BACHELOR THESIS

USER REQUIREMENTS OF PHYSIOTHERAPISTS OF A TELEHEALTH SERVICE FOR PATIENTS WITH MOVEMENT DISORDERS: AN EXPLORATORY STUDY

Maximilian Perez Mengual

s0134775

FACULTY OF BEHAVIOURAL SCIENCES

PSYCHOLOGY

1st Supervisor: Dr. C. Bode

2nd Supervisor: Dr. C.H.C Drossaert

External supervisor: E. Moekotte Msc.

August 2012

Summary

Background: Telehealth, the use of communication technologies within the context of clinical health care has the possibility to substantially transform health care to match the demands of a demographically changing society. Although the positive effects of telehealth have been supported by numerous studies, few telehealth applications have been implemented so far. This is partially due to the technically focused approach when developing these applications. To maximize the effectiveness of telehealth services a user-centered approach is needed to tailor them to the specific demands of the end-user.

Aim: This qualitative study was conducted to acquire insight on the user requirement of physiotherapists regarding a web-based remote monitoring and feedback service, consisting of three modules closely connected with the rehabilitation of patients with movement disorders.

Method: A total of seven research questions serve two purposes. Five research questions were posed to capture the preferences of physiotherapists regarding the parameters needed to be monitored, the time when they shall be monitored and which technologies they would want to use for this purpose. Further the participants were asked how, and how frequent they would want to provide feedback to their patients. Two of the research questions were formulated according to constructs derived from the technology acceptance model (Davis, 1989), examining how intention to use is influenced. To answer these research questions a total of sixteen semi-structured interviews were conducted, transcribed and analyzed. Five participants were recruited at rehabilitation centre in Groot Klimmendaal. The other eleven were recruited at primary care offices in Venendaal (five participants) and Rheine (six participants).

Results: Results showed that none of the participants believed that the service could actually replace personal meetings, but that the application of videoconferencing as a medium for feedback could be an valuable asset. Physiological variables, information on daily activities and patient´s experiences were regarded valuable information to be used for enhancing and adjusting the treatment. Activity monitors and self-report questionnaires as well as diaries were the preferred methods to acquire these information. For the provision of feedback, most respondents preferred a fixed weekly evaluation moment.

The majority of the respondents reported that they perceive a web-based remote monitoring and feedback service useful, but that its actual application is heavily dependent on the patient´s condition. Regardless of that, most respondents found the possibility to create and share electronic patient dossiers to coordinate the treatment with other healthcare professionals very promising.

Conclusion: Most physiotherapists participating in this study perceived a telehealth service as a useful addition to traditional therapy. Especially for the current generation which is proficient in the use of computer technologies, telehealth services could be an valuable addition. However, most of the respondents lack confidence in current information technologies and cooperation from the patients´ side is mandatory to make telehealth systems work. Also, in order to implement these systems on a societal level, their benefits, such as cost effectiveness, need to be recognized by the authorities and insurance companies.

Table of contents

1. Introduction

1.1 Background information

European healthcare systems are currently experiencing major pressure from the changing society. Changing demographics, a growing prevalence of chronic diseases, shortages of healthcare personnel and increasing demand from patients are challenging issues to be dealt with and raise fundamental questions on how to achieve a sustainable healthcare system (UCL policy briefing, 2012). Telehealth, an umbrella term for several applications of medical care, treatment and medical education carried out from a distance, poses a possible solution to these challenges. Telehealth aims at easing the access to medical services making use of extant information technologies such as videoconferencing and web based diagnostic and feedback methods. In the beginning, telehealth was referred to as telemedicine, as it was more focused on the curative aspect. Today, the term also incorporates preventative and promotive aspects and represents "*a wide range of variables including clinical application, promotive characteristics of the information being transmitted, temporal relationships of data transfer and the organizational context"* (Hebert, 2001). Telehealth services can have positive impact on an individual´s health status. A meta-analysis of literature conducted by Clark (2007) showed that remote monitoring (telehealth) programs reduced the rates of hospital admission for chronic heart failure patients by 21% and all causes mortality by 20%. Although many studies have demonstrated the effectiveness of telehealth services, literature and research on the end-user requirements of healthcare professionals is scarce.

Gagnon et al. (2006) conducted research assessing the perceptions of physicians and managers on telemedicine. Results revealed that the respondents believed telemedicine to have the potential to facilitate access to and availability of services in remote regions that would be otherwise difficult to provide. Telemedicine was also perceived useful to the extent that follow up examinations could be conducted without the need for the patient to travel, thereby increasing patient comfort and lowering expenditures. At the professional level, telemedicine is believed to ease communication among professionals and produce significant savings for the health care system (Gagnon et al., 2006). Still, according to the ICT Report on the diffusion of telehealth services in Europe (2010), tele-monitoring services are not used in the Netherlands yet. The existing telehealth applications mainly serve the purpose of facilitating the communication

between professionals but not patient-professional interaction (ICT report, 2010). However, there are a number of trials and pilot studies conducted at the moment, testing the monitoring of patients in their homes. Bosch healthcare is currently performing trials with their "Health Buddy" system which not only monitors signs and symptoms but also promotes self-care and provides guidelines for healthier living (Kühne et al., 2009).

With the effectiveness of telehealth services demonstrated, end-user acceptance implied and system trials running, it becomes apparent that in order to make the systems currently at trial more effective and simple to use, the user needs and requirements need to be incorporated in the development process. According to Esser & Goossens (2009) a more user-centered approach is missing in the development of telehealth services. With the market for telehealth services growing it becomes increasingly important to develop a perception what the requirements of users are and how they influence usage intention and motivation.

1.2 Relevance of this research

This exploratory study was conducted as part of the research currently performed at the Roessingh Research and Development on the user requirements of patients and professionals of a telehealth service for patients with movement disorders. Goal of that study is to design scenario's from the patient point of view and from the professionals' point of view that describe the preferences of patients and professionals regarding the content, easiness of use, and output of a web based remote monitoring & feedback service. These scenarios shall be taken into account in the development of upcoming telehealth services which shall match the individual needs of patients and professionals.

As part of the above described study, goal of this specific research is to assess the user requirements of physiotherapists regarding a web based remote monitoring and feedback service. Taking the preferences of physiotherapists into account during the development can result in a system that is simple to use and fulfill the specific demands of this occupational field.

2. Theoretical Framework

The application of telehealth services in the occupational field associated with the rehabilitation of patients is called telerehabilitation. Rehabilitation services have become increasingly important to support the ageing population and help people suffering from treatment aftermaths, illness related disability or chronic conditions. This study shall not only assess the requirements and preferences of physiotherapists regarding remote monitoring and feedback, but shall also focus on their opinions regarding three different modules associated with telehealth. The first module, *web based exercising* shall focuses on exercising at home. The second and third module shall focus on the aspects of *lifestyle management* and *health monitoring* which also are closely connected with rehabilitation. In the following sections, the essential terms monitoring and feedback as well as the three different modules shall be introduced and a brief definition shall be given.

2.1 Monitoring

According to Westwood (2003) the main application of telerehabilitation, the delivery of rehabilitation services over telecommunication networks, is to make use of a two-way teleconferencing structure, which enables the communication between several instances of the health care system and the patient. However, these systems only enable the parties involved to communicate with each other, what makes the information obtained quite limited (Westwood 2003). The possibility to acquire patient specific data would be a great improvement as it would provide the remote therapist with a continuous stream of information on the patients performance, statistics and history (Westwood, 2003). The term monitoring therefore refers to providing information about location and physiological status of an individual. By monitoring physiological variables it is possible for therapists to adjust the treatment or withdraw a patient from an exercise if body functions exceed a certain limit or if the exercise is done falsely, to prevent harm. Furthermore, an additional object of remote monitoring is to gather data on the patients health status that assists in or regulates the administration of medication and/or other treatments. Research conducted by Alwan (2006) examined the psychosocial impacts of monitoring technology in assisted living and found that older adult participants largely accepted monitoring.

2.2 Feedback

In the context of telehealth and telerehabilitation the term feedback refers to the exchange of information between the patient and the therapist or an automated system. Data gathered from monitoring the patients physiological health, e.g. blood pressure or heartbeat, is analyzed and appropriate feedback is given to aid the patient in maintaining or enhancing their physiological health. This mostly happens through the assessment of the gathered data by a therapist who in turn gives feedback to the patient in form of an advice or suggestion for future behaviour. With new technological possibilities emerging, feedback does not necessarily have to be given by the therapist but also can be provided by an automated system. Ghasemi (2011) proposes a system to be implemented in physiotherapist offices which would reduce the interaction between patient and therapist while still providing support equal to the treatment. This system consists of two parts. A so called Central Intelligent System (CIS) installed at the physiotherapists office, which on the one hand reports already analyzed data, gathered by sensors installed at the patients home, to the therapist and on the other hand includes a database to automatically adjust the treatment of the patient. The second part consists of a robotic device used to execute the rehabilitation exercises and a wireless sensor network as well as an motion analysis module to gather data on the patients movements (Ghasemi, 2011). Feedback thus refers to the way how therapists or automated systems give information and counsel to the patient.

2.3 Web based exercising

In the rehabilitation process, exercising daily plays a crucial role when recovering from a injury or disease. Depending on the injury or disease numerous physical therapy exercises can be applied. Stretching and strengthening activities are rather applied in the rehabilitation of patients with orthopedic diseases while balance, joint control and muscle re-training is mostly applied for those with neurological diseases or those suffering from a stroke. Research conducted by Thomas et. al. (2002) examining whether regularly applied home exercise can improve outcomes in patients with knee pain showed that simple home based exercises can provide significant reductions in knee pain over two years. However, patients undergoing such a treatment need to adhere to it regularly. This need for adherence can be a motivational inhibitor if progress is made slowly. Telerehabilitation can solve this problem by providing guidelines, to which the patient can stick to, as well as an overview over the effort made so far. Merians et al. (2005) researched

the outcomes of an virtual reality program for hand rehabilitation, similar to telerehabilitation, in stroke patients. The program allowed therapists to monitor the patients advancements and adjust the therapy. Each subject showed significant improvement of their movement parameters. These results are indicative of the potential impact telerehabilitation holds.

