary plans the patients' procedure in the available opening. After final confirmation from all parties, it is sent to the planning desk for communication to the patient.

However, there is a knowledge gap between administrative specialists and medical specialists. This results in a hurdle in the decision-making of the planning, as the cardiologist has to decide who should best operate the patient and if there are specific circumstances to consider. This results in inefficient communication flows between the administration and medical professionals.

How to optimize this process?

An idea to optimize the process flow and increase the efficiency of this communication flow in order to ensure the date of admission is sent to the patient in the zorgpakket is seen in figure 82.

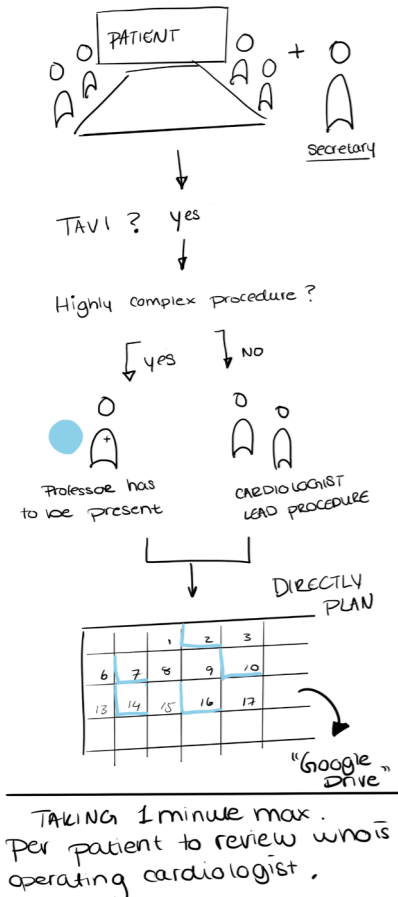


Figure 82: Logistic process

This idea adds the secretary to the heart-team meeting. This could also be the role of someone else who works directly in the 'google drive' planning the TAVI schedule. The key part is that the decision is made about who is the operator and therefore the procedure is planned on the day this cardiologist is present. Having this information, the date can be planned and the date can be confirmed. A lock system can be put on the confirmed dates to avoid anyone from shifting the patients' dates after sending the zorgpakket with the letter.

Due to patients with severe symptoms or emergency patients, the time and date of a procedure can get changed. This is inevitable and should be handled professionally if it occurs. Most patients show understanding for this situation, especially if they are informed relatively on time.

Before implementation, a more detailed logistic overview should be done on this process. This overview has to include all stakeholders involved. This is further explained in the recommendations chapter.

Logistics zorgpakket

A series size of 300 is used for this implementation plan, as this is approximately the number of TAVI procedures conducted per year. The difficulty with this is storage; therefore, the assembly will be in batches of 60 (30 female and 30 male), which can easily fit in an office closet, two columns of stacked boxes, approximately 75cm. In addition, the unfolded boxes, booklets, and other elements will take up less volume and can be stored in storage space.

The boxes will be assembled (steps 1,2,3) by TAVI students who help with the TAVI care and cure questionnaires. Three students should be able to do this in 2 hours. This can be organized at the cardiology department.

The TAVI planning desk will help with (steps 4 - 8)

- The printing of the letter which is a template where the name needs to be changed and the date of admission to the hospital. This is a step that is already done by the planning desk with the current letter.
- Write the patient's name by hand on the envelope
- Print address label and stick on the outside of the box.
- Close and send the zorgpakket to the patient.

The process journey for the cardiology department is shown in figure 83.

Implementation

A presentation moment will be organized with the TAVI planning desk, secretary, TAVI students, and coordinator to implement both these processes. Here, the goal behind this implementation will be presented to ensure everyone is on board and understands the goal.

