EXPLAINING ADHERENCE TO PORTAL-SUPPORTED REHABILITATION TREATMENTS

AN EXPLORATIVE STUDY

Hendrik P. Buimer
S1379739
Faculty of behavioural, management, and social sciences
29-04-2015

UNIVERSITY OF TWENTE.

EXPLAINING ADHERENCE TO PORTAL-SUPPORTED REHABILITATION TREATMENTS

An explorative study

Student

Hendrik Buimer

s1379737

Communication studies

Media and Communication

Faculty of Behavioural, Management, and Social Sciences

University of Twente, The Netherlands

Supervision University of Twente

Dr. T.M. Van der Geest

Dr. J. Karreman

S. Barth MSc

Roessingh Research & Development

Dr. L. Van Velsen

29-04-2015

Abstract

Patient adherence is an important issue in healthcare treatments, such as rehabilitation treatments. Adherence occurs when patients behave in line with agreed prescriptions from care professionals. Previous studies have shown that low adherence can result in negative health outcomes. The use of e-health technologies in rehabilitation treatments, such as portals, is increasing and might be useful to increase adherence. Therefore, it is important to explore the determinants for adherence to portal-supported rehabilitation treatments, which is the main objective of this study. Interviews and monitoring portal usage were used to collect information from patients and care professionals from three different treatments in a rehabilitation centre concerning oncology, lung diseases, and chronic pain. The study showed that (perceived) severity of the disease, perceived benefits from the treatment, environmental factors, and social influence by care professionals and fellow patients are determinants for patient adherence to rehabilitation treatments. Acceptance and use of the portal by patients was determined by the relevance of the portal functionalities within the treatment, the efforts it took to use the portal, the facilitating conditions of the portal, and social influence by care professionals. The most important determinants for acceptance and use of the portal by care professionals were relevance of the portal within the treatment, the role of the portal within the treatment, and the ease of use for patients. Finally, the interaction between care professionals and patients has proven to influence patient adherence to portal-supported rehabilitation treatments. The study found that when care professionals are not using and not stimulating usage of the portal, the usage by patients will decline. To counter this phenomenon, a portal requires functionalities that are perceived as relevant to the treatment by care professionals, and should be launched alongside solid facilitating conditions.

Keywords: adherence; rehabilitation; technology acceptance; e-health; care professionals; patients

Table of Contents

1   Introduction

Adherence is an actual and important issue in healthcare treatments. According to Linn, Vervloet, Van Dijk, Smit, and Van Weert (2011), patients are adherent when their behaviour is in line with the agreed prescriptions from the prescriber. Problems with adherence are especially occurring at patients with chronic diseases and have many negative effects on healthcare, including negative health outcomes and high costs (Vermeire, Hearnshaw, Van Royen, & Denekens, 2001). Previous scholars have provided many reasons that could lead to low adherence (Haynes, Ackloo, Sahota, McDonald, & Yao, 2008). This study will investigate possible determinants of adherence to portal-supported rehabilitation treatments.

The study was conducted at Roessingh Rehabilitation Centre in Enschede, The Netherlands. The Centre recently launched a new portal, a form of e-health, to support some of its treatments. Like e-commerce and e-government, e-health is a term that is increasingly used to describe health services and information delivered or enhanced through internet and related technologies (Eysenbach, 2001). E-health has offered new opportunities for healthcare delivery and support. It is believed that e-health can increase both efficiency and effectiveness of healthcare services (Vance Wilson & Lankton, 2004). However, many of such interventions have problems keeping users adherent to the treatment (Mohr, Cuijpers, & Lehman, 2011). This leads to the fact that this study is aimed at two fields of interest, which are adherence to the treatment, and the acceptance and use of a portal within the treatment.

The portal is currently available in following treatments: oncology, lung diseases, and chronic pain. Patients from each group are in treatment for twelve weeks, in which they learn to cope and live with their disabilities. Each treatment is supervised by a multidisciplinary team that includes social workers, physiotherapists, psychomotor therapists and rehabilitation physicians, who will be referred to as care professionals in the remainder of this article. During the treatment, the lung diseases and oncology treatment group are present at the Centre for three days a week, whereas the treatment group concerning chronic pain is present at the Centre for a complete week once every two weeks. The main use of the portal is to support patients when they are not physically present at the rehabilitation centre. The functionalities in the portal are therefore aimed at supporting the treatment. However, the treatment can be followed without loss of quality if the portal is not used. Examples of functionalities available to patients are information about their disease, activity trackers, and diaries to monitor progress. After the treatment at the rehabilitation centre, the portal remains available to the patients for another twelve weeks, without supervision by care professionals. The context of this study gives the opportunity to investigate adherence to the treatment, and the acceptance and use of the portal which is available to support the treatment.

When investigating adherence to portal-supported rehabilitation treatments it is crucial to investigate acceptance and use of the portal. According to the technology acceptance model (TAM), technology acceptance is based on two beliefs, perceived usefulness and perceived ease of use (Davis, Bagozzi, & Warshaw, 1989). Holden and Karsh (2010) have shown that the TAM is also applicable on acceptance of e-health technology, such as the portal used in this treatment. However, they recommend

further research concerning the applicability of TAM in healthcare contexts and exploratory research to add new constructs and relations to the TAM. This study will respond to this call for action by investigating determinants of acceptance and use of portals of patients and care professionals in portal-supported rehabilitation treatments. The main objective of this study is to explore the determinants of adherence to portal-supported rehabilitation treatments. Therefore, the following main research question is formulated:

MQ   What are the determinants of patient adherence towards portal-supported rehabilitation treatments?

As the portal has such a supportive role in the treatment, adherence to the treatment and acceptance and use of the portal are treated as two separate issues during the research. Due to the supportive nature of the portal, it is possible that that a patient who is adherent to the treatment, hardly uses the portal.

Several scholars have pointed out that the patient-physician relation might be a determinant for adherence (Haskard-Zolnierek & DiMatteo, 2009; Mohr et al., 2011; Vermeire et al., 2001). Therefore, both patients and care professionals are included in the study. This leads to three research questions that will provide the answer to the main question by looking into patient adherence to the treatment and acceptance and use of the portal, from both the perspective of patients themselves and care professionals.