2.4 Lifestyle management

Further, rehabilitation is closely connected with maintaining a healthy and active lifestyle. According to Kurth (2006), healthy lifestyle consisting of non-smoking, moderate alcohol consumption, exercising regularly and a healthy diet greatly reduces the risk of a stroke. A study conducted by Wallace (1987) with similar results also indicated that patients are concerned about their lifestyle and that counseling from health care professionals would be welcome. Telemedicine applications could grasp here by providing means to monitor and guide healthy behavior. In this research the aspect of lifestyle management is divided into three categories. The first aspect, active lifestyle, is associated with a certain amount of body motion such as daily activities as wandering or cycling. Second, a healthy diet can facilitate health.

2.5 Health Monitoring

With the worldwide deployment of wireless networks, the mobile infrastructure becomes increasingly capable of supporting existing and emerging telehealth applications. Advances in sensors and microelectronics provide promising solutions for ubiquitous health monitoring. Small sensors are already capable of creating a wireless body area network which can be used to monitor vital signs of patients and give the data gathered back to the patient and medical personnel (Otto et al., 2005). These data can be used by the therapist to adjust the treatment to the patient´s specific demands. However, these technological advances do not only allow a more precise treatment, but also to some degree its automation. According to Varshney (2007) the vision of "pervasive healthcare" does not only include health monitoring, but also intelligent emergency management systems, health-care data access and mobile telemedicine. Thus, with access to a patients history and electronic dossier, telemedicine applications could be able to deploy certain measures, such as adjusting the dose of medication.

2.6 Technology Acceptance Model

The technology acceptance model (TAM) is one of the most notable theories which can be used to predict and explain user´s reaction and acceptance towards information technology. The TAM was introduced by Davis (1989) and is rooted in the behavioral sciences. It is based on the theory of reasoned action (TRA) by Fishbein & Ajzen (1975) which is a model for the prediction of behavioral intention in general. In contrast to the TRA, the TAM focuses not on general behavioral intention, but on the voluntary acceptance of information technology. In his research, Davis (1989) found, that attitude towards using is influenced by perceived usefulness and perceived ease of use. Perceived usefulness also has direct influence on the behavioral intention to use. The TAM served as a basis for continuous studies and expansions. Further development resulted in one of the TAM´s major upgrades, the unified theory of acceptance and use of technology (UTAUT, Venkatesh et al., 2003). The UTAUT model (Venkatesh et al., 2003) is comprised of eight models in total, thereby increasing its predictability of technology acceptance. However, the complexity and the quantity of constructs and variables involved in the UTAUT model do exceed the scope of this study and therefore it is not applied. The constructs perceived usefulness and perceived ease of use are of great value for research on telerehabilitation. A system that neither fulfills the specific demands of physiotherapists nor is easy to use will most likely not be accepted.

2.7 Problem statement

This study serves two purposes. First, in order to develop a web-based remote monitoring and feedback service the user needs of professionals, in this case physiotherapists, need to be explored and documented. Thus, how exactly do physiotherapists want to monitor their patients, which technologies they would want to use for this purpose, and how often they would want to receive information on the patient´s status and give feedback. Due to the exploratory nature of these questions, no model or theory will be applied as the purpose of this study is to investigate and not to explain these preferences. Second, it needs to be explored how useful and easy to use such a system would appear to them. According to the technology acceptance model (Davis, 1989) the variables perceived easiness of use and perceived usefulness do account for usage intention and actual use.

2.8 Research Questions

For each of the three modules, web based exercising, lifestyle management, and health monitoring the following research questions shall be applied.

RQ 1: How useful do physiotherapists perceive a web-based remote monitoring and feedback service?

RQ 2: How easy to use does a web-based remote monitoring and feedback service appear to physiotherapists?

RQ 3: Which parameters need to be monitored according to physiotherapists?

RQ 4: When do physiotherapists want to monitor their patients?

RQ 5: Which technologies do physiotherapists want to use to monitor their patients?

RQ 6: How do physiotherapists want to give feedback to their patients?

RQ 7: How frequent do physiotherapists want to give feedback to their patients?

3. Methodological approach

In order to explore the user requirements of professionals, in this case physiotherapists, regarding a web based remote monitoring and feedback service an exploratory, qualitative study was conducted. The following section will focus on the methodology of the research an explain why a qualitative approach was chosen and how it was carried out in this study.

3.1 Purpose

Traditionally rooted in the social sciences, qualitative research tries to gather in-depth understanding of human behavior as well as the underlying reasons influencing such behavior. Being explorative and descriptive of nature, qualitative research does not try to prove propositions right or wrong by seeking empirical support. Instead, qualitative research collects evidence and produces findings that are not determined in advance. Therefore a smaller sample than in quantitative research is required.

Since little research has been conducted yet on the requirements of professionals regarding a web based remote monitoring and feedback service, qualitative research is particularly suited to provide insight in the factors contributing to the needs of professionals regarding a web-based remote monitoring and feedback application.

3.2 Sampling

In this qualitative research purposive sampling was used. Purposive sampling, which is one of the most common sampling methods, groups participants around predefined criteria which are relevant to a particular research question (Mack,2005). The sizes of these samples may vary depending on the resources and time available as well as the study´s goals. Mostly the sample sizes are determined by theoretical saturation which is the point at which new data does no longer bring additional insights and understanding to the initial research question (Mack, 2005). Numerous factors determine the sample size in qualitative research but exact guidelines on when saturation is reached are scarce. Guest, Bunce and Johnson (2006) state that "*although the idea of saturation is helpful at the conceptual level, it provides little practical guidance for estimating sample sizes for robust research prior to data collection*".

According to Bertaux (1981), fifteen is the smallest acceptable sample for all qualitative research. Since this study focuses on a specific occupational field and does not take ethnic, gender or age differences into account, Bertaux' (1981) guideline shall be used.

Further, to obtain a sample relevant for this research a number of criteria were set up to screen potential participants. These criteria were that professionals had to be dealing with patients suffering from postural and movement disorders and that these had to be chronic of nature. The range of age was set between 18 and 65 years.

3.3 Participants

The participants were recruited through the RRD (Roessingh Research and Development) in Enschede. Interviews with physiotherapists were conducted at the RMC (Revalidatie Medisch Centrum) Groot Klimmendaal, at a primary care office in Venendaal, and at the Rehaprax, a primary care office, in Rheine.

The actual recruitment of physiotherapists took place via contact persons, community members or superiors with a position of official authority. After consultation these contact persons identified and recruited potential participants. The sample consisted of a total of sixteen participants, ten of Dutch nationality (62,5%) and six of German nationality (37,5%). Five of the Dutch participants were employed at the rehabilitation centre in Groot Klimmendaal (31,25%) while the other five, as well as the six German participants, were working in primary care (68,75%).

Table 1: Demographic information on the respondents

Respondent	**Gender**	**Age**	**Educational degree**	**Nationality**	**Rehabilitation centre/ Physiotherapists office**
1	Female	28	WO	Dutch	Rehabilitation centre
2	Female	29	HBO	Dutch	Rehabilitation centre
3	Female	31	HBO	Dutch	Rehabilitation centre
4	Male	37	HBO	Dutch	Rehabilitation centre
5	Female	54	HBO	Dutch	Rehabilitation centre
6	Male	25	WO	Dutch	Primary care

7	Male	28	WO	Dutch	Primary care
8	Female	25	HBO	Dutch	Primary care
9	Female	33	HBO Master	Dutch	Primary care
10	Male	46	WO	Dutch	Primary care
11	Female	23	Examen	German	Primary care
12	Male	23	Examen	German	Primary care
13	Female	28	Examen	German	Primary care
14	Female	24	Examen	German	Primary care
15	Male	49	Examen	German	Primary care
16	Female	31	Examen	German	Primary care

3.4 Materials & Data Collection

Semi-structured interviews with open-ended questions were used to acquire the data. According to DiCicco-Bloom (2006), semi-structured are particularly suited for qualitative and explorative research as they provide detailed in-depth information for a particular topic. Three different mock-ups, one for each module (web based exercising, lifestyle management, health monitoring), were used to support and guide the interviews (Figure 1 shows the mock-up used for the first module). The mock ups showed images of examples of a web based service to give the participants an idea of how such a system would work. The design and composition of the mock-ups matched the structure of the interviews. Each image was described briefly before asking the participant the matching question. Prior to each interview a short introduction to the topic was given to make sure that the participants were able to follow. The scheme for the first ten interviews consisted of three pages, one for each module (Appendix B). For the last six interviews some questions were slightly adjusted to obtain more relevant information (Appendix C). The questions asked were related to the mock-ups and similar across each module. The first module, web-based exercising (Appendix D), assessed whether a professional would use a telerehabilitation service and which and in what way parameters, such as feedback and face-to-face contact, were deemed important and in what way they want to see them implemented in a web-based telerehabilitation system. The second module was settled in the context of lifestyle management (Appendix E). Professionals were asked whether they regard a patients healthy

lifestyle as supportive for a therapy and whether this aspect should be part of the web-portal. The third module, health monitoring (Appendix F), asked the professionals opinion on modern health monitoring methods. An informed consent form was obtained from each participant.

Figure 1: Mock-up 1 (Web-based practicing)

3.5 Data Analysis

To analyze the data the semi-structured interviews were transcribed. An interpretive technique named coding was used. Trough coding it is possible to organize and interpret rich data such as interview transcripts. Coding requires the researcher to read the data and mark passages and phrases within it. Each marked phrase, describing the opinions and preferences of physiotherapists regarding a web based remote monitoring and feedback service, was labeled with a code, a word used to group common concepts recurring in these phrases. First, the coding process was determined by the research questions, which were formulated according to the UTAUT model (Venkatesh, et al., 2003). The UTAUT model however proved to be too complex for the analysis of the data gathered from the interviews. A more inductive approach was chosen what led to a reformulation of the research questions, making them more exploratory of nature. Instead of the UTAUT model, the TAM model (Davis,1989) was applied. The selected interview fragments were related to the structure of the interview which explored the preferences of the respondents regarding a telehealth service. The research questions and therefore the code scheme can be grouped into three main groups. The first two research questions (RQ 1, 2) are related to the technology acceptance model (Davis, 1989) exploring the intention to use a telehealth system. The following three research questions (RQ 3, 4, 5) examined the preferences regarding the parameters which need to be monitored, at what time they need to be monitored and which technologies should be used to monitor these. The last two research questions (RQ 6, 7) examined the preferences of physiotherapists regarding how and when they would want to provide feedback to their patients. For each of the three modules, the common concepts found in the transcripts were compared to each other by reviewing their similarities and differences and were reduced into several core concepts which describe the preferences of the respondents regarding each research question. The core concepts describing the preferences shall be presented in the following results section. Tables 2, 3 and 4 provide an overview over the findings for each of the three modules. For the coding process, a qualitative data analysis software, Atlas ti, was used.