Process journey

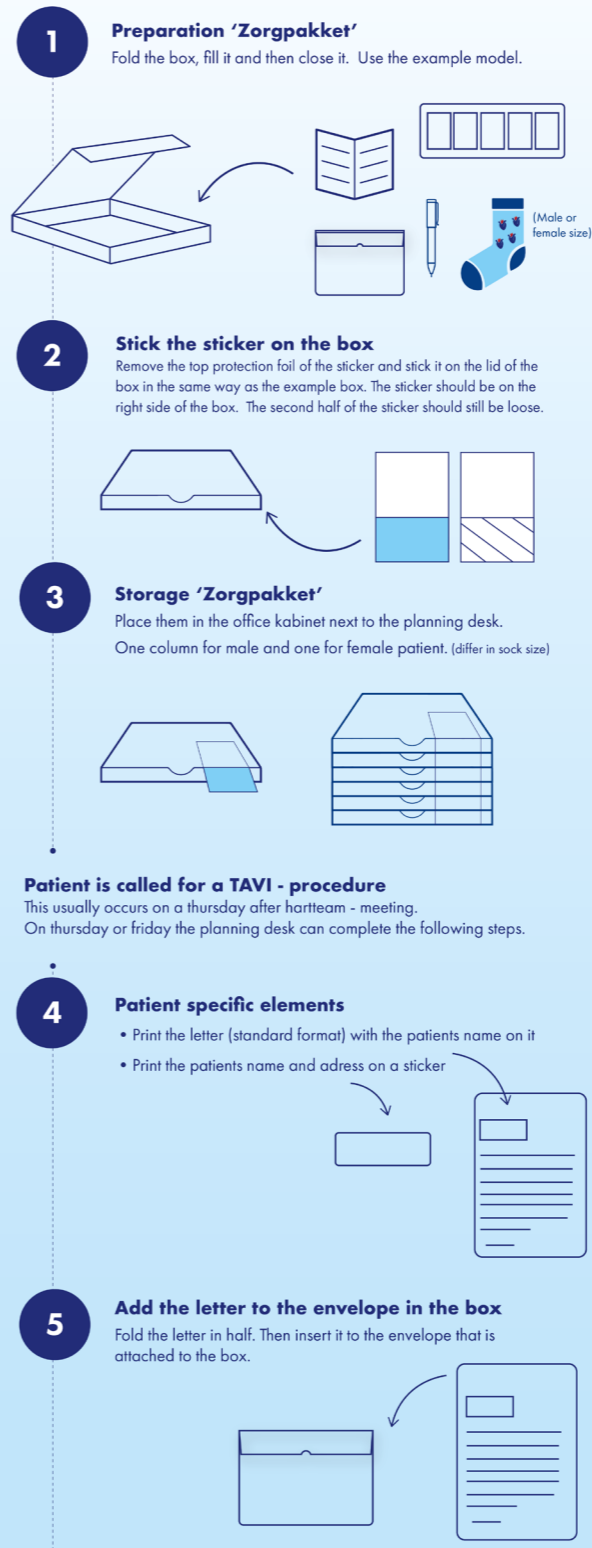


Figure 83: Logistic process zorgpakket

Logistics with the clinical cardiology department

Two moments in the new patient journey apply to the clinical cardiology department where the patients stay during their hospitalization.

1. *Explanation about the patient tablet and the TAVI animation.*
Currently, the nurses explain the function of the tablet to the patients. This will continue, but in addition, they will explain to TAVI patients that they can watch an animation about the procedure. This must be explained early on during the admission to ensure patients have time to watch it and perhaps ask questions about the animation. After the patients are informed, they will have the possibility to watch it whenever they wish.

2. *Information about their 'route' after the procedure.*
An expected route is determined for the patient after the procedure based on various factors. During admission to the hospital, the patient is told what their expected route is (early discharge, back to their referral hospital, or standard stay EMC). At this point, stickers are introduced to add to the patient's Zorgpad. The nurses will have access to a batch of these stickers, and based on the information from the doctors seen in HiX, they give the patient the correct sticker. HiX is the system where healthcare professionals can see patient information.

Implementation

In order to implement this, two presentation moments will be planned with the nurses from the cardiology department. However, it remains difficult to speak to everyone because of the various shifts. Therefore, a poster is printed (figure 84) with the necessary information and placed in the nurses' area.