SQ1   What are, from the perspective of patients and care professionals, the determinants for patient adherence towards portal-supported rehabilitation treatments?

SQ2   What are, from the perspective of patients and care professionals, the determinants for the acceptance and use of the portal by patients in portal-supported rehabilitation treatments?

SQ3   What are, from the perspective of care professionals, the determinants for the acceptance and use of the portal by care professionals in portal-supported rehabilitation treatments?

By answering these questions, possible determinants for adherence to portal-supported treatment can be distinguished and further analysed. Findings of the study will have a direct impact on the portal that is the subject of this study and possibly on the appliance of e-health portals in general.

2   Theoretical framework

In the following section literature is discussed that provides guidance for the study. Topics of interest to investigate are determinants of adherence that have been identified by other scholars, as well as determinants for the acceptance and use of information technology (IT) such as the portal used in this case.

2.1   Adherence to the treatment

It is important to look into the research on the determinants of adherence to healthcare treatments. By doing so, a framework can be created for answering the question about the determinants of patient adherence to portal-supported rehabilitation treatments. Compliance and adherence are reoccurring themes in healthcare literature, evolving around the notion that patients do not always follow health prescriptions or advice. The term compliance suggests a patient-doctor relationship in which the patient just has to obey the 'rules' that are prescribed by a doctor (Bourbeau & Bartlett, 2008; Vermeire et al., 2001), whereas adherence is defined as "the extent to which the patient's behaviour matches the agreed recommendations of the prescriber" (Linn et al., 2011).

The definition of adherence by Linn et al. (2011) is emphasizing a shift in the relationship between patients and doctors where patients are more involved in their own treatment, as in the treatments in the rehabilitation centre studied. Patients are included in the treatment to learn to live with their disabilities. During the treatment, patients are given a big responsibility, while care professionals serve in a more supportive role, helping the patients to successfully follow the treatment.

Up to now there is no clear consensus considering the determinants of the degree of adherence. Various phenomena are presented as reasons for low adherence to a treatment such as complexity and duration of a treatment, frequency of medication (Vermeire et al., 2001), perceived severity of the disease (Janz & Becker, 1984), motivation, a lack of voluntariness of the patient (Mohr et al., 2011), or patient-doctor communication (Haskard-Zolnierek & DiMatteo, 2009; Janz & Becker, 1984; Mohr et al., 2011; Vermeire et al., 2001). More research is needed to create better understanding of the subject adherence, such as investigating determinants of adherence towards rehabilitation treatments which are supported by a portal.

2.2   Adherence as a behaviour

Adherence can be considered as a form of behaviour in which a person made the decision to behave according to agreed prescriptions of a care professional. The theory of planned behaviour (TPB) assumes that all behaviour is intentional and is determined by attitudes, normative beliefs, and perceived behavioural control, making it a theory worth using to describe adherence (Ajzen, 1991; Fishbein & Ajzen, 1975). Mohr et al. (2011) state that some people will never shower adherent behaviour due to motivational reasons, no matter the quality of a treatment. Therefore, the TPB and the different motivation types described by Mohr et al. (2011) were used as a framework to analyse determinants for adherence to the treatment.

2.2.1 Attitudes

The first determinant of behavioural intention discussed by the TPB is attitude. Attitudes are defined as being the sum of beliefs about a particular topic, and are determined by two factors: evaluation of an object and belief strength (Fishbein & Ajzen, 1975). This means that persons will evaluate a specific object (e.g. the portal used within this portal) and form a belief about it (e.g. using the portal will increase treatment quality). The combination of evaluation and belief strength will result in an attitude, ultimately resulting in behavioural intention.

Previous studies have shown that patients with chronic diseases often show a low degree of adherence, due to the fact that their disease is not continuously evaluated as severe (Janz & Becker, 1984; Vermeire et al., 2001). In other words, if the disease is not evaluated as being severe, people will have a weak believe that adherence is necessary. Besides perceived severity, Janz and Becker (1984) state that perceived susceptibility (vulnerability to a condition) to the disease will also lead to a behavioural intention. It is likely that attitudes towards the disease will influence health behaviour, which is adherence in this case.

Therefore, it is important to gain knowledge about the patients' perceptions of their disease. In this study, respondents were asked about the impact that the disease has on their daily lives and whether they believe that the treatment is sufficient enough to reduce this impact.

2.2.2 Normative beliefs

Normative beliefs are the perceptions that persons have about what others think they should do (Fishbein & Ajzen, 1975). These beliefs are formed based on perceived beliefs of peers and the degree of motivation to comply with these beliefs. According to Janz and Becker (1984) interpersonal interactions are possibly an external cue that turn behavioural intention into actual behaviour.

In the context of this study, three peer groups can be distinguished that are potentially influential: friends and relatives, patients, and care professionals. Whether these three groups have an equal influence on adherence remains to be seen. A study about medication compliance showed that a positive attitude within a peer group can influence health behaviour (DiMatteo, 1994). However, this does not necessarily mean that peer pressure is always a successful way of increasing adherence.

Research has shown that patients will only accept prescriptions from care professionals when they are perceived as being legitimate, while a feeling of being observed in a controlling way can be devastating for adherence (Mohr et al., 2011). Therefore, it was investigated what peer groups are influential in the context of this study and to what extent persons are motivated to comply with these groups. Therefore, the following research topics are added: the influence that others have on behaviour within the treatment and the usage of the portal, the role that professionals have within the treatment, and the extent to which behaviour in the treatment is voluntary.

2.2.3 Perceived behavioural control

Sometimes, things are simply beyond control of a person. Therefore, Ajzen (1991) developed the idea of perceived behavioural control, comprehending two factors: self-efficacy and controllability

(Ajzen, 1991). Self-efficacy is the belief that people have in themselves when it comes to the capability to behave in a particular way (Dainton & Zelley, 2011). It is believed that a positive self-efficacy will lead to a greater intention to comply with a treatment (Van Es et al., 2002). Therefore, it is important to determine to what extent patients belief they are capable of staying adherent by looking into their goals and expectations within the treatment.