The research team consisted of three researchers, one supervising researcher and two students. The first five interviews were conducted by the supervising researcher and the remaining eleven by the students. Transcription an coding was done by the students. Consensus

about the coding system was reached by discussing them in meetings with the supervising researcher.

4. Results

This section will present the findings of the research. Sequential arrangement of the findings was made according to the order of the research questions and the modules of the system, web-based exercising, lifestyle management and health monitoring. The second research question (" *How easy to use does a web-based remote monitoring and feedback service appear to professionals")* was not assessed in the sections on lifestyle management and health monitoring as it is assumed that the easiness to use them is no different than in the first module, web-based exercising.

4.1Web based exercising

In this section the results on the first module, web based exercising, shall be presented. Table 2 provides an overview over the opinions of the physiotherapists interviewed on the web based exercising module which focuses on exercises conducted at home.

Table 2: Overview over the results (Web based exercising)

How useful to physiotherapists perceive a web-based remote monitoring and feedback service?	• Most of the respondents found the system useful • Dependent on the patient´s acceptance of such a system • Enable the patients to train more efficiently at home
How easy to use does a web-based remote monitoring and feedback service appear to physiotherapists?	• Stationary computer insufficient • Handheld devices (Smartphones and Tablet PC´s) acceptable • Users need to be experienced with computers
Which parameters need to be monitored according to physiotherapists?	• Physiological variables (heartbeat, blood pressure) • The correct execution of the exercise

	• Patient´s performance over a period of time • Patients experiences with the prescribed exercises
When do physiotherapists want to monitor their patients?	• Dependent on the patient´s condition • Preliminary lead time of approx. 2-6 weeks necessary
Which technologies do physiotherapists want to use to monitor their patients?	• Monitoring technology no replacement for face-to-face contact • Activity monitor/pedometer • Online questionnaires
How do physiotherapists want to give feedback to their patients?	• Videoconferencing • Week schedules for exercises
How frequent do physiotherapists want to give feedback to their patients?	• Dependent on the patient´s condition/cognitive capabilities/motivation • Fixed weekly evaluation moment

4.1.1 How useful do physiotherapists perceive a web-based remote monitoring and feedback service?

Most of the physiotherapists interviewed had a positive opinion on the usability of a telerehabilitation service. Asked about the perceived advantages and disadvantages of a telerehabilitation service, most respondents named flexible training schedules and increased efficiency when practicing at home. Most respondents said that the requirement was that patients had to be able to practice at home and that they need to be instructed about new exercises in person.

> *"Yes, certainly, as I do see the value in that. Certainly because now there is a bit of a tendency towards more treatment at home for example. It is of course quite expensive to continuous travel between here and home.[...] And maybe just through videoconferencing you can point out what you mean, I see sure value in this. So that people can exercise in their own environment." (Respondent 4)*

4.1.2 How easy to use does a web-based remote monitoring and feedback service appear to physiotherapists?

Regarding the actual use and user friendliness, more than half of the respondents found the stationary nature of a computer based system insufficient. An issue raised by the respondents was that several exercises involved moving and that constantly adjusting the monitor would be exhaustive. Several respondents mentioned that the device should be of mobile nature, such as an IPhone, to ease the access to the system and eliminate the necessity to log on to a stationary computer.

> *"[…] But it should be something to carry around instead of having to log onto a computer first. That just doesn't come in handy because it takes too much time, you are not going to do that. […] If I want to look up the daily news for example I will just look at my IPhone." (Respondent 6)*

> *"If it has a simple structure, a simple design, then yes. It should not be complicated. It has to be intuitive, like Apple, practical, intuitive menu guidance. It would work then. If it gets more complicated, it gets difficult [...] So this must really be an intuitive system [...] so that you don´t have to read a manual of 50 pages. That would not work." (Respondent 15)*

Most of the respondents agreed that computer experience was a important precondition for the application of such a system. According to them, patient motivation would be highest if they were proficient in the use of computers.

> *"Well ,it should, a computer should be an ordinary everyday thing for them. If they still have to learn how to use computers to go or how to start up a program..." (Respondent 3)*

4.1.3 Which parameters need to be monitored according to physiotherapists?

When asked which parameters/information they would want to receive from the patients most respondents agreed that they would want to receive physiological data such as blood pressure and heartbeat, but also whether the exercise was performed correctly. The majority of the respondents also would want to receive reports from the patients informing them how they feel after performing the prescribed exercises. Several respondents also would like to receive a summary of the patients´ performance over a given time.

Performance on/ experience with exercises

"That depends on the patient, if you have a patient with heart attack,[...] the heart, circulatory system, that is, blood pressure, heart rate, are the most important indicators of heart attack in a patient. [...] I want to see these indicators. With locomotor disorders,[...] I want to see what exercises he does, and how he does it. Controlling, or remote monitoring, when he performs the exercise and how often he performs it. So there you have to watch out, what kind of patient you have patient. With hemiplegic patients, it is something completely different. With stroke patients who cannot move the arm, you don´t want to know execution, how he moves it, but whether he moves it at all?" (Respondent 15)

Well I would like to know what someone does on a day about what someone does. Because you can observe the peaks moments. If someone complains about fatigue[...] then you can use the Activity Monitor to read [...] your peak time is mornings only, and you should spread (the exercises) some more (over the day). "(Respondent 9)

4.1.4 When do physiotherapists want to monitor patients?

Asked when to start using the a telerehabilitation system a common opinion was that, dependent on the patients abilities, a preliminary lead time of two to six weeks should be appropriate for starting with the web based exercising module. Further, most respondents reported that the patient should be monitored by the system itself and that the relevant data should be submitted to the therapist, who then should be able to review it at a later stage.

"Yes, I definitely think the first contacts are needed to build up a relation, some trust, I think that this is very important." (Respondent 4)

"[...] they get a observation period and then we start. So then we can see, after having identified the patients (symptoms), we know what we want to offer him to do at home and what we want him to do here (rehabilitation centre). And then start. So after about six weeks, four to six." (Respondent 2)

4.1.5 Which technologies do physiotherapists want to use to monitor their patients?

Although most of the respondents believed that using a telerehabilitation service could decrease the need for frequent visits, none of them believed that it could be an actual replacement of regular face-to-face contact. Nearly all of the respondents agreed that they would want to see the patient at least once per week. Checking on whether the exercises were done correctly and maintaining a personal relationship with the patient were the common reasons for that. Nearly all respondents agreed that an activity monitor, in form of wearable sensors, or pedometer could provide good information on the patients´ activity level. Some were skeptic whether these sensor networks could actually provide a good overview over the patient´s activity level and whether wearing those would evoke the feeling of being constantly monitored in the patients.

"Yes I'm very much into face-to-face contact, that someone sees me back. But it can also imagine that if the distance, yes, if people live far away [...] that perhaps you see them less frequent physically." (Respondent 1)

4.1.6 How do physiotherapists want to give feedback to their patients?

Regarding the contact between therapist and patient most respondents believed that videoconferencing would be the most information rich medium to use. One respondent found the quality of a videochat via webcams not sufficient. Half of the respondents also believed a chat system to be a viable way.

"I think an image (videoconferencing) can be very meaningful. E-mail or things like that, remain to superficialities and I think that if you want to measure something specific like a certain movement you need to see it. " (Respondent 9)

Regarding the feedback the patient would receive from the therapist or the system itself, half of the respondents found week schedules to be appropriate to give the patients some overview and structure the exercise program.

"Oh yes the week schedules. I think people should have something tangible, so this already is tangible, or visible" (Respondent 3)

"Well of course what we already do in particular in the field of occupational therapy is measuring activities. As people go into the weekend, weekend activities ,they just have to fill in what they have done. So basically the same idea. That insight into being active and inactive, is very good. And you can also just a fit it to your therapy. So I think that may be very useful." (Respondent 4)

When asked about their opinion on automated feedback from the system itself most of the respondents found it appropriate for basic exercises and activities which could be easily monitored by measuring blood pressure, heartbeat or repetitions of exercises, but were sceptic on more complicated issues. Exercises which had to do with relaxation were deemed to be difficult to monitor.

"[...] you could indeed measure strength exercises by meter reading […] but so many exercises do not deal with strength but just with relaxation[...] If it is something marginal, it can give out the little tips. But if there still are problems someone should look into it further. That link, that line should be there are actually." (Respondent 3)

4.1.7 How frequent do physiotherapists want to give feedback to their patients?

Opinions on the frequency of feedback moments were differed among the respondents. According to the majority, exercise related evaluation moments should at least happen twice a week, but found this topic to be dependent entirely on the individual. While those respondents

who were working mainly with stroke patients reported that cognitive capabilities play a great role, those therapists who were working with orthopedic patients agreed that patient motivation is the main factor. Patients who are active by nature would need less attention and feedback, than those who are less disciplined.

> *"I think if you talk about it once or twice a week in an evaluation moment, that would be fine" (Respondent 1)*

> *"I guess that also depends on the issues. If someone really, there are also severely depressed people, so that you just see them frequently. That you should really take their hand ... [...]so yes, that is very personal. If things get a little better, yes you can greatly reduce that frequency." (Respondent 4)*

4.2 Lifestyle management

In this section the results on the second module, lifestyle management, shall be presented. Table 3 provides an overview over the opinions of the physiotherapists interviewed on the lifestyle management module which is centered around daily activities and healthy behavior.