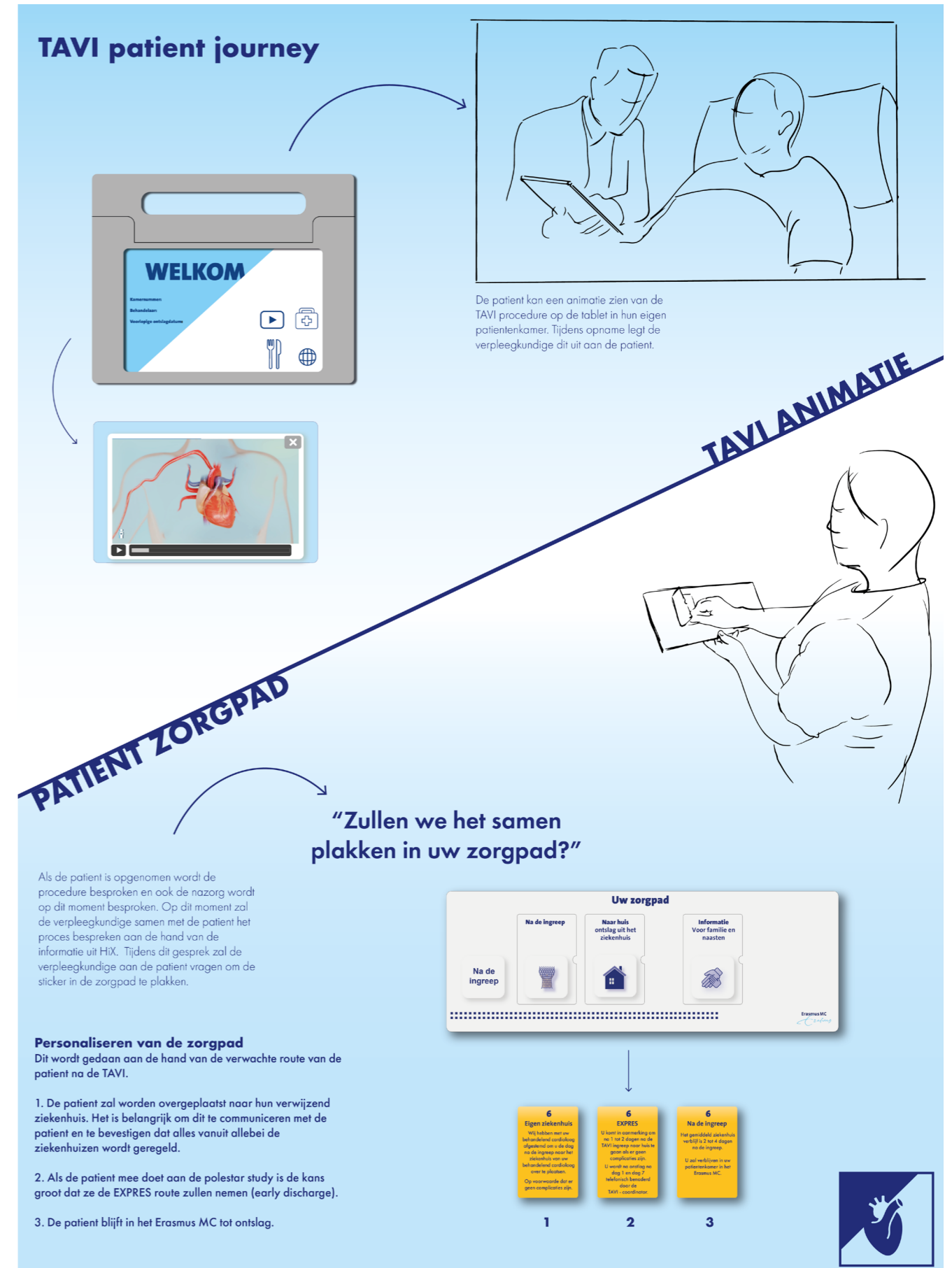


Figure 84: Poster clinical department

Part 08

Conclusion

14.0 CONCLUSIONS AND RECOMMENDATIONS

This chapter reflects on the assignment and design goal and concludes whether the design intervention will solve the problem definition (1.3) and design goal(5.5) Next, the relevance of the project is discussed based on desirability, feasibility and viability.

In addition, some recommendations are presented on how to improve the research and development of this project.

14.1 Conclusion

based on the problem definition and design goal.

This project originated from a problem identified by the doctors in the TAVI patient journey. The problem is that a majority of the TAVI patients were anxious and uninformed prior to the procedure, therefore needing a holistic solution.

Why is this a problem?

High anxiety levels influence patient satisfaction, patient ability to process information, and blood pressure levels.

This problem was used as a starting point for the research and analysis phase.

The extensive research resulted in a detailed overview of the journey a TAVI patient goes through, in terms of touchpoints, context, and stakeholders involved, and most importantly, the emotional effect this has on patients. This led to a deep understanding of the patients and their experience, specifically the pain and success points in the current journey. The pain points were identified by the increase in anxiety levels.

The overall goal was formulated as:

Develop a tool to improve the **patient experience** of TAVI patients by **reducing pre-operative anxiety**.

To tackle the pain points and reduce anxiety levels prior to the procedure, insights from the literature review, inspiration from existing interventions, and ideation phases were converged. Finally, the ideas went through several iteration phases and build-measure-learn loops by integrating the target group in the whole process.