The other determinant for perceived behavioural control, controllability, concerns factors influencing behaviour that is perceived as being beyond a person's control (Dainton & Zelley, 2011). In the case of the current context, controllability could include perceived barriers, such as the feeling that following a treatment might be expensive, time-consuming, or unpleasant (Janz & Becker, 1984). On the other hand, factors like the severity of the disease, and complexity of the regimen (Vermeire et al., 2001) could decrease control over the behaviour. To measure perceived behavioural control, research constructs were added concerning self-efficacy, controllability, perceived barriers to the treatment and the portal, perceived severity of the disease, and complexity of the regimen.

2.2.4 Motivation types

Earlier motivation to comply was mentioned when discussing the TPB (Ajzen, 1991; Fishbein & Ajzen, 1975). This type of motivation is primarily focussed on compliance with the beliefs of others. However, this is not the only type of motivation that is included in the current study. Mohr et al. (2011) state that some people will show a low degree of adherence, no matter the quality of the treatment. They describe four different types of motivation that are capable of influencing adherence: intrinsic motivation (curiosity), identification (based on values and goals), introjection (social approval), and extrinsic motivation (mandatory by authority). The best chance for long-term success occurs when a person is intrinsically motivated. When a person is lacking intrinsic motivation to behave in a way, such as following prescriptions, external motivators should be used to increase motivation. Examples of such external motivators are tangible rewards, feedback (Mohr et al., 2011), or interpersonal interactions (Janz & Becker, 1984; Vermeire et al., 2001). It is important to understand whether, and if so in what way, patients in the rehabilitation treatment are motivated and how their motivation is influenced, since this could very well influence adherence.

2.3 Acceptance and use of the portal

Besides discovering possible determinants for adherence to the treatment, this study will explore determinants for the acceptance and use of a portal applied in a rehabilitation treatment. The problem of low adherence is occurring when it comes to the use of e-health technology over time (Mohr et al., 2011). Much research has focused on the design and implementation of e-health interventions, such as the portal used in the current study. However, according to Holden and Karsh (2010) not enough research has been conducted on how care professionals and patients respond to e-health interventions after its implementation. The context of the current study offers the opportunity to investigate the acceptance and use of a portal that is already available within a treatment.

The portal subject to this study is primarily aimed at patients; it has a supportive role within the treatment. This means the quality of the treatment does not decrease in case the portal is not used by a patient. Potential benefits of the portal for patients are a simplified treatment and the ability to follow the treatment at home, at a time that suits them. However, much of the content of the portal, such as training schemes and exercises, requires care professionals to invest time in maintaining the portal. Benefits from portal usage in a rehabilitation treatment can only occur when the portal is used by both patients and care professionals. Therefore, the determinants of portal acceptance and usage by both care professionals and patients require further investigation.

2.3.1 Technology acceptance model

Davis et al. (1989) developed the Technology Acceptance Model (TAM), which is a model that is focussed on acceptance and use of information technology by employees in an organization. In this case, employees are replaced by care professionals and patients using an e-health portal within the rehabilitation treatment. Holden and Karsh (2010) believe the theory is also applicable for e-health interventions, making it suitable for the current study.

According to TAM3, the third version of TAM, behavioural intention towards IT is primarily determined by perceived usefulness and perceived ease of use (Venkatesh & Bala, 2008). Besides the influence that both determinants have on behavioural intention to accept the technology, it is believed that perceived ease of use has a positive influence on perceived usefulness (Venkatesh & Bala, 2008). Venkatesh and Bala (2008) have extended the TAM by adding possible determinants for perceived usefulness and perceived ease of use. These determinants can be divided into four groups: individual differences (e.g. personality, demographics, and experience); system characteristics (e.g. features of the system); social influence (Mohr et al. (2011) found human support can influence effectiveness of, and adherence to e-health interventions); and facilitating conditions (e.g. organizational support) (Venkatesh & Bala, 2008). The participants in the study were asked about the perceived ease of use and perceived usefulness of the portal.

Perceived usefulness

Perceived usefulness is the extent to which a person believes using IT will enhance task performance. There are two determinants mentioned in TAM3 that are believed to be relevant within this study: subjective norm, and job relevance. The theory states that subjective norm could have a positive influence on perceived usefulness by means of rewards and punishments, social status, or aligning with others' beliefs (Venkatesh & Davis, 2000). However, the strength of subjective norm is likely to reduce when users become more experienced with a technology (Fishbein & Ajzen, 1975; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). The other determinant is job relevance, or the applicability of the system to the task it is used for. In this case, this concerns the fit of the portal within the treatment (Venkatesh & Davis, 2000). To explore the perceived usefulness of the portal in the treatment, it is important to look at the influence of others on portal usage, experience with technology, and the fit of the portal functionalities with the treatment tasks.

Perceived ease of use

Perceived ease of use is the extent to which a person believes using IT is free of effort. When looking at ease of use perceived internal control, a persons' believe about the ability of himself to perform tasks with technology, and external control, which is the perceived availability of sufficient organizational and technical resources to support the system, are important (Venkatesh, 2000; Venkatesh, Morris, Davis, & Davis, 2003). Besides internal and external control factors, objective usability is interesting. Objective usability is the actual effort to complete tasks using technology (Venkatesh, 2000). Whereas Venkatesh (2000) speaks about objective usability (i.e. the actual level of usability), this study will focus on user perceptions concerning usability by inquiring care professionals and patients about the usability of the portal.

To conclude this section, perceived usability and external control are topics that are investigated by adding the research topics perceived usefulness and portal usage. In which the last topic will also focus on reasons for non-usage due to portal limitations.

3 Method

The main goal of the study is to investigate the determinants of adherence to portal-supported rehabilitation treatments. Due to the complexity of the matter and the relatively new subject of the research, adherence to portal-supported rehabilitation treatments, a qualitative research method is most suitable. Qualitative research methods can be used to discover new concepts and relations from data, and are particularly useful to obtain information such as feelings, thought processes, and emotions (Strauss & Corbin, 1998). In this study, besides interviews, monitoring portal usage was used for data collection. Both patients and care professionals from the rehabilitation centre were included in the study. The choice was made to include both groups because patients are the ones who are subject of the treatment, while the expected effects that the interaction between patients and care professionals might have, led to the inclusion of care professionals.