Table 3: Overview over the results (Lifestyle management)

How useful do physiotherapists perceive a web-based remote monitoring and feedback service?	• Core values are important for the rehabilitation process • Doubtful whether patients would use the system
Which parameters need to be monitored according to physiotherapists?	• Daily activities • Relaxation • Physiological variables (heartbeat, blood pressure, weight) • Physical appearance
When do physiotherapists want to monitor their patients?	• Immediately when beginning with the treatment (orthopedic patients) • After approx. 3 months

	(neurological/stroke patients) • Preventive
Which technologies do physiotherapists want to use to monitor their patients?	• Activity monitor/sensor • Online questionnaires • Diaries • Videoconferencing • Personal contact
How do physiotherapists want to give feedback to their patients?	• Automated feedback from the system itself • Personal contact
How frequent do physiotherapists want to give feedback to their patients?	• Regularly (weekly) in the beginning of the treatment • Decreasing over time

4.2.1 How useful do physiotherapists perceive a web-based remote monitoring and feedback service?

Although all respondents agreed that the topics the lifestyle management module incorporates, such as active lifestyle, healthy diet and enough relaxation are of great importance in the rehabilitation process, not every respondents agreed that the module can be useful. Several respondents doubted that patients would actually make use of such a system, especially when facing problems with addictions, such as smoking. Also, respondents working at a rehabilitation center found the module less applicable than respondents working in primary care.

> *"Absolutely, but in particular I think about food and exercise, than of those addiction habits. Those addiction habits, you can get rid of them, but then it really has to happen at the event (incident/stroke)." (Respondent 10)*

4.2.2 What parameters need to be monitored according to physiotherapists?

Regarding lifestyle management, opinions differed among the physiotherapists in what needs to be monitored. While the majority found an active lifestyle and the monitoring of daily activities to be important, some respondents laid emphasis on the relaxation aspect. However, nearly all respondents agreed that a journal on daily activities could provide good additional information to the treatment. Further, most respondents mentioned physiological variables such as heartbeat, blood pressure and weight to be important indicators for measuring lifestyle. Regarding the diet of a patient, most respondents believed that this aspect would fall under the jurisdiction of a nutritionist.

Physiological variables

"Weight, maybe yes .. I think it is indeed true that things like pedometers for example, or [...] heart rate that you can see how someone, how many hours someone has exercised and how intensively. That is important for us physiotherapists." (Respondent 7)

Daily activities

"For me as a therapist it is interesting to know what (a patient) does in a day. If I know that he has a very complex history with heartbeat, then I would go with the blood pressure or a heart rate." (Respondent 9)

Relaxation

"Relaxation. That is very important because in today's time, during the job, everyone is under stress, time pressure [...] and I think that (the relaxation) comes too short. Anyway the active part is very important too, but I find the relaxation more important [...]." (Respondent 11)

4.2.3 When do physiotherapists want to monitor patients?

Nearly all respondents reported that monitoring of lifestyle should start immediately after the patient is released from the rehabilitation center an back at home. Those therapists who were working with stroke and neurological patients reported that the application of this module should

start around three months after the treatment has begun as it could only facilitate the rehabilitation process.

> *"No, that can happen at the same time, especially if you're talking about activity an relaxation and perhaps just, not smoking and that kind of agreements. That's actually already from the beginning important. So I would like to see it happening parallel. People who are simply doing their homework exercises, must also master many other activities to get their lives back on track. And this certainly goes with it. So I would not introduce it after each other but really parallel." (Respondent 4)*

4.2.4 Which technologies do physiotherapists want to use to monitor their patients?

Most respondents reported that the application of a activity sensor could provide the relevant data such as heartbeat. Some expressed concern whether constant monitoring would cause indisposition in patients. Nearly all respondents found self-report questionnaires and diaries to be appropriate means for monitoring a patient´s lifestyle. Further, the physical appearance of a patient, monitored via skype or personal contact, was regarded very important by most respondents as it would allow to observe non-statistical observations such as posture and body language.

> *"They should write down what they have done." (Respondent 6)*

> *"So I would use Skype again, in any case. I personally am not a fan of so many devices. I prefer the use of verbal communication with each other. As I said equipment and such.... well, pulse and blood pressure is right and important, but yes, I would prefer skype in any case." (Respondent 11)*

4.2.5 How do physiotherapists want to give feedback to their patients?

A shared opinion among the therapists interviewed was, that giving feedback on lifestyle issues would be a less urgent matter than it is with the web-based exercising module. Here, automated feedback from the system was perceived as a useful procedure to guide the patients healthy lifestyle. Clear definitions on how the automated feedback should look exactly differed greatly and ranged from simple auditory signals to visual clues presented on a mobile device. However, all respondents still wanted to have personal contact periodically, to maintain the

personal relationship and give personal advice. While few reported they would want to do so via skype or telephone, the majority agreed that personal, physical contact would be most appropriate.

Automated feedback

" I think this regarding this more indirect (feedback), and also I would just turn on the moments when I do see the patient, I would just again that personal feedback. [...] It´s hard to give values that are wrong to interpret. When talking about time or calories or things like that, they are known to everyone." (Respondent 6)

Personal feedback

"Video chat or meet. I see no other possibility. Via email or sms via smartphone, in the worst case, one does not achieve much." (Respondent 12)

4.2.6 When do physiotherapists want to give feedback to their patients?

The majority of the respondents said they still would want to have personal contact on a regular basis. Checking on the patient´s lifestyle should happen once in a week or two in the beginning and decrease over time.

"Weekly , especially in the beginning to encourage them to do things. And to adjust a little bit[...]. In the course of time you can decrease that. So that people find their own way. Coaching from a distance." (Respondent 6)

4.3 Health monitoring

In this section the results on the third module, health monitoring, shall be presented. Table 4 provides an overview over the opinions of the physiotherapists interviewed on the health monitoring module which examined the preferences of physiotherapists regarding monitoring of physiological variables.

Table 4: Overview over the results (Health monitoring)

How useful do physiotherapists perceive a web-based remote monitoring and feedback service?	• Possibility to coordinate treatments was perceived useful • Not of real use for the occupational field of physiotherapy
Which parameters need to be monitored according to physiotherapists?	• Fatigue/pain • Medication • Treatment from other healthcare professionals
When do physiotherapists want to monitor their patients?	• Continuous monitoring of body functions
Which technologies do physiotherapists want to use to monitor their patients?	• Online questionnaires • Diaries
How do physiotherapists want to give feedback to their patients?	• Medication reminders
How frequent do physiotherapists want to give feedback to their patients?	• Retrieved information should be used to adjust/enhance the treatment

4.3.1 How useful to physiotherapists perceive a web-based remote monitoring and feedback service?

Several of the respondents believed that this module could be useful. Especially the possibility to coordinate treatment and retrieve additional data was seen as an advantage. Some of the physiotherapists interviewed however reported that, although they see the usefulness of the system, its application and the insights gained from it would be of no use for their specific occupational field.

> *Yes, seems interesting, [...] it is precisely this kind of things that you want to see in a kind of EPD (electronic patient dossier), which is something I often miss. A patient is usually still a layman, so they do not know exactly what the doctor has discussed with him now or*

what the nurse said. And if you have more insight into data that can think it can enhance care." (Respondent 7)

"Much more of use for health centre's to support the health of their target group." (Respondent 10)

4.3.2 Which parameters need to be monitored according to physiotherapists?

Regarding the monitoring of a patient´s health status most respondents wanted to retrieve physiological variables such as fatigue and pain as well as information on which daily activities would cause the most problems. Further, several respondents said that information on medication and treatment from other therapists could be of great use to coordinate the treatment, thereby minimizing the risks of conflicting treatments.

Physiological variables

"Parameters such as pain, fatigue, difficulty, things like that. Regarding activities I would like to know what activities cause problems. And what, what the problems are. And what the symptoms are, when someone is tired, just heavy legs when walking etc. or is it really dizziness, vertigo. Yes those things, I would like to know. Blood pressure too" (Respondent 6)

Medication

"What we do here in our health centre, is that if they have to take three or more types of medicine, and they see that side effects or something are coming, an immediate response is given. That there is a counsel hour where the GP, a nurse and a pharmacist sit together and check whether the mix of medicine is acceptable." (Respondent 10)

4.3.3 When do physiotherapists want to monitor patients?

Most of the respondents agreed that monitoring of patients should be continuous to provide an ongoing stream of information on the patient´s health status which can then be used to adjust the treatment. The system should automatically give an alarm to the therapist if certain physiological variables exceed a predefined limit.

"If it is a serious calamity, so feverish cases, inflammatory-like things [...]But actually you are doing measurements. And, on the basis of the measurements together with what the patient said (you can adjust the therapy)." (Respondent 10)

4.3.4 Which technologies do physiotherapists want to use to monitor their patients?

According to most of the respondents, only questionnaires and diaries would be the best way to measure the variables relevant for physiotherapists. Overall, personal contact was regarded less important than the physiological variables. Comparison of these to the daily activities could provide additional information useful for the patient´s treatment.

" Pain diary, that is very important to me. I can provide very good control if it is filled in regularly. [...] We already make use of them very often." (Respondent 11)

4.3.5 How do physiotherapists want to give feedback to their patients?

As mentioned in the previous paragraph, most respondents would use the information gained from monitoring the health status to improve traditional treatment or adjust exercises. Reminders to take medicine however were perceived to be useful by nearly all participants.

"I think for things like drugs [...] you can just fine do that through a device. So that a patient gets a light 'hey you haven´t taken your pills yet'. Feedback in terms of problems with activities, for example, someone says, I have trouble with stairs, I think there is no need to give much feedback but use it as an alert function instead. So that the therapist sees that and can think about it." (Respondent 10)

4.3.6 When do physiotherapists want to give feedback to their patients?

Regarding the moment of feedback, the majority of respondents agreed that information from managing health status should not be transformed into direct feedback but that it should be integrated in the treatment. For patients who are residing at a rehabilitation center the monitoring of health would be done by medical personnel but as soon as they are released, the monitoring should start.

4.4 Additional results

4.4.1 Opinions on the different modules

When asked whether lifestyle management and health monitoring could be of effective use most respondents agreed that several of the aspects included in these modules, such as a healthy diet or quitting smoking, would exceed their competences and that another health professional would need to be asked for advice here. Half of the respondents mentioned an electronic patient dossier and communication with other health care professional to be important in order to coordinate the treatment.