The design intervention is evaluated based on the outcomes of the design phase. The designer reflects on the design proposal and also a user evaluation test is conducted

Does the design proposal meet the design goal?

I want to create a **communication tool** which ensures patients have **trust** in the **procedure and the health care professionals** resulting in the **patient feeling at ease** prior to the TAVI procedure. This new touchpoint in the patient journey provides both **patient and family/caregiver** the necessary information to shape the **right expectations** of the procedure.

- The design is a communication tool that includes different elements and uses different means of communication.
- The design evokes trust in both the procedure and the health care professionals by providing the patient with an empathetic experience and honest and open information.
- The design provides the patient with a warm experience in which they receive the tools to prepare themselves for the procedure and therefore feel at ease.
- The design integrates relatives in the whole patient journey.
- The design provides professional, relevant, easy-to-understand information for the patient to shape the right expectations of the procedure. However, this will need to be fully validated during the large-scale pilot test. The new patient journey ensures that patients have a better understanding of the expectations in terms of the pre and post- TAVI journey.

Does the design proposal meet the wish?

I want the patient to **feel recognized** throughout the continuum of care.



The design includes interventions on different points in the journey. The sum of all these interactions makes the patient feel recognized.

This conclusion has shown that the new patient journey, including the zorgpakket and animation, will improve the experience of TAVI patients. It ensures the patient feels at ease by providing the tools to form the right expectations and increase trust through empathy and professionalism throughout the continuum of care.



Prepares the patient.



Manages the patients and their relatives expectations.



Creates new interactions that lead to trust and recognition throughout the continuum of care.

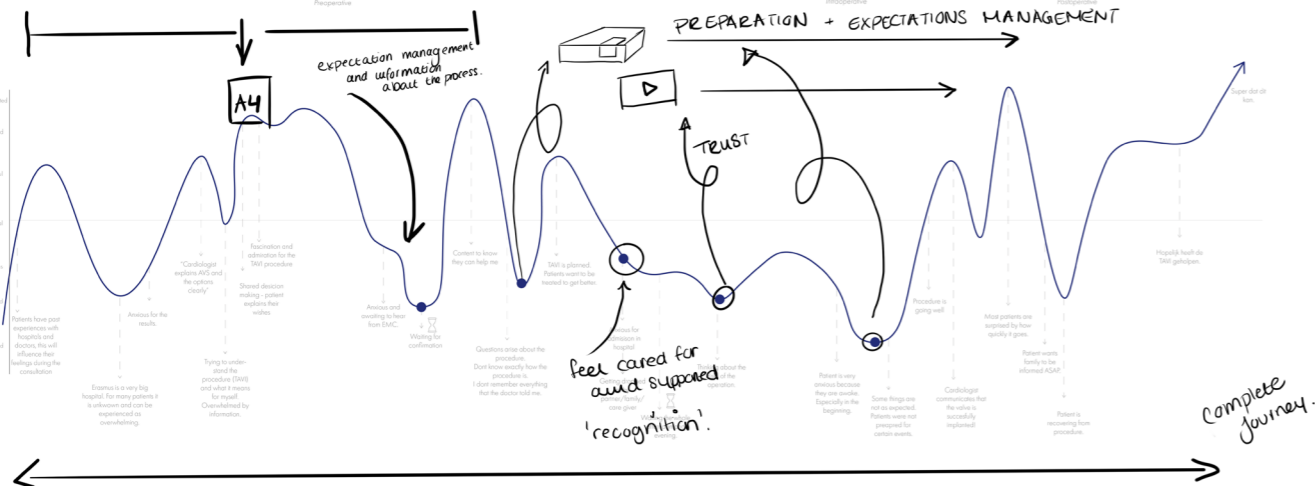
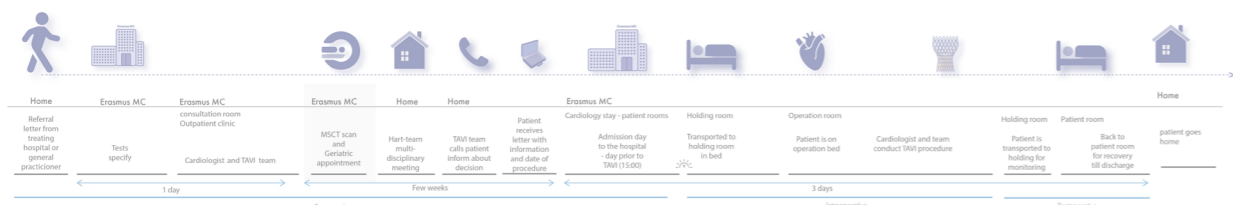
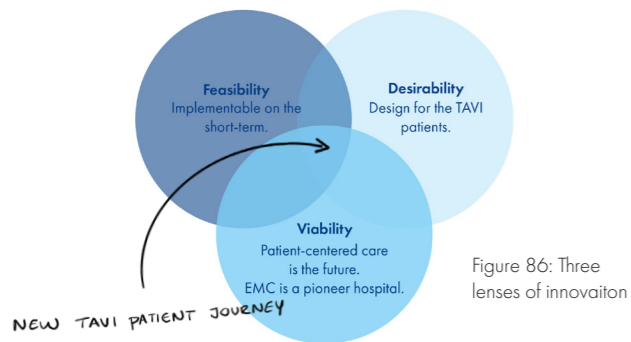