3.1 Participants

A total of 31 patients were approached to participate in the study, of which sixteen patients agreed to participate in the interviews (Table 1). The average age of the patients who participated in the interviews was 49 years; thirteen of them were females. The oncology group was overrepresented in the study. However, this corresponds with the population at the rehabilitation centre. The total number of interviews with patients was 35, spread over three sessions. More information about these different sessions can be found in section 3.3. As presented in Table 1, the number of respondents decreased over time, from sixteen in the first interviews, fourteen in the second interview session, to five in the third interviews. Special attention has to be paid to the two respondents who did participate in the first interview, but did not participate in the second interview. Due to insufficient support from the rehabilitation centre after encountering problems with the portal used in the treatment, they decided to stop their participation in the study.

Table 1 Description participating patients

Treatment	N	Age (M, SD)	Interview 1 (N)	Interview 2 (N)	Interview 3 (N)
Oncology	12	53.8 (7)	12	10	3
Lung	3	34.3 (3)	3	3	2
Chronic pain	1	35.0	1	1	0
Total	16	49.0 (12)	16	14	5

Six care professionals participated in the study, varying in age and profession. The average age of the care professionals was 46.5 years old. The group consisted of three female and three male professionals (Table 2). The care professionals were either contributing to oncology or lung treatments. No care professionals were included in the study that were actively involved in the chronic pain treatment group, due to the fact that there were no respondents of this treatment group until late in the study.

Table 2 Description participating care professionals

#	Age	Gender	Profession	Treatment group
1	29	M	Psychomotor therapist	Oncology
2	59	F	Social worker	Oncology
3	40	F	Physiotherapist	Lung
4	44	M	Physiotherapist	Lung
5	63	M	Rehabilitation physician	Lung (active), Oncology (currently not active)
6	44	F	Physiotherapist	Lung

3.2 Instruments

The research methods that were used in the study were focused interviews and collecting usage data from the portal used in the treatment. Focused interviews are interviews which are guided by a set of topics or questions (Yin, 2003). Even though it might look as if a topic list would limit the topics spoken about, the use of open questions in the interviews results in answers by respondents that were not anticipated by the researcher (Downs & Adrian, 2004), making it the best research method available for this explorative study.

The main goal of the interviews was to collect sufficient data to answer the first three sub-questions of the research, which were to find out the determinants of patient adherence and technology acceptance of care professionals. The topic list, which can be found in Table 3, is based on these research questions and current knowledge about adherence to the treatment and the acceptance and use of technology, as was discussed in the theoretical framework. The full set of questions that belonged to these topics can be found in Appendix A, note that these questions are in Dutch.

Table 3 Topic list interviews

Interview	Care professionals	Patients

#1	1. Work
	2. Treatment
	   a. Expectations
	   b. Treatment plan
	   c. Match
	3. Role of the portal
	   a. Experience with portals
	   b. Choice portal
	   c. Goal of the portal
	   d. Pros/Cons
	   e. Expected use
	4. Near future
	   a. Expectations adherence
	   b. Motivation of patients
		1. Living with the disease
		   a. Impact on daily life
		2. Treatment
		   a. Goals
		   b. Expectations
		   c. Influence of others
		3. Role of the portal
		   a. Acceptance of technology
		   b. Expectations
		   c. Goals
		4. Near future
		   a. Behavioural intention treatment
		   b. Behavioural intention portal usage
		   c. Expectations

#2	1. Recap
	   a. Treatment
	   b. Adherence
	2. Knowledge of the disease
	3. The portal
	   a. Problems
	   b. Instructions
	   c. Adherence
	4. Preview on future
	   a. What's next?
	   b. Availability portal after treatment
	   c. The future
		1. Recap
		   a. Impact on daily life
		   b. Treatment
		   c. Influence of others on treatment
		2. Role of the portal
		   a. Portal usage
		   b. Perceived usefulness
		   c. Influence of others on portal usage
		3. Preview on future
		   a. Self-efficacy
		   b. Portal usage after treatment

#3	1. Recap
	a. Impact on daily life
	b. Adherence to treatment
	2. Portal usage
	a. Reasons for portal usage
	b. Reasons for non-usage

Note. For every topic several questions were formulated as guidelines for the interviewer.

According to Yin (2003), interviews as a research method have some disadvantages, as interviews might result in data that is poorly recalled, biased, and inaccurate. To counter this problem, interview data should be complemented with other data. Therefore, portal usage data of the patients has been collected during the twelve week treatment and follow-up period. The data that was collected consisted of the number of logins to the portal and the usage of particular functionalities on the portal. The usage data gave an insight in the actual usage of the portal by all patients who used the portal, rather than only relying on the ability to recall information by the patients who participated in the interviews.

3.3 Procedure

Thirty-one patients and six care professionals were approached to participate in the study. Both the patients and care professionals who participated voluntarily signed up for the interviews, whereas all approached persons had access to the portal. The participants signed an informed consent form to confirm that their participation in the research was voluntary and that the collected data could be anonymously used in the study.

A schematic overview of the data collection process for patients can be found in Figure 1. The first interview, which was scheduled in the first two weeks of the treatment, was introductory and was aimed at getting an insight in the behavioural intention to stay adherent and use the portal, the goals and expectations of the treatment, as well as the attitude towards technology and experience of the interviewee (1). After this introductory interview usage data from the portal were collected to see whether and how, patients used the portal. Usage data was collected from all patients in the treatment that logged in to the portal at least once (2). After several weeks of data logging a second interview was scheduled. This in-depth interview was focussed on actual behaviour in the treatment and, combined with results from the first interview, gave an insight in the determinants of adherence and portal acceptance and use (3). During the follow up of the treatment, after twelve weeks, the portal usage was logged to analyse whether there was a difference in the portal usage while being on and off the treatment at the centre (4). Five respondents were approached for a third interview through telephone; three from the first oncology group, and two with lung diseases. The patients approached were selected based on the fact that they had been out of the treatment for more than one month. The objective of this interview was to see whether patients were staying adherent to the portal and their treatment prescriptions after the rehabilitation treatment was finished (5). An overview of the themes included in the interviews has been presented in Table 3. The duration of the interviews varied from around twenty minutes in the first two interviews to about five to ten minutes in the third interview.