> *"Yes because if the dietician says something about a diet which, let's say, very exaggerated, someone should eat less and lose weight. This person then feels weak and listless at first and if I then say that he needs to be cycling twenty km per day , yes that is not consistent with each other. So that you need to find these information somewhere. If that would be working and connected and it is clear then I think it is a very nice system." (Respondent 4)*

> *"Of course you have, we have some team meetings, where all disciplines come together and then work out a plan. I can imagine if you or the occupational therapist says something about active activity and then I will say something about it that is not consistent with each other, since we have no such consultations, that can be very complicated for those who sit at home and follow its instructions."(Respondent 2)*

4.4.2 Treatment motivation

Some of the respondents agreed that making use of a telehealth system could increase patient´s motivation to exercise at home. Using online timetables and reminders could increase the feeling of autonomy. However, most of the respondents pointed out that the initial motivation needs to come from the patients themselves.

> *"I think this system allows for more independence at home, because this clinical setting already covers a lot. Schedules are set strictly and we hear once in a while that they are really dominating one´s life. So there is very little own initiative. Think that this is more at home. Although I think you continue to get some reminders here to get started. But it*

is something you must do yourself, without anyone here saying, we are going to come and then this and that and do these exercises. So I can imagine that the feeling of independence is thus enlarged or so."

4.4.3 Age as an indicator of technology acceptance

Although the factor age was not extensively studied in this research, initial assumptions, that higher age would be associated with lower technology acceptance could not be observed in this study. The factor "perceived usefulness" was more important to the respondents as they were willing to use the system if it would have positive outcomes for the patient.

4.4.4 Influence of colleagues

The majority of the participants reported that their use of the system is dependent on the opinions of their colleagues and other healthcare professionals. One of the main advantages of the system, the multidisciplinary approach towards the treatment, could only be achieved if colleagues and healthcare professionals from other occupational fields are willing to participate.

"Only with the acceptance of my associates. Because I alone cannot bring this system to life. And it has to live. You need the staff, the therapists, as well as the administrative staff to pull the train. " (Respondent 15)

"Definitely. Because we work together with speech therapists and occupational therapists and it would be helpful then. Otherwise, the patient is there and one says "so" and the other says "so" and the patient is in between and does not know at all what to do." (Respondent 11)

4.4.5 Cost Factors

Several respondents replied that, although they were quite fond of such a system, the implementation of these systems would rely on actual cost effectiveness and increase in training efficiency. According to them, the implementation could only take place on a broad level if insurance companies would offer to pay for these systems and the workload of physiotherapists per patient would be reduced.

5. Discussion

This explorative study was conducted in order to gain insights in the user requirements of health professionals, specifically physiotherapists, regarding a web based remote monitoring & feedback service. Current development and advances in the e-health sector undermine the importance of not only overcoming technological barriers but also fitting the systems to the user´s demands. In this section the findings from the research conducted shall be discussed, the limitations and implications for future research shall be listed and practical implications shall be given.

5.1 Discussion of the results

This study served two purposes. First, the user needs and requirements of professionals, in this case physiotherapists were explored and documented. Second the intention to use such a web based remote monitoring and feedback system was assessed by applying the TAM model (Davis, 1989). A total number of seven research questions were formulated with five of them assessing the requirements of physiotherapists on the system and two examining usage intention.

1.How useful do professionals perceive a web-based remote monitoring and feedback service?

The interviewed professionals reported that the use of such a system would be very patient dependent. Professionals at the rehabilitation centre in Groot Klimmendaal, who were working mostly with patients suffering from the aftermath of a stroke reported that the patients need to have the cognitive capabilities to use such a system. Professionals working at the rehabilitation centre and those working at a physiotherapist´s office both reported that age is a major factor for the use of a web based remote monitoring & feedback service. According to them, the older generation has a lower affinity for technology than the younger generation. This estimation is consistent with the New Millenium Research Council´s (NMRC) report on telemedicine which examines the increasing "digital divide" between the generations. However, independent from patient-related issues the majority of the respondents perceived the system useful as it could lead to increased training efficiency at home, provide guidelines for healthy behavior and coordinate the treatment with other healthcare professionals. This supports the research findings of Gagnon et al. (2006), saying that telemedicine applications can facilitate

communication among health care professionals, leading to a more coordinated and effective treatment.

2.How easy to use does a web-based remote monitoring and feedback service appear to professionals?

Most of the respondents agreed that a stationary computer would not fit the requirements of patients as the exercises would require them to move or lay down. Further, the respondents said that the whole system and procedure of logging in should be as simple as possible to avoid confusion and ease access to the portal. The graphic presentation of week schedules and training schemes should also be clearly arranged to prevent patient´s confusion. Some of the physiotherapists interviewed criticized the start page of the web based system as patients would have to remember login name and password. These issues however can be avoided by making use of current hand-held devices such as tablet pc´s and smartphones. Rendering the web portal into an application for these devices could prevent the issues raised, as login data for example can be remembered thereby easing the access to the system. Some respondents mentioned current Apple products as their surface feel is easily understandable and self-explanatory.

Another issue raised by the respondents regarding the user friendliness of the web based remote monitoring & feedback service was that the users need to be experienced with computers. Especially the physiotherapists working at the rehabilitation centre in Groot Klimmendaal reported that teaching the use and application of the system to stroke patients would exceed their cognitive capabilities and would cost a great amount of time. However, the majority of respondents agreed that this issue would only concern the current generation of fifty years and older and that the younger ones should have satisfactory knowledge of computers to make efficient use of such a system.

Several respondents reported that they themselves would not be that computer affine, what could account for the initial skeptic attitude against telemedicine. As Laguna & Babcock (1997) found out computer anxiety, computer experience and age is related to end-user acceptance. In this research, although not studied, no relation between age and end-user acceptance was found. Several of the younger participants showed more computer anxiety than the older ones which contradicts the findings of Laguna & Babcock (1997). However, as these

differences were not extensively examined, future research should focus on the relation between computer anxiety and age.

3.What parameters need to be monitored in each of the three modules?

Regarding the parameters they would want to monitor, the majority of the respondents mentioned that an electronic dossier of the patient´s previous diseases and comorbidity would be helpful. Further, nearly all of the respondents would want to receive information on daily physical activities and problems arising from these. Information on the exercises executed at home was perceived to be heavily patient dependent. Those respondents working in rehabilitation centers found it important to know whether the exercise is performed correctly whereas the physiotherapists in primary care found it more interesting to know whether the patients moves at all. Nearly all respondents believed that physiological variables such as heartbeat and blood pressure together with the patient´s performance over a certain period of time could provide valuable insights which in turn can help to adjust and enhance the treatment. This is consistent with the results of the research conducted by Westwood (2003) saying that additional information on the patient´s status can lead to improved and patient-tailored treatments.

4. When should patients be monitored in each of the three modules ?

All respondents agreed that a preliminary lead time of approximately two to six weeks would be needed before the first module, web based exercising, could be used. This time would be needed build up an relationship with the patient and instruct them in the use of the system as well as the correct execution of the prescribed exercises. Most respondents however reported that for the other two modules, lifestyle management and health monitoring, no lead time would be necessary and that the application of them should start immediately with beginning of the treatment.

5. What technologies should be used to monitor patients in each of the three modules?

All respondents wanted to see their patients at least once a week in person. As a reason for that, all of the respondents reported that they could retrieve more information on a patient´s health status by taking a look at their physical appearance. To examine a patients posture and non-verbal communication was perceived as necessary for the treatment. In addition to

traditional treatment however, for data gathering purposes, most respondents would like to make use of digital versions of questionnaires and diaries which resemble those which are already in use. Further, the application of an activity monitor was widely accepted to measure physical activity. Some respondents however believed that constant monitoring of a patient´s lifestyle and activities could evoke the feeling of being constantly watched. Research done by Alwan (2006) however showed that elderly people were comfortable with being monitored as it is for their own safety.

6. Which technologies do professionals want to use to give feedback to their patients?

Nearly all of the respondents reported that they would preferably make use of videoconferencing technology. As a reason for that nearly all respondents mentioned that this technology is not that prone to misinterpretation as written messages or automated feedback from the system. This finding can be supported by the media richness theory (Daft & Lengel, 1984). According to this theory, videoconferencing is the most information-rich medium after personal face-to-face contact. In this scenario the advantages of videoconferencing are obvious as it can provide immediate feedback, to avoid misconceptions and is focused on the recipient, in this case the patient. Further, videoconferencing provides greater social presence thereby increasing warmth and immediacy (Daft & Lengel, 1984). In addition to that, week schedules and goals set should motivate the patient to stick to the prescribed exercises.

7. When do professionals want to give feedback to their patients?

Most respondents mentioned that the date of feedback is patient dependent. Several factors such as the type of disease or disorder, motivation and physical condition play a role. Due to the time consuming nature of feedback sessions most respondent preferred a fixed weekly evaluation moment. Content form the web based exercising module as well as the lifestyle management module should be discussed in these sessions. For the health monitoring module however a weekly evaluation moment was regarded unnecessary. Respondents agreed that feedback should only be given in case of major incidents or if the medical condition is worsening in an alarming rate.

Automated feedback from the system itself was seen controversial among the respondents. Automated medication advice was rejected by the majority of the respondents

whereas provision of tips and tricks regarding daily activities and the use of activity monitoring was mostly accepted. The lack of control on automated advice, especially regarding medication, was perceived as problematic as was its inaccuracy. Another issue raised by the majority of the participants was that the automated feedback, triggered by online questionnaires, could easily be manipulated by inaccurate input from the patients side. Reminders when to take medication however were regarded unproblematic and helpful by nearly all of the respondents.

8. Additional results

The interviewed physiotherapists reported that several aspects of the web based remote monitoring & feedback service, like nutrition and medication advice would fall under the jurisdiction of other health care professionals. Some facets of the modules lifestyle management and health monitoring could only be efficiently used through the input from other occupational fields. This fact stresses the importance of coordinated treatment from different instances of the health care system. As mentioned earlier, telemedicine applications could grasp here by providing a platform for information exchange (Gagnon et al. ,2006).

4.1 Practical implications

Nearly all of the respondents reported that they would make use of the web based remote monitoring & feedback service as an addition to traditional therapy. The intrinsic motivation to use the system however seems to be different among the professionals. While some of the respondents were very enthusiastic and curious on how such a system would work out in praxis, others saw it as an evolutionary step in modern healthcare they would need to accept to be able to compete on the market. A minority of the respondents declined to make use of the system despite acknowledging its advantages. Correlation between the respondent's age and their acceptance this technology could not be observed. More research on this topic would be needed to make conclusions.