Figure 85: New patient journey and its effect on the experience curve.

14.2 Relevance of project

This sub-chapter describes the project's relevance by reflecting on the desirability, feasibility, and viability from both the patient's and Erasmus' perspectives. The desirability describes whether the design meets the needs of the patient and of Erasmus MC. Next, the feasibility zooms in on whether it can be implemented in relatively a short time. Lastly, the viability analyzes its effect on the long-term and if it will survive for several years. Also, in which form it will survive.



Patient journey From the point of view of the patient

Desirability: Does it address the patient's needs?

The concept was developed based on a structured and insightful research phase, leading to conclusions that helped develop a substantiated and desired concept.

The participants from the pilot test evaluated the intervention in a positive way which can be seen in the conclusion of the iteration phase, where *I feel cared for* and *I feel at ease* scored high. Furthermore, the main conclusions of the evaluation phase show that the concept has a positive effect on the patient en simultaneously provides with the right tools to prepare themselves. In addition, all three TAVI patients whom were interviewed were positive and would have liked to have the zorgpakket during their TAVI journey. Based on these evaluation results the concept is desirable. It also is in line with the design goal (14.1).

Does it address the needs of elderly patients?

Designing for the elderly involves considering different factors. During the research and validation phase there was concluded that patients' technology capabilities largely differ. Due to this, the choice was made to use a combination of non-digital and digital solutions. Concurrently, it stimulates and supports the elderly to watch the animation at home and make use of the digital aspects of the solution.

However, this is still a dynamic project with room for improvement; therefore, the recommendation is made to conduct a large-scale pilot test to optimize the design. The pilot test would take place with real patients experiencing the TAVI journey, which will lead to more in-depth insights.

Feasibility: can it be done?

All the materials needed to produce the zorgpakket are easily accessible, and the design is ready to be produced. This makes the concept highly feasible, as one of the goals was to implement it within 6 months.

In addition, the digital element, which is the animation, is also feasible as it is created using existing technology.

Viability: Will it survive in the long term?

For the greater part, the concept is non-digital, which may seem like a less long-term view.

However, for this target group in 2022, it was crucial to consider that we are in a transition phase regarding adaptability with technology. By adding the animation via a QR code, the patients are stimulated to interact with this digital element and watch the animation at home with relatives. This element will survive in the long term. It remains important for patients to prepare themselves and know what to expect prior to a procedure under local anesthesia.

If changes occur in the procedure, the animation can be updated to ensure it stays in line with developments in the procedure.

Furthermore, the importance of printed information within the medical sector will remain for certain groups of people. This is also seen in the letters from official authorities as they partly remain non-digital. Printed information is important to capture the users' attention but it is also the experience of reading it from paper. (Mangen et al., 2013) Receiving a personal box at home will be an element that will survive several years because of the experience it generates. This cannot easily be replaced by a digital design.

However, it is inevitable to see that the digital transition is underway. The users are also getting used to the technology developments and advantages. Therefore, it is important to join the transition. This will lead to adapting the zorgpakket into digital solutions. This will begin to happen in 5 - 10 years time, as the larger part of the elderly will also be more progressive. The idea behind the new patient journey and its interventions will still be the basis of the design intervention because it is desirable for the patients and the hospital. Perhaps only the medium in which it is communicated will adapt. For example, the timely information divided into phases will be depicted using a phone application or perhaps even message notifications.

Furthermore, the visual communication style during the whole journey will change the way the medical staff looks at the process, especially once its effect on patients is visible. It facilitates interaction and increases the processing of information.