Between September 2014 and February 2015 the usage data of all patients that used the portal were tracked. Upon entering the portal for the first time, patients were asked to give permission for their

usage data being tracked for scientific purposes. Only users who agreed on this were included in the study. Thus, the usage data from people who did not sign up for the interview sessions, but who were using the portal and gave permission for usage tracking, were also tracked.

Treatment			Follow up	
(1)	(2)	(3)	(4)	(5)
Interview 1	Portal usage data	Interview 2	Portal usage data	Interview 3
(N=16)	(N=31)	(N=14)	(N=31)	(N=5)

Figure 1 Research design patients

Care professionals were interviewed twice over a timespan of several weeks (Figure 2). These interviews were scheduled in the same weeks as the interviews with patients with lung diseases and the first oncology group included in this study. This was done to give care professionals the opportunity to come up with real examples from current treatment groups. It was decided not to do a third interview with the care professionals, due to the fact that the treatment stops for the care professionals after twelve weeks, which means they have no role during the follow-up period. The goal of the first interview was to gain knowledge about the intentions and expectations of care professionals on adherence to the treatment and their intentions to use (or not use) the portal within the treatment. The main objective during the second interview was retrospective, looking back on the treatment of a particular treatment group, providing an insight in the actual usage of the portal and patient adherence.

Treatment			Follow up
(1)		(2)	
Interview 1	X	Interview 2	X
(N=6)		(N=6)	

Figure 2 Research design care professionals

3.4   Analysis

3.4.1   Analysis of the qualitative data

The data collected in this research was analysed using a thematic analysis method. This means the data set was analysed in order to distinguish various themes (Braun & Clarke, 2006). Both the interviews with patients and care professionals were recorded with a voice-recorder. All the audio-files were transcribed and divided into short fragments that included statements relevant to the research questions. These fragments varied in length from a group of words to multiple sentences. All the fragments were then coded into different categories based on the theories and determinants discussed in the theoretical framework, which can be found in section 2. These codes were inspired by determinants from the TPB (Ajzen, 1991), TAM3 (Venkatesh & Bala, 2008), and motivation types (Mohr et al., 2011), complemented with often other possible determinants and often mentioned topics in the interviews. An overview of the coding scheme can be found in Table 4. Finally, the fragments in the transcripts were analysed using ATLAS.ti. The analysed data was then used to identify determinants for adherence to portal-supported rehabilitation treatment.

Table 4 Coding scheme

Code	Description	Based on construct
Adherence to the portal	Intention to use the portal or actual usage of the portal.	Behavioural intention (Venkatesh & Bala, 2008)
Adherence to the treatment	Intention to stay adherent to the treatment or actual adherence to the treatment.	Adherence (Linn et al., 2011); Behavioural intention (Fishbein & Ajzen, 1975)
Accountability	Accountability within the treatment, including both statements about process and result accountability.	Accountability (Mohr et al., 2011)
Disease	The (perceived) severity, duration, susceptibility, and health knowledge as perceived by the interviewed person.	(Janz & Becker, 1984)
Ease of use	The extent to which a person believes using an IT is free of effort. Including topics such as availability, accessibility, usability, and user experience.	Perceived ease of use (Venkatesh & Bala, 2008)
Experience	Whether individuals have experience with using IT such as the portal, computers, laptops, and tablets.	Experience (Venkatesh & Bala, 2008)
Facilitating conditions	Organizational support surrounding the portal. Including hardware, instructions, and available time.	Facilitating conditions (Venkatesh & Bala, 2008)
Interpersonal motivation cues	Cues that can be traced back to other persons and influence motivation or (intention to) behave.	Extrinsic motivation, introjection (Mohr et al., 2011); Normative beliefs (Fishbein & Ajzen, 1975)
Intrapersonal motivation cues	Cues that are from inside the person and influence motivation or (intention to) behave.	Intrinsic motivation, identification (Mohr et al., 2011); Attitude (Fishbein & Ajzen, 1975)
Environmental motivation cues	Cues that are not traceable to any person, but do have an influence on the motivation or ability of a person to perform particular behaviour.	Perceived behavioural control (Ajzen, 1991)
Role of the portal	The (expected) role of the portal within the treatment (e.g. supportive or leading).	
Role of the professional	The (expected) role of the professional within the treatment (e.g. supportive or leading).	
Treatment	Expectations, goals, and the usefulness of the treatment.	(Janz & Becker, 1984)
Attitude towards technology	The general attitude of a person towards technology.	
Usefulness of the portal	The extent to which a person believes using IT will enhance task performance.	Perceived usefulness (Venkatesh & Bala, 2008)
Usefulness (other)	Other statements that concern usefulness of something that is not the portal or the treatment.	
Voluntariness	Perceived voluntariness (or mandatory) when it comes to particular actions.	Voluntariness and controllability (Mohr et al., 2011)

Note. For readability purposes, the code adherence to the portal is referred to as usage of the portal in the report.

Introducing interpersonal, intrapersonal, and environmental motivation cues

After coding the first interviews, the researcher found several codes related to adherent behaviour were too detailed and showed too much overlap with other codes. Therefore, the decision was made to combine codes originating from motivation (Mohr et al., 2011) and TPB (Ajzen, 1991) into three new codes. First of all, interpersonal motivation cues are motivation cues that influence motivation and originate from other persons. This code was based on normative beliefs (Fishbein & Ajzen, 1975), extrinsic motivation, and introjection (Mohr et al., 2011). Second, intrapersonal motivation cues are cues that stem from inside a person, and comprehends fragments that could be coded as attitudes (Fishbein

& Ajzen, 1975), intrinsic motivation, and identification (Mohr et al., 2011). Finally, environmental motivation cues are cues that are not directly traceable to other persons.