Through this research knowledge on the user requirements of physiotherapists regarding a web-based remote monitoring and feedback service has been provided. These preferences should be taken into account when developing upcoming telehealth services for the occupational field of physiotherapy.

4.2 Limitations of this research

This study faces several limitations. Being exploratory and qualitative of nature the findings of this study cannot be generalized for the whole population as no randomized sample was used. This however is a common issue in qualitative research. Frequencies are regarded less important in qualitative research as the insight gained into a specific topic from one occurrence can be just as useful as those from many (Crouch & McKenzie, 2006). In this research saturation of data was reached after approximately the tenth interview transcript. No new codes were found in the following six.

The focus of this study laid on the user requirements of professionals. User requirements of patients were not taken into account although they are closely connected with those of the physiotherapists. This point can be regarded important when taking a look at the TAM construct "perceived ease of use". The respondents had to make estimations of what patients would regard important and their assumptions could therefore be inaccurate.

This research made use of semi structured interviews where the respondents were guided by the interviewer. This can influence and limit the responses obtained from the participants. In-depth answers and attitudes cannot be obtained this way. The use of semi-structured interviews could also cause the respondents to give socially desirable answers. Still, semi-structured interviews are the method of choice if the respondents are not yet familiar with the research topic. Additionally, the interviewers were not trained in conducting interviews. This could have lead to less reliable results and more precise information could have been obtained. Still, the interviewers tried to be flexible and adapt to the course of the conversation.

Age and gender differences between the participants were not studied although these data have been collected. The size of the sample however does not allow general conclusions on this issue, neither does the model used (Technology Acceptance Model, Davis, 1989).

The interviews were conducted at different dates. Physiotherapists who were already interviewed could have told their colleagues who were to be interviewed about the study, thereby priming them. This could have lead to biases in measurement with participants being prejudiced and giving answers, which previously have been given by their colleagues.

The mock-ups (Appendix D,E,F) used to guide the interviews displayed prototypes of the user interface of a telehealth service as well as extant monitoring devices and techniques. The information obtained from the interviews, which technologies the physiotherapists would want to use to monitor and give feedback to the patients, therefore is limited to the possibilities displayed. However, mock-ups have the advantage of providing an explanation and giving an idea to the respondents what the research is about. Without using mock-ups, the information obtained could have been far less centered around the initial research questions.

In the beginning of this research, focus was laid on professionals as well as patients. The research questions were formulated according to the UTAUT model. The results of the first interviews conducted did not provide answers or insights to the original research question, so they were rewritten. The new research questions were more general and exploratory of nature.

4.3 Implications for future research

As already mentioned, the moderating value of age was not taken into account in this study. Some evidence found suggests that this effect could be important. Future research should examine how age influences technology acceptance among healthcare professionals.

Future research should also focus on the patient's user requirements as the estimations of the interviewed professionals could be inaccurate. In order to design a fully operable telerevalidation service these user requirements need to be recorded and taken into account during development.

This study involved respondents from two different nationalities, German and Dutch. The healthcare systems of both countries however are slightly different from each other. While in the Netherlands so called "Gezondheitscentrums" are emerging where several healthcare professional are situated at one site in order to facilitate coordinated treatment these are still an exception in Germany. German participants reported that though communication with physicians is improving, little to none communication with occupational therapists exists. A great deal of competition is reported to exist between these two types of professionals. Future research should focus on how to enable cooperation between theses different types of healthcare professionals in order to facilitate coordinated treatment. Also, a new assessment on the user requirements of

physiotherapists regarding a web-based remote monitoring and feedback service with more emphasis on national differences is needed.

4.4 Conclusion

Most respondents believed that a telehealth service could be a valuable addition to traditional physical therapy and were willing to make use of such a service. Especially the possibility to monitor patients´ daily activities and physical health status was perceived as helpful. These insights could be of great value when combined with traditional therapy. Also the possibility to share information with other healthcare professionals was perceived as beneficial. Automated feedback was discussed controversial among respondents with most of them rejecting it. However, their intention to use these services is limited by lack of confidence in current information technologies and uncertainty whether patients would make use of these services. Physiotherapists argued that in order to make a telehealth system work, the cooperation of the patients is mandatory. Further, monitoring systems need to be very accurate in order to provide the correct information and prevent patients from cheating (e.g. by shaking a pedometer). Despite the mentioned concerns, the respondents believed that a transformation of the current health care systems is necessary and the implementation of information technologies not only helpful, but inevitable. Still, in order to implement telehealth services on a broad, societal level, its advantages need to be recognized by the government and health insurance companies. The development of upcoming telehealth applications should therefore not only take the user requirements into account, which are important for acceptance and use of these systems, but also consider approaches which make these systems very cost effective. One respondent shared:

"Definitely in the future. How does it go with urbanization? How does it go with decentralized supply of health care services? How does it stand with urban transportation? How mobile are the people? The aging of the population. We do have a good infrastructure in the Netherlands, in Germany, in central Europe. If a system like this is installed, the primary reason for the health insurance companies are cost savings. Nothing else. Don´t fool yourself. The idealization of the patient is pleaded. But ultimately, if it does not prove to be more cost efficient, they forget about these systems and will not accept them. [...] But if it would be accepted, it can definitely be put to use."

References

Ajzen, I. (2002) Perceived Behavioural Control, Self -efficacy, Locus of Control, and the Theory of Planned Behaviour. *Journal of Applied Social Psychology*, 32 (1) 1-20.

Ajzen, I., & Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Alwan, M., Dalal, S., Mack, D., Kell, S., Turner, B., Leachtenauer, J., & Felder, R. (2006) Impact of monitoring technology in assisted living: outcome pilot. *Information Technology in Biomedicine, IEEE Transactions on*, 16 (4).

Bertaux, Daniel (1981). From the life-history approach to the transformation of sociological practice. In Daniel Bertaux (Ed.), *Biography and society: The life history approach in the social sciences* (pp.29-45). London: Sage.

Cranen, K., Drossaert, C.H.C., Brinkman, E.S., Braakman-Jansen, A. L. M., IJzerman, M. J., Vollenbroek-Hutten, M. M. R. (2011) An exploration of chronic pain patients' perceptions of home telerehabilitation services. *Health Expectations*

Benbasat, Izak and Barki, Henri (2007) Quo vadis TAM?. *Journal of the Association for Information Systems*: 8 (16).

Clark, R., Inglis, S., McAlister, F., Cleland, J., & Stewart ,S. (2007). Telemonitoring or structured telephone support programmes for patients with chronic heart failure; systematic review and meta-analysis, *BMJ* , 334.

Crouch, M., & McKenzie, H. (2006). The logic of small samples in interview based qualitative research. *Social Science Information*, *45*(4), 483-499.

Daft, R.L.; Lengel, R.H. (1984). Information richness: a new approach to managerial behavior and organizational design. *Research in organizational behavior*, 6, 191–233.

Davis, F.D. (1986) *Technology Acceptance Model for Empirical. Testing New End-User Information System: Theory and Results*. Cambridge, MA: MIT Sloan School of Management.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Davis F., Bagozzi, R., & Warshaw, P. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology,* 22(14), 1111- 1132.

DiCicco-Bloom, B. & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, 40, 314–321.

Dutta-Bergman, M. J. (2005). The antecedents of community-oriented Internet use: Community participation and community satisfaction. *Journal of Computer-Mediated Communication,* 11 (1).

Gagnon, M.P.; Duplantie,J.; Fortin, J.P.; Landry, R., (2006) Implementing telehealth to support medical practice in rural/remote regions: what are the conditions for success? *Implementation Science* 2006, 1 (18)

Ghasemi. F. (2011). *Developing a Multilateral Telerehabilitation System for Patient with Diminished Hand Function IT Department*
Payame Noor University, Tehran, I.R. of Iran

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, *18*(1), 59-82.

Hebert, M. (2001). Telehealth success: Evaluation framework development. *Studies in technology and informatics.* IOS Press.

Kühne, H., Behner, U., Henke, S., Nelles, S., (2009). Das selbstbestimmte Leben älterer chronisch Kranker und Risiko-patienten im eigenen Zuhause erfordert innovative und bezahlbare Versorgungslösungen; *Ambient Assisted Living AAL*, 2

Kurth, T., Moore, S., Gaziano, M., Kase, C., Stampfer, M., Berger, K., Buring, J., (2003) Healthy Lifestyle and the Risk of Stroke in Women. *Arch Intern Med.*,166, 1403-1409.

Laguna, K., & Babcock, R. (1997). Computer Anxiety in Young and Older Adults: Implications for Human–Computer Interactions in Older Populations. *Computers in Human Behavior*, 13(3), 317–326.

Lee, Y., Kozar, K., Larsen, K. (2003). The technology acceptance model: past, present, and future. *Communications of the American Informatics Society*, (12), 752–800

Mack, N., Woodsong, C., MacQueen, K., Guest, G., (2006) *Qualitative Research Methods: A Data Collector's Field Guide*, Family Health International 360, Retrieved from http://www.fhi360.org/en/rh/pubs/booksreports/qrm_datacoll.htm

Merians, A.S., Jack, D., Boian, R., et al. (2002). Virtual reality–augmented rehabilitation for patients following stroke. *Physical Therapy* 82, 898–915.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research,* 2(3), 192-222.

New Millenium Research Council (2007), *Overcoming the Psychological barriers to Telemedicine: Empowering Older Americans´ to Use Remote Health Monitoring Services*, Retrieved from http://www.newmillenniumresearch.org/archive/Telemedicine_Report_022607.pdf

Otto, C., Milenkovic, A., Sanders, A., Jovanov, E. (2006), System Architecture of a Wireless Body Area Sensor Network for Ubiquitous Health Monitoring, *Journal of Mobile Multimedia*, 21(4), 307-326.