Erasmus MC journey From the point of view of the hospital

Desirability

Erasmus MC has the vision to create a hospital where the patient stands central. Equivalently, the Cardiology department is striving to improve the patients' experience throughout the whole TAVI journey as well as reduce their anxiety to have a higher chance of a successful operation and quicker recovery process. Therefore, based on its effect on the patients, it is also desirable for Erasmus MC and the cardiology department to implement this design. The effect the design intervention has on the patients is among other things because of the professionalism of the Erasmus MC tailored information. For Erasmus MC it is also very desirable to provide the patient with correct and reliable information to avoid patient's forming the wrong expectations based on findings on the internet. As hospitals can approach their TAVI procedures differently.

It is important to present to doctors and nurses the positive effect this has on patients and directly also on them and their work methods. Using the communication flow and the different interventions as a reference point during interactions with patients will help to facilitate the exchange of information between medical professionals and patients.

Overall, patient satisfaction will increase, which is very important for a known thorax center and hospital. This will reflect on the image of the cardiology department.

Feasibility

In order to realize this new patient journey, logistic changes need to apply within the Erasmus journey. After analyzing and observing the processes, it can be concluded that this is feasible (Erasmus MC implementation chapter). It is about shortening the communication routes between stakeholders and making decisions together. This logistic process will need further analysis prior to implementation. Having a direct link between members of the hospital staff reduces the chance of miscommunication. It allows for direct questions and input, increasing the overall efficiency.

Sending out the zorgpakket will reduce the workload in the long term as fewer patients will call with questions about either the planning or the procedure.

The design is financially feasible. It has an added cost per patient in comparison to the current patient journey; however, these costs will be returned in different ways. Namely, shorter stays in the hospital due to lower pre-operative anxiety levels (Yuzkat et al., 2020), higher patient satisfaction (Herrera et al., 2009) and a decrease in complaints and questions.

Viability

The new patient journey is built up of different elements that will all impact patient care positively and serve as a turning point for other departments within the hospital.

The zorgpakket, being a simple solution that is easily feasible but provides a whole new level of patient-centered care. This is mainly because it is developed from the patient's point of view. The socks have a functional use and a positive element of surprise. The function of the socks is applicable in all operative areas as patients more often experience it as a cold room. This idea will survive in the long term and inspire other departments.

Communication via animation is increasingly growing within the medical sector. Applying a tailor-made animation for the Erasmus MC TAVI procedure will be effective for many years to come. Lastly, the communication flow and visual patient journey is an efficient way of integrating the patient to their own journey and making them aware of the phases of their journey. This will make them less of a spectator in their own journey but rather more involved. The patient journey also helps healthcare professionals and patients visualize where they are in their journey and which phases they will still experience. This concept of visualizing information will be a valuable communication tool for the long term, whether it is applied on paper or integrated digitally.

These elements will create a new standard for approaching patient-centered care. It will be an example of how simple yet functional and meaningful solutions will help improve the patient experience.

In the future, the TAVI team has a goal of sending all patients back to their referral hospital after 24 hours. This is to ensure patients are close to their homes and simultaneously there are enough places for new patients at Erasmus MC. When this is applied, the different communication tools will still remain valuable. As Erasmus MC will still be the hospital that performs the procedure on the patient. Therefore, receiving open and honest information directly from the source helps the patient increase trust. It ensures the patient has the right information and prevents patients from relying on information found on the internet.

Does the design proposal guide Erasmus MC towards value-based care?

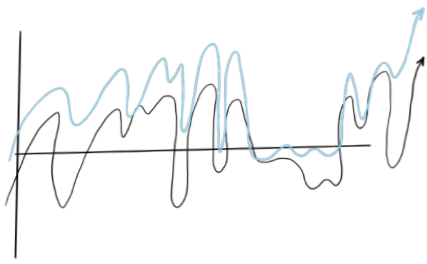
Yes, the research analysis and design proposal has led to a solution which helps Erasmus MC deliver optimal care. Optimal for both the patient and Erasmus MC.

14.3 Recommendations

Recommendations are presented on how to improve the design intervention, the overall patient journey and the design research. The latter is important to consider when further research is done.

Patient experience curve

It is recommended to conduct a large scale pilot test (12.2). Following this evaluation study, the experience curve of a TAVI patient should be plotted again to compare the results with the conclusions from this project.



Living situation of patient

During the TAVI care and cure program, more attention should be based on the socio-demographic characteristics of a patient. A very important element is the home situation of a patient. Especially when they are older, there is a higher chance of the patient being alone. It would be interesting to ask about the living situation and contact with relatives and friends during the baseline appointment. Knowing if a patient is alone, a moment could be created where they can call with someone from the TAVI team to share their thoughts or questions. This would provide an extra element of support.