Reliability of the coding

A second coder was added to check the reliability of the coding. The second coder was instructed which fragments required a code and the number of codes to assign to each fragment. A fragment consists of one or more sentences and could have multiple codes assigned to it. Cohen's kappa was calculated to measure inter observer agreement. In Table 5 the calculated kappa's for each of the interviews can be found. As can be seen, the kappa's vary between .535 and .735, which means the strength of the agreement between both coders was moderate to substantial (Landis & Koch, 1977). The kappa statistics found were a reason to discuss the coded interviews with the second coder to find an explanation for the differences in kappa's. This discussion resulted in some alterations for future coding. A reoccurring flaw in the coding was the fact that the first coder thought one code was sufficient enough to describe a fragment (Appendix B), where in fact multiple codes were applicable. A striking example is the following: in the case of interviews with professionals, the first coder assigned interpersonal motivation cues to 32 fragments. The second coder, on the other hand, assigned fifteen of these fragments to role of the professional. In the example given, both coders had assigned different codes, but agreed that each of the assigned codes would be applicable to the fragment. After a discussion with the second coder the decision was made to increase the number of times that multiple codes were assigned to single fragments. Due to the lack of available time and the successful increase of the recoded kappa for the second interview with professionals, the decision was made not to recalculate Cohen's kappa for any other interviews.

Table 5 Overview of Cohen's kappa's

Interview	Cohen's kappa	Strength of Agreement (Landis & Koch, 1977)
Interview 1 – Patients	.554	Moderate
Interview 2 – Patients	.586	Moderate
Interview 3 – Patients	.735	Substantial
Interview 1 – Care professionals	.535	Moderate
Interview 2 – Care professionals	.536*	Moderate

*Note. * This kappa was reached after recoding the interviews after a discussion between the first and second coder. The kappa before the discussion with the second coder was .418.*

3.4.2 Analysis of the quantitative data

By analysing the number of logins into the portal and visits to particular pages, it was examined whether people used the portal or not. Due to the large number of pages on the portal, it was decided to assign each page into one of four categories. First of all, information pages were available and in use in all the treatment groups. This category beholds all the pages that are solely used to present information related to the disease or treatment. Videos are the second category, and was based on the fact that all exercises included videos with instructions on how exercises should be executed. By analysing the amount of times a video was watched it was possible to get an idea of the amount of exercises done. The third category was the graded activity scheme, which was just one functionality, however, it did

play a key role in some treatments. This functionality was used by the psychomotor therapist to monitor walking or cycling activity of patients over time. It was the responsibility of the patients to update the time they spent on walking and cycling. The final category that was defined are questionnaires, which includes diaries and short questionnaires about the disease or other related topics.

An analysis of the number of logins was done to see which functionalities were used at what time. By combining these results with information gained from the interviews, possible explanations for usage were explained. This can be found in the results section.

4   Results

In the following sections the outcomes of the data collection are presented, using the research questions as a starting point. First, the actual usage data will be presented per treatment group. In the second section, information extracted from the interviews with both patients and care professionals about patient adherence will be presented. In the third paragraph, the acceptance and use of the portal by patients will be presented, using data from the interviews with both patients and care professionals. The fourth section includes the presentation of the determinants of technology acceptance and use by care professionals, as found in the interviews with this group.

It is important to note that results are presented based on possible determinants, without distinguishing in which interview (e.g. first, second, or third) statements about these determinants were made. In Appendix C, an overview of the codes assigned can be found. This is done because the study was exploratory and aimed at finding possible determinants for adherence to the treatment and the acceptance and use of portals. The information gathered in the various interview was complementary, rather measuring change in the various determinants over time. A second issue to take into account is the fact that the results will be presented using the terminology that was introduced in section 3.4.1.

4.1   Portal usage of the patients

In Figure 3 the average numbers of logins per week is shown for each of the treatment groups and a combined average for all groups. The legend shows the starting month of the groups and the number of patients included in the group. It is possible to recognize a pattern in the logins across all groups. The number of logins is relatively high in de first weeks of the treatment (46% of all logins were between the third and the fifth week), after which the number of logins goes down gradually. The number of logins is higher in groups which started later in time (oncology 12-'14 and pain 12-'14). At the time of the analysis of the data, these groups were in treatment for nine weeks, making it impossible to analyse data for these groups for the entire twelve week treatment and six week follow-up. Nevertheless, these groups show a decline in the number of logins over time, similar to other treatment groups.

Adherence to portal
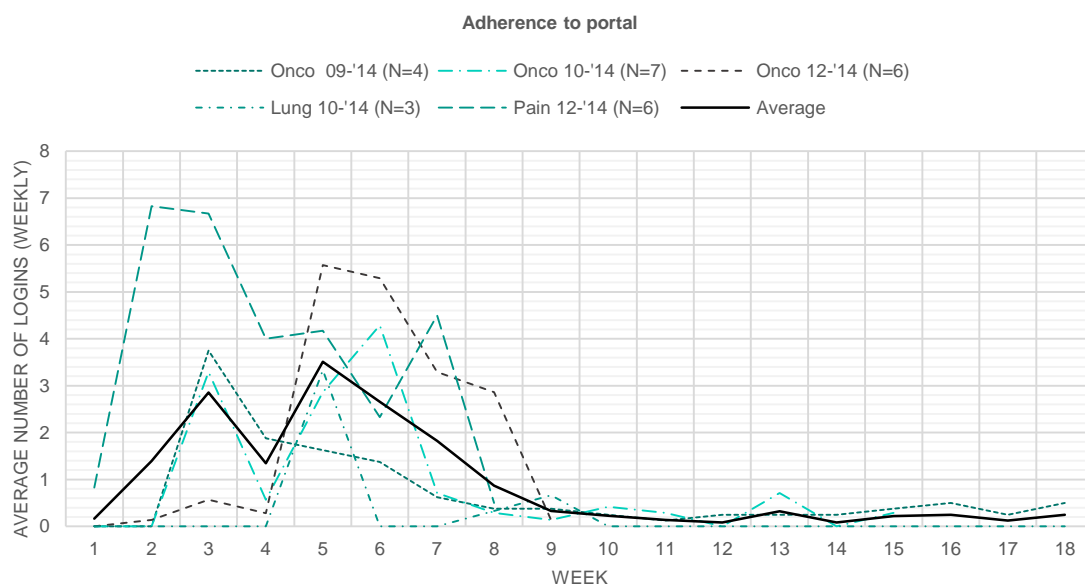
Figure 3 Adherence to the portal per treatment group, based on number of logins per week

In Figure 4 the number of visits to functionalities per group is presented. Functionalities are used in the first weeks of the treatment, but after a couple of weeks a decline is noticeable for all functionalities. Over time we can see that all functions are sporadically used. There is a peak in visits to the graded activity scheme in the sixth week of the treatment. Possible explanations for the peak and the decline in usage after the peak are presented in the sections 4.3 and 4.4.