UCL (2012), *Grand challenge of human wellbeing: Future of healthcare in Europe- Meeting future challenges: Key issues in context*
Retrieved from http://www.ucl.ac.uk/public-policy/public_policy_publications/FHE-print.pdf

Scalvini, S., Capomolla, S., Zanelli, E., Benigno, M., Domenighini, D., Paletta, L., Glisenti, F., & Giordano,A. (2005) Effect of home-based telecardiology on chronic heart failure: costs and outcomes *Royal Society of Medicine Press*

Stroetmann, K.A.; Kubitschke, L.; Robinson, S.; Stroetmann, V.; Cullen, K.; & McDaid,D. (2010) How can telehealth help in the provision of integrated care? *Policy Brief 13*, WHO

Sluijs, E.M.,& Knibbe, J.J. (1991) Patient compliance with exercise: different theoretical approaches to short-term and long-term compliance. *Patient Education and Counseling*, 11, 191-204.

Taylor, S., & Todd, P. (1995) Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research* 6 (2) 144-176.

Thomas, K., Muir, K., Doherty, M., Jones, A,, O'Reilly, S., Bassey, E. (2002) Home based exercise programme for knee pain and knee osteoarthritis:randomised controlled trial. *BMJ*, 325 (752).

Triandis, H. C. (2002) Subjective culture. In: W. J. Lonner, D. L. Dinnel, S. A. Hayes, and D. N. Sattler [Eds.], *Online Readings in Psychology and Culture*
Retrieved from http://www.ac.wwu.edu/~culture/triandis1.htm

Valero, Miguel A.; Arredondo, Maria T. (2006) Home Telehealth: Telematics-Supported Services; *Published Online: 14 APR 2006 DOI: 10.1002/9780471740360.ebs1300*

Vallerand, R.J. (2001) A hierarchical model of intrinsic and extrinsic motivation in sport and exercise. In: G. Roberts [Eds.] *Advances in motivation in sport and exercise*, IL, Champaign: Human Kinetics. 263-319

Varshney,U (2007). Pervasive healthcare and wireless health monitoring, *Mobile Networks and Applications*, 12, 113-127

Venkatesh, V.; Morris; Davis; Davis (2003), User Acceptance of Information Technology: Toward a Unified View, *MIS Quarterly*, 27, 425–478.

Wallace, G., Brennan, P., Haines, A., (1987) Are general practitioners doing enough to promote healthy lifestyle? Findings of the Medical Research Council's general practice research framework study on lifestyle and health. *British Medical Journal 198*, 294 (940)

Werner, P.; Karnieli E., (2003). A model of the willingness to use telemedicine for routine and specialized care. *Telemed Telecare.*, 5 ,(264)

Westwood, James D. (2003). *Medicine Meets Virtual Reality 11, NextMed : Health Horizon*, Amsterdam, IOS Press

World Health Organization. (2002). *The world health report 2002 - Reducing Risks, Promoting Healthy Life.* Retrieved from http://www.who.int/whr/2002/en/

Appendix A

Code scheme

1. Which parameters need to be monitored ?

- 1.1 Physiological variables
  - 1.1.1 Heartbeat
  - 1.1.2 Blood Pressure
  - 1.1.3 Fatigue/Pain
- 1.2 Body posture/Appearance of the patient
- 1.3 Performance on the exercises
- 1.4 Comorbidity
- 1.5 Daily Activities
- 1.6 Patient experiences
  - 1.6.1 With exercises
  - 1.6.2 With daily activities
- 1.7 Medication
- 1.8 Pain scale/ graphical feedback

2. When do professionals want to start monitoring their patients?

- 2.1 Preliminary lead time
- 2.2 System should monitor the patients
- 2.3 Patient dependent

3. What technologies do professionals want to use to monitor their patients?

- 3.1 Need for physical contact
- 3.2 Activity sensors/monitor
- 3.3 Videoconferencing/skype
- 3.4 Week schedules
- 3.5 Questionnaires
- 3.6 Cardio sensor etc.
- 3.7 Diaries

4. How do professionals want to give feedback to their patients?

- 4.1 Personal (physical contact)
- 4.2 Videoconferencing/skype
- 4.3 Chat function
- 4.4 Week schedules
- 4.5 Medication reminders
- 4.6 Automated feedback
- 4.7 E-mail

5. How frequent do professionals want to give feedback to their patients ?

- 5.1 Patient dependent
  - 5.1.1 Cognitive capabilities

5.1.2 Character of the patient/ Motivational factors

5.2 Once a week

5.3 Feedback only if necessary (e.g. wrong execution of exercises)

5.4 After a certain period of time

5.5 Fixed moment

5.6 Twice a week

5.7 Decreasing over time

6. How useful do professionals perceive a web-based remote monitoring and feedback service?

6.1 Flexible training schedules

6.2 Increased efficiency when training at home

6.3 Travel issues

6.4 Dependent on the patient´s cognitive abilities

6.5 Dependent on the patient´s age

7. How easy to use does a web-based remote monitoring and feedback service appear to professionals ?

7.1 Structure of the system

7.2 Experience with Internet

7.3 Experience with Computers

7.4 Dependent on the patient´s cognitive abilities

7.5 Dependent on the patient´s age

8. Opinions on the modules

8.1 Web based exercising

8.1.1 When to use the module in treatment?

8.2 Lifestyle management

8.2.1 When to use the module in treatment?

8.2.2 Active lifestyle

8.1.2 Positive opinion on usefulness of this aspect

8.1.3 Negative opinion on usefulness of this aspect

8.2.3 Healthy diet

8.1.2 Positive opinion on usefulness of this aspect

8.1.3 Negative opinion on usefulness of this aspect

8.2.4 Relaxation

8.1.2 Positive opinion on usefulness of this aspect

8.1.3 Negative opinion on usefulness of this aspect

8.3 Health monitoring

8.3.1 When to use the module in treatment?

9. Additional results

9.1 Cooperation with other therapists

9.2 Opinions of colleagues

Appendix B

Interview Scheme (Dutch)

Module 1 Web based oefenen

1. Denkt u dat een telerevalidatie service nuttig kan zijn bij de behandeling van uw patiënten?
    a. Wat denkt u dat de voordelen van een telerevalidatie service zijn?
    b. Wat denkt u dat de nadelen van een telerevalidatie service zijn?

2. Vindt u face to face contact met patiënten belangrijk? Waarom wel/niet?

3. Wat vindt u ervan als patiënten oefeningen in de thuisomgeving doen? Waarom?

4. Op welk moment in de behandeling zou u deze module willen gebruiken?
   a. Zou u het als toevoeging of als vervanging willen gebruiken?

5. Zou u deze module willen gebruiken bij uw patiënten? Waarom wel/niet?

6. Kunt u zich voorstellen om deze module als toevoeging of gedeeltelijke vervanging van een behandeling te gebruiken?

7. Denkt u dat de web portal met oefeningen makkelijk in gebruik is? Waarom wel/niet?

8. Vindt u het belangrijk wat uw collega's van deze module vinden? Waarom wel/niet

9. Denkt u dat de trainingsmotivatie van patiënten bij thuis trainen anders is dan bij het trainen in de kliniek? Waarom wel/niet?
    a. Wat denkt u dat de voordelen van thuis trainen zijn?
    b. Wat denkt u dat de nadelen van thuis trainen zijn?
       (vb. van voorbeelden zijn flexibiliteit van oefen tijden, niet meer hoeven reizen; nadelen zijn sociaal isolement, minder contact met arts/fysiotherapeut)

10. Hoe zou u feedback willen geven? (vb. in scenario)

11. Hoe moet de feedback eruitzien?
    a. Welke parameters vindt u belangrijk?
    b. Hoe moet het er grafisch uitzien?

12. Wanneer wilt u de feedback geven?

13. Denkt u dat patiënten contact met lotgenoten belangrijk vinden? Waarom wel/niet?
    Bij lotgenoten kunt u denken aan andere patiënten, familie, vrienden of andere mensen uit uw directe sociale omgeving

14. Wat denkt u dat patiënten willen delen met lotgenoten?

15. Als u iets kon veranderen aan de module, wat zou dat zijn?

Module 2 Lifestyle Coaching

1. Welke vindt u het meest belangrijk?

2. Wie geeft deze zorg nu?

3. Op welk moment in de behandeling zou u deze module willen gebruiken?

4. Vindt u het belangrijk wat uw collega's van deze module vinden? Waarom wel/niet

5. Zou u deze module willen gebruiken bij uw patiënten? Waarom wel/niet?

6. Ziet u deze module als een mogelijke toevoeging op de behandeling, of eventueel een vervanging?

7. Hoe zou u feedback willen geven? (vb. in scenario) en welke technologien zou u ervoor willen gebruiken?

8. Hoe moet de feedback eruitzien?

9. Hoe moet de feedback eruitzien?
   a. Welke parameters vindt u belangrijk?
   b. Hoe moet het er grafisch uitzien?

10. Wanneer wilt u de feedback geven?

11. Denkt u dat patiënten contact met lotgenoten belangrijk vinden? Waarom wel/niet?

12. Wat denkt u dat patiënten willen delen met lotgenoten?

13. Als u iets kon veranderen aan de module, wat zou dat zijn?

Module 3 Disease Management

1. Welke vindt u het meest belangrijk?

2. Wie geeft deze zorg nu?

3. Op welk moment in de behandeling zou u deze module willen gebruiken?

4. Vindt u het belangrijk wat uw collega's van deze module vinden? Waarom wel/niet

5. Zou u deze module willen gebruiken bij uw patiënten? Waarom wel/niet?

6. Ziet u deze module als een mogelijke toevoeging op de behandeling, of eventueel een vervanging?

7. Hoe zou u feedback willen geven? (vb. in scenario) en welke technologien zou u ervoor willen gebruiken?

8. Hoe moet de feedback eruitzien?

9. Hoe moet de feedback eruitzien?
   a. Welke parameters vindt u belangrijk?
   b. Hoe moet het er grafisch uitzien?

10. Wanneer wilt u de feedback geven?

11. Denkt u dat patiënten contact met lotgenoten belangrijk vinden? Waarom wel/niet?

12. Wat denkt u dat patiënten willen delen met lotgenoten?

13. Als u iets kon veranderen aan de module, wat zou dat zijn?

Appendix C

Script used during the interviews (Dutch version)

Draaiboek Mock-ups Grenzeloze Zorg

Web based exercise

We beginnen met de module web based oefenen. U ziet hier de startpagina van het systeem, hierop kunt u inloggen om bij uw persoonlijke oefeningen te komen.