Patient profiles

Patient profiles are a generalization of the patients. Within these profiles there are several sub groups. Perhaps an interesting sub group is those that do not want any medical information nor emotional support. It would be interesting to further research the TAVI patient profiles.

Using this research the design of the zorgpakket could be made more personal based on the patients necessity.

By adding an element focused on emotional support for the modest patient. For example, a stuffed animal. This would be specific for the modest profile, on the contrary the optimistic would rather have a TAVI video game.

Patient specific

In the letter to the patient, there is a list of medicine that a patient cannot take prior to the procedure. Ideally this is personalized based on the medicine the patient takes to ensure it is relevant for them.

Patient tablet

The tablet in the patient room should be updated in terms of design style. The use of the tablet seems difficult for elderly patients therefore, this should be improved by simplifying the user interface. Furthermore, if in the future more animations are developed for different procedures, this should be embedded into the tablets.

MyErasmus

An improvement to the zorgpakket could be to add a QR code that directs the patient to the MyErasmus page. Here the patient can find information on their medical dossier and their appointments. Many TAVI patients do not use this as often, but integrating it would stimulate them to look on their MyErasmus page.

Package

A recommendation is to look into using a mailbox packaging with a tear strip, as seen in figure 87. This helps the patient to open the package while still being a secure.

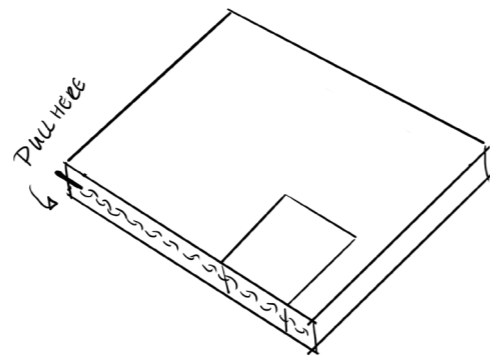


Figure 87: Packaging

Information booklet

Besides having a thorough language check, the booklet should be optimized by adding TAVI specific foto's. Most of the photos have already been taken specifically for this booklet, but some are missing. For example, the cover. The cover should speak to the patient and grasp their attention. A picture of a patient entering Erasmus MC would work well.

Languages

The whole patient journey should be developed in English and perhaps other common languages in the Netherlands. Also, it is important to analyze the design with patients who are visually impaired.

Data Driven

In the future, it would be interesting to use data-driven research as a variable in the research phase. This could lead to correlations between the qualitative research and data findings that could lead to a real-time solution. For example, collecting a large amount of data on the procedure time or the length of stay in the hospital and comparing this to pre-procedure anxiety. If correlations are found, patient-tailored solutions can be applied to prevent any challenges or in contrast, stimulate a positive outcome. This project research involved a small amount of data making it difficult to conclude these correlations. Philips is conducting various data driven studies and are applying AI solutions to improve the experience of the patient and health care professional.

Besides patient experience, data-driven solutions could be applied in the TAVI patient journey to prevent complications after the procedure. For example, Philips developed a health dot to monitor patients at a distance. The patient does not have to connect to an application; the monitor sends the information directly to the hospital every few minutes. In the future, this could be used to send the patient home faster but with a higher sense of security.

Prior to the procedure, this health dot could be applied to facilitate the planning of the TAVI's based on the patient's health condition.

Visuals

Hix is the system in which all patient information is collected. All information is clearly organized however, it is built up of long pieces of text. An icon that is used is the hospital bed; this shows the medical staff whether a patient is still hospitalized. These types of visual communication tools should be used more often. For example, to show where the patient is in the journey. This facilitates reading through all the reports in an easy way.

Adding a direct contact touchpoint

Patients can now write their questions down and are aware they can ask them during the admission to the hospital; however, there could be looked at adding a 'TAVI specific phone number' (similarly to the ABN AMRO, seniors helpline). The goal of the intervention remains to inform the patients well and help them to feel at ease, which results in fewer uncertainties and questions.

Based on this adding a direct contact line is feasible as the number of patients who will use it will lower.

Part 09

Reflection

15.0 Reflection

This chapter includes my reflection on the process of my graduation project and me as a designer.

15.1 Personal reflection

In this reflection, I look back at the start of my graduation project, my role as designer in the healthcare context, stakeholder engagement and my personal learnings from completing this project individually.