Functionality usage
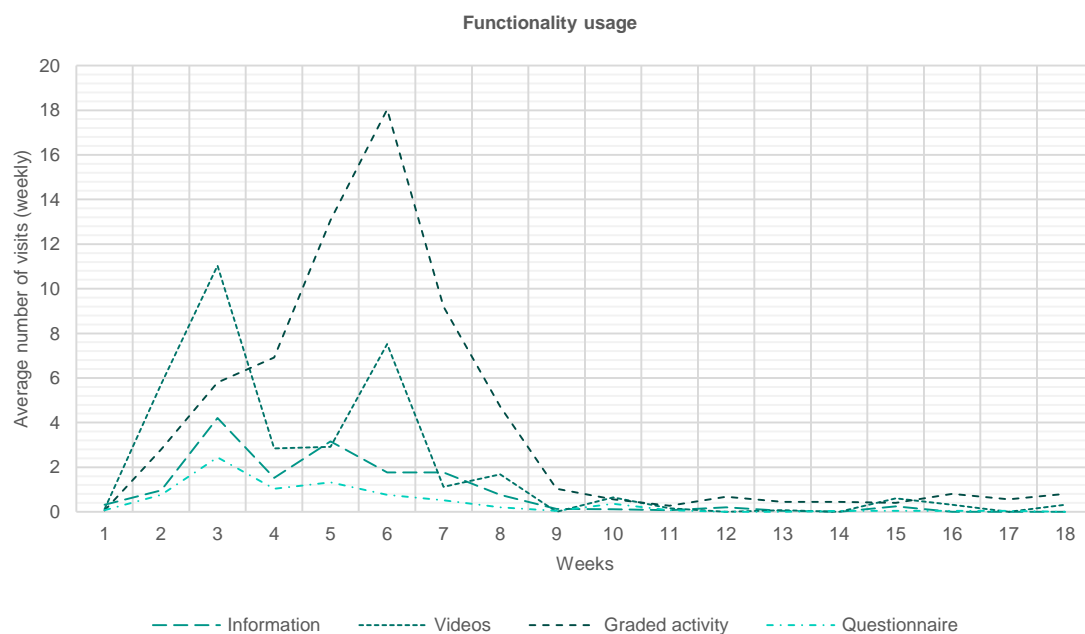
Figure 4 Usage of the most important functions on the portal

4.2 Determinants of patient adherence to the treatment according to patients and care professionals

First of all, results will be presented concerning the determinants of patient adherence to portal-supported rehabilitation treatments, from both a patients' and care professionals' perspective. All interviews were used to gain an insight in the answers to this topic. Where the first interviews were mainly focussed on getting an insight in behavioural intention, the second and third interview (in the case of patients) were used to analyse actual behaviour and a possible mismatch between behavioural intention and actual behaviour.

The interviews were divided into 1103 fragments, which were assigned to one or more of the eighteen codes (which can be found in Table 4 in the method section). An overview of the coding amounts and percentages of each of the interviews can be found in Appendix A. When looking at codes that are related to the adherence to the treatment, five codes stood out: intrapersonal motivation cues, interpersonal motivation cues, environmental motivation cues, treatment, and disease. An explanation on how these codes determine adherence can be found in the following section.

4.2.1 Intrapersonal motivation cues for patient adherence

The first code that provided information on adherence to the treatment are intrapersonal motivation cues, which are all cues that stem from the individuals themselves and is based on attitudes (Fishbein & Ajzen, 1975), intrinsic motivation, and identification (Mohr et al., 2011). In the three interviews with patients, only 6% of the fragments were coded into this category. However, this does not mean that the patients included in the study were not motivated. In fact, the interviews did prove the opposite. The patients in this treatment were highly motivated to stay adherent to the treatment and had clear expectations and goals for the treatment. This was both stated by patients themselves and confirmed by care professionals. The first reason for this intrinsic motivation were the perceived benefits of the treatment. Most patients had really positive expectations of the treatment.

Patient 4 – Oncology – 1st interview

"Ja, eigenlijk…. Dit is gewoon zo'n mooie therapie, dit is zo fantastisch dat dit er is. Ik ken meer mensen die… ik heb dan een soort burn out gehad, vind ik zelf dan, waardoor ik hier zit na mijn ziekte."

Yes, actually... This is just such a great therapy, it is so fantastic this is available. I know more people who… I have had some sort of burn out, I think, as the reason for why I am here after my disease.

Besides the benefits of the treatment, the perceived disease severity also influences the attitude towards adherence. In the example mentioned below, patient 6 states he is aware of the negative impact of the disease on his life. To minimize the impact of the disease, he is really motivated to stay adherent to the treatment to improve his health condition. This reason for intrapersonal motivation was heard more often throughout the interviews with patients.

Patient 6 – Lung – 1st interview

"Ja, ik heb er wel heel veel moeite mee gehad… Omdat ik nog maar jong ben, ik ben nog maar 24. En ik wil nog niet bij de pakken neer gaan zitten. Ik vind… net zoals jou, gewoon verder in het leven en niet als een zoutzak in de bank gaan zitten de hele dag."

Yes, I have had a lot of trouble with it... Because I am still young, I am only 24 years old. And I do not want to give up. I want… just like you, to continue my life and I do not want to sit on the couch the entire day.