Bijbehorende vragen:

- Denkt u dat een telerevalidatie service nuttig kan zijn bij uw behandeling? (voordelen/nadelen?)
- Denkt u dat een telerevalidatie service een toevoeging kan zijn op uw huidige behandeling?

Een voorbeeld van de oefenschema's met oefeningen. Hierop is te zien op welke dag en op welk dagdeel de oefeningen gedaan moeten worden. Ook kan er een weekoverzicht opgevraagd worden. De oefeningen zijn geselecteerd door de fysiotherapeut. Deze oefeningen zijn belangrijk voor uw herstel en helpen om de behaalde resultaten tijdens de klinische behandeling te behouden.

Bijbehorende vragen:

- Denkt u dat de web portal makkelijk in gebruik is? (Waarom wel/niet)
- Denkt u dat de trainingsmotivatie bij thuis trainen anders is dan bij het trainen in de kliniek? (voordelen/nadelen)

Een voorbeeld van hoe de oefeningen weergeven kunnen worden. De oefeningen worden in een filmpje voorgedaan, maar staan ook in tekst beschreven naast de video. De oefeningen worden geselecteerd door de zorg professional.

Bijbehorende vragen:

- Zou u het prettig vinden om de oefeningen in uw thuisomgeving te doen? (Waarom wel/niet)

Er zijn verschillende manieren om op afstand te kijken hoe oefeningen worden uitgevoerd en om problemen die u eventueel in het dagelijks leven tegenkomt te signaleren.
Bijbehorende vraag:

- Zou u het prettig vinden als uw fysiotherapeut uw oefeningen kan (terug) zien?(waarom wel/niet)
- Welke gegevens moet de fysiotherapeut kunnen zien van de oefeningen? (mobiliteit, kracht, hartslag, oefening wel/niet gedaan, wel/niet goed uitgevoerd, etc.)

De behandelaar heeft verschillende mogelijkheden om een reactie te geven op de oefeningen. Er kunnen vragen gesteld worden aan de behandelaar via het systeem, maar er kan ook directe feedback worden gegeven door bij. het gebruik van een activiteiten monitor.
Bijbehorende vragen:

- Vindt u face to face (persoonlijk) contact met uw behandelaar belangrijk? (Waarom wel/niet)
- Hoe zou u deze feedback willen krijgen?
- Wat vindt u van deze manieren van feedback geven? (*via webcam, mail, beeldbellen en door systeem zelf*)
- Wanneer en hoe vaak wilt u de feedback ontvangen?

Voorbeelden bij onduidelijkheid over feedback mogelijkheden
Er zijn verschillende manieren om feedback te geven, dit kan zonder direct contact met de behandelaar, u kunt hierbij denken aan uw hartslag of bloeddruk tijdens een oefening, of een sensor die de bewegingen registreert zodat u direct op uw computerscherm ziet of u de oefening correct uitvoert.
Er kan kunnen ook opmerkingen bij een oefening geplaatst worden, die de therapeut dan later terug kan zien. Er is ook een chat en email functie om contact op te nemen met de therapeut. Een andere mogelijkheid is dat er via beeldbellen contact wordt opgenomen met de therapeut om de oefeningen door te nemen.

Lifestyle Management

Een andere module binnen dit systeem is lifestyle management. Een gezonde levensstijl is er belangrijk en zeker tijdens de revalidatie. Deze module kan helpen bij het krijgen en behouden van een gezonde levensstijl.

Een gezonde levensstijl kent verschillende onderdelen, zoals gezond eten, matige alcoholconsumptie en niet roken.

Een ander onderdeel is voldoende beweging en daartoe behoren niet alleen de oefeningen zoals getoond in de vorige module. Hierbij kunt u denken aan wandel of fiets routes in uw omgeving die worden aangeboden.

Een ander belangrijk onderdeel is voldoende ontspanning.
Bijbehorende vragen:

- Hebt u behoefte aan 1 van deze onderdelen? (welke & waarom wel/niet)

Ook hier zijn verschillende mogelijkheden om dit op afstand te monitoren en te coachen. Dit kan bijvoorbeeld met een activiteiten monitor (stappenteller), bloeddrukmeter, eetdagboek, etc.
Bijbehorende vraag:

- Moet uw behandelaar hier gegevens van terugzien? (waarom wel/niet)
- Welke gegevens moet uw behandelaar hiervan zien (bijv. bloeddruk, hartslag, eetdagboek, gedane activiteiten)

Health monitoring

De laatste module is health monitoring. Het kan u helpen een beter inzicht te geven in klachten en symptomen.

Er zijn drie aspecten binnen de module health monitoring. Allereerst de gezondheidsstatus. Hierbij gaat het erom hoe mensen zich voelt bij het uitvoeren van de dagelijkse activiteiten zoals douchen, aankleden en het doen van huishoudelijke activiteiten. Er kan voorlichting worden gegeven over 'hoe ga ik daar precies mee om' en mensen kunnen tips krijgen.

Een tweede aspect is dat mensen hun lichamelijke symptomen kunnen aangeven via bepaalde vragenlijsten of een dagboek kunnen invullen, waarop zij direct advies terugkrijgen via het telerevalidatie systeem. Er kan een bepaalde grenswaarde worden ingesteld. Als een persoon na het invullen van de vragenlijst teveel afwijkt van deze grenswaarde, kan direct contact met de behandelaar worden gezocht via het telerevalidatie systeem. Het is wel belangrijk dat deze onderdelen regelmatig/dagelijks worden ingevuld.

En ten slotte is er hulp bij medicatie, het systeem geeft aan wanneer en welke medicatie ingenomen moet worden. Er kunnen herinneringen worden ingesteld wanneer medicatie ingenomen moet worden.

- Hebt u behoefte aan 1 van deze onderdelen? (welke & waarom wel/niet)
- Zijn er nog dingen die u mist in deze module?

Ook dit kan weer op verschillende manieren op afstand gemonitored worden via remote monitoring: het op afstand meten van de klachten die u heeft, of problemen die u ervaart. U kunt hierin ook aangeven of u wel of geen moeite hebt met het volgen van revalidatie en waar dit aan ligt. Dit kan met een activiteitenmonitor, het meten van de bloeddruk, het invullen van een dagboek/vragenlijst, etc.
Bijbehorende vraag:

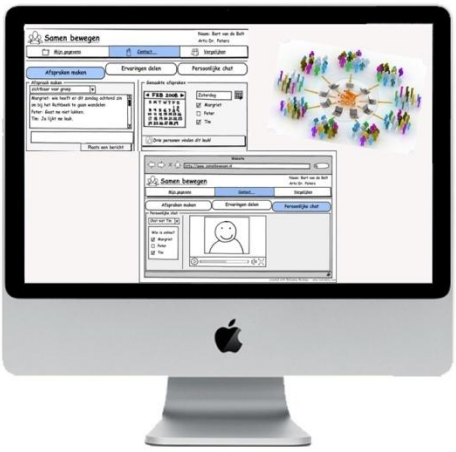
- Moet uw behandelaar hier gegevens van terugzien? (waarom wel/niet)
- Welke gegevens moet uw behandelaar hiervan zien (bijv. bloeddruk, hartslag, medicatie, gedane activiteiten)

Daarbij zijn ook weer verschillende manieren van feedback weergegeven. Mensen kunnen ook weer een gedeelte zonder therapeut feedback (een reactie) krijgen door het systeem zelf en een gedeelte feedback via contact met de therapeut.
Bijbehorende vragen:

- Hoe zou u feedback willen krijgen?
- Wanneer en hoe vaak wilt u de feedback ontvangen?

Het is ook mogelijk om, behalve met de behandelaars, via dit systeem contact te hebben met medepatiënten, familie, vrienden en mantelzorgers.
Bijbehorende vragen:

- Vindt u contact met medepatiënten e.a. belangrijk? (Waarom wel/niet)
- Is daar verschil in contact tussen medepatiënten en mantelzorgers, familie en vrienden (directe sociale omgeving)?
- Zou u het prettig vinden om via de telerevalidatie service contact met medepatiënten e.a. te hebben?



Het is ook mogelijk om afspraken te maken met medepatiënten, samen doelen te stellen of samen te trainen.
Bijbehorende vragen:

- Zou u met medepatiënten doelen willen stellen?
- Zou u met medepatiënten willen trainen?
- Zou u het prettig vinden om tips en ervaringen uit te wisselen met medepatiënten?
- Wat mogen andere patiënten zien van de door u uitgevoerde oefeningen (hartslag, bloeddruk, oefening wel/niet gedaan, doel wel/niet behaald, etc.)
- Denkt u dat het u steun biedt om met medepatiënten over de behandeling, maar misschien ook andere zaken te praten?

Verder heb ik nog enkele vragen over de invloed van de arts en uw omgeving op uw gebruik van deze telerevalidatie service.
Bijbehorende vragen:

- Vindt u het belangrijk wat uw arts van deze telerevalidatie service vindt? (Waarom wel/niet) *(Op schaal van 1 (niet belangrijk) tot 5 (erg belangrijk) aangeven)*
- Vindt u het belangrijk wat uw omgeving van deze telerevalidatie service vindt? (Waarom wel/niet) *(Op schaal van 1 (niet belangrijk) tot 5 (erg belangrijk) aangeven)*

En als afsluitende vragen van deze module.

- Zou u deze telerevalidatie service willen gebruiken? (Waarom wel/niet)
- Op welk moment in uw behandeling zou u deze telerevalidatie service willen gebruiken? (Bijvoorbeeld in het begin van de behandeling of pas later in revalidatieproces)
- Als u iets kon veranderen aan de telerevalidatie service, wat zou dat zijn? (Zijn er dingen die missen)

Appendix D


Web Based oefenen
CVA Patiënten
Remote Monitoring
Feedback zonder health professional
Feedback met health professional

Appendix E


Lifestyle Management
CVA Patiënten
Active Lifestyle
Healthy diet
Relaxing Lifestyle
Remote monitoring
Feedback zonder health professional
Feedback met health professional

Appendix F


Health monitoring
CVA Patiënten
CVA
Managing health feelings
Managing health complaints
Medication
Remote monitoring
Feedback zonder health professional
Feedback met health professional