Prior to starting my graduation project, I had spent quite some time thinking about what I would like to do as my final project at TU Delft.

Reflecting on my previous project during my studies, I found that I most enjoy using design research and design thinking methods to work on the fuzzy front end of the project but in the end deliver a concept solution. I believe that conducting thorough research on the problem is an essential starting point. I especially enjoy doing this by exploring the context and conducting user studies. While thinking of this, I realized that an area focused on user experience and its effect on the user is inside a hospital, patient experience.

In addition, due to a personal experience, I had noticed the impact the healthcare system has on a patient and the importance of viewing care in a broader sense rather than only focusing on treatments. This also made me realize that a designer can have a valuable role in this sector. Therefore, after speaking to various people, I was delighted to have gotten the opportunity to do my graduation project at Erasmus MC cardiology department.

When I began the project, I was nervous, excited and skeptical all at once. The idea sounded like the challenge I wanted to tackle. However, the medical sector was entirely new for me. Quickly, I noticed that Erasmus MC had a very clear image of the project they wanted me to develop. They had already identified the problem, which was that patients have high anxiety levels, and they had also had already thought of the solution, virtual reality. With the support of my TU Delft supervisors, I was able to begin the kick-off meeting by being very clear that I would first dig deeper into the problem and the reason why the patient is anxious before the procedure before choosing design directions and solutions. While still keeping virtual reality in mind as an option. I made sure to communicate clearly at every meeting to ensure the stakeholder was aware of my thoughts and design process.

During the kick-off meeting, I realized that this would become a very interesting and dynamic project. It was the convergence between two distinct work sectors, and thanks to all my four supervisors, I was supported in both the medical area and the design aspects.

Since this was my first encounter with a project in the health care sector, I had to explore my role as a designer. Sometimes this was challenging as medical professionals did not always understand the way designers approach problems. While at the same time, they were positively surprised by the creative and new perspective I had and the skill to communicate and visualize things.

Doing this project at Erasmus, I learned to understand the strength of a designer, being a problem solver. Eager to learn about the current patient experience and the hospital's process journey, I asked many questions and kept my eyes and ears open at all times. At this point, I realized the skill a designer has to collect a lot of varied information and synthesize it to the core problem. Then, more importantly, taking this problem and converting it into a design opportunity. Using the methods and tools, I learned during my studies together with the highly involved stakeholders helped me create a feasible, desirable, and viable design for Erasmus.

I was nervous to begin my project because I thought I already needed to know everything before starting. Luckily, I quickly noticed that the most important part is learning and applying these learnings. By following an online MOOC course on patient journey mapping, I created a basis for my design research phase and developed a reliable patient journey map of TAVI patients. I also had never organized a creative session before, so I decided to organize one with my fellow design students. This made me go out of my comfort zone while still being in a safe place where I could get direct input from fellow students. After this session, I organized another session with technical medicine students; this was very different but also very insightful. I find it a very fun challenge to guide non-designers in thinking freely and outside of the box.

During my project, I struggled with presenting my ideas early on in the process (when they were not finished yet), especially at Erasmus MC. In contrary to easily showing sketches and rough prototypes to my IDE supervisors. I noticed that it was harder for me to convey my message to Erasmus stakeholders. Perhaps, also because I was scared. Once I began testing and iterating different design elements, I noticed how insightful it is to receive feedback on something which is still being developed. This was when I began to show my sketches and prototypes more openly, which directly led to new inspiration. After the multiple user tests I conducted and all the input I received, I realized how important it is to test and share ideas. Designing is not something you do on your own. This is something which I will take with me for my next projects.

One of my key personal learnings of this graduation project has been Communication and how important it is. Communication with all the stakeholders involved in this project, with the patients I interviewed, elderly participants I tested with, and the animation company who were involved from a later stage of my project. Communication is also a core theme in my end result, but it is also very important in my project. I learned about how to communicate to different stakeholders as well as how to listen to others' feedback.

Overall reflection

This graduation project has helped me to discover what I like doing, what I am good at, and what I find challenging. I like researching complex problems, creating ideas, iterating and visualizing my findings. This whole process was very enjoyable and taught me more than I could have ever imagined.

I hope that my graduation project has created added value for both the patient and the health care sector by developing an innovative yet simple solution.

I am very grateful for this opportunity. I have been challenged by my supervisors and also received a lot of appreciation which has motivated me throughout the whole process. I am proud and happy with the whole journey, the coaching I received, and the end result.



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Image references:

Photos taken from the audiovisual team of the cardiology department and from the Erasmus MC beeldbank.