The care professional quoted above, states that intrapersonal motivation cues are probably a really important reason for patients to stay adherent to the treatment. However, the fact that all patients who participated in the interviews showed high motivation to stay adherent, makes it is hard draw to draw conclusions about the effect that intrapersonal motivation cues might have on adherence to the treatment.

4.2.2 Interpersonal motivation cues for patient adherence

The second coding category that is discussed are interpersonal motivation cues, which includes quotes that mention the influence of peers on the motivation of an individual. This code was based on normative beliefs (Fishbein & Ajzen, 1975), extrinsic motivation, and introjection (Mohr et al., 2011). In the interviews with patients there are 235 quotations that were coded to interpersonal motivation cues, which is 16.2% of the total amount of quotes by patients. As expected, patients believe that others are capable of influencing their intention to stay adherent. Interestingly though, family and friends were almost never mentioned as influencing factors for motivation. The two groups that do seem to influence adherence are care professionals and other patients within the treatment group.

Besides patients, care professionals are likely to influence the intention to stay adherent. They can have both a positive and a negative influence. Reasons mentioned for a positive influence of care professionals on patient behaviour are social pressure felt to comply with care professionals' instructions, care professionals' legitimacy, and the enthusiasm of care professionals during the treatment. In general, monitoring of the patients by care professionals was perceived as something positive, as if the care professionals care about their patients, rather than it being perceived as being controlling. Besides positive influence, care professionals are capable of negatively affecting patient adherence by showing lack of enthusiasm or providing insufficient guidance within the treatment.

Secondly, several patients stated that the attitude within the treatment group they are in also was a potential influencer of their motivation to stay adherent. However, the downside is that a negative attitude within the treatment group also has a negative influence on the adherence of patients within the group. Making the attitude within a treatment group a very important determinant of patient adherence.

To conclude, it is very likely that adherence to the treatment is strongly influenced by peers such as care professionals and fellow patients, whereas the influence of family and friends is not often mentioned as a reason to stay adherent. An explanation for this could be the fact that patients feel that their peers and care professionals are better capable of understanding their health situation than family and friends, as can be seen in the quotes below.

4.2.3 Environmental motivation cues for patient adherence

The quote below shows a patient who is motivated to participate in the treatment and to stay adherent, but who is unsure how her body will respond to the intensity, as it is out of her control. Such determinants for adherence were defined as environmental motivation cues. Environmental motivation cues are cues that are not originating from other persons, but are able to influence the motivation or the ability to stay adherent. Expected determinants belonging to this category were complexity of and barriers to the treatment, and severity of the disease.

The treatment, especially the multidisciplinary approach of if, including mental and physical aspects, was often mentioned as a positive feature of this particular treatment. However, the intensity of the treatment sometimes leads to low adherence, as can be seen in the statements below. The quoted patients state that the intensity of the treatment was a cause for fatigue or a lack of concentration,

making it harder to stay adherent to the treatment. In other words, the self-efficacy of the patient was affected by the intensity of the treatment, having its effects on the adherence of the patient.

Patient 15 – Oncology – 2nd interview

"Maar waar ik heel veel moeite mee heb, is bijvoorbeeld arbeid, dan krijg je bijvoorbeeld opdrachten om te doen. Dan moet je een weekindeling maken, met 168 uur, nu dat je thuis zit. En dan een weekindeling als je straks weer aan het werk gaat. En daar heb ik heel veel moeite mee, daar kan ik mij niet toe zetten. Dat soort opdrachten dat kost mij te veel energie allemaal nog. Omdat je zo veel dingen tegelijk wilt werken. Je wil aan zo veel dingen tegelijk werken. En dat vind ik gewoon te veel."

But I have a lot of troubles with labour, for example if you get exercises. You have to create a schedule for a week, including 168 hours, now that you are at home. And a schedule for the moment that you are back at work. I have a lot of troubles doing so, because I cannot motivate myself to do it. Such exercises are too energy consuming for me. Because you want to do so much things at the same time. I just find that too much.

Patient 2 – Oncology – 2nd interview

"Twee dagen werken, twee dagen Roessingh, en dan dat. Ik bedoel, ik kwam de hele tijd terug met een heleboel aantekeningen en een heleboel ideeën en een heleboel dingen die ik nog een keer wilde lezen en dingen die ik wilde doen en die ik anders wilde doen en… naar buiten en bewegen hoorde ook nog weer daarbij. Af en toe was het wel gewoon heel erg veel. En in het begin had ik nog wel zoiets van, dat moet ik ook elke dag, en op een gegeven moment heb ik dat ook een beetje los gelaten."

Two days at work, two days at Roessingh, and then that. I mean, I was coming back with a lot of notes, ideas, and things that I wanted to read and do, that I wanted to do differently and…. To go outside and to exercise was a part of it. Every now and then it was just a lot. At the beginning I was thinking like, I should do that every day, but at a certain point I did let that go.

Besides the treatment, the disease can also act as an environmental motivation cue, uncontrollable by the patient, able of influencing the intention to adhere to the treatment. An example mentioned by the patients is increased severity of the disease, which made them physically unable to stay adherent.

Patient 14 – Oncology – 2nd interview

"Ik probeer de ontspanningsoefeningen wel te doen. En dat kan... De ene keer gaat het goed en de andere keer gaat het ook niet goed. Dat is heel erg wisselend. En ik ben gewoon heel erg moe als ik hier weg kom. Dan moet ik eerder bijvoorbeeld anderhalf uur slapen. Dan ben ik er weer, maar daar schaam ik mij ook niet voor. Dat is gewoon de intensiteit die je hier hebt, maar het samen hier zijn... En ik denk wel dat ik het straks even ga missen, ja..."

I try to do the relaxation exercises. Sometimes I am successful in doing so and sometimes I am not. That is varying. I am just really tired when I leave here. Then I need one and a half hours of sleep, for example. Then I am fine again, and I do not feel ashamed for it. It is just the intensity of the treatment, but being here together with peers… I think I will miss it.

Patient 2 – Oncology – 3rd interview

"In de weken dat ik griep had niet, want dan ging ik ook niet lopen enzo. Want daar had ik helemaal geen zin in."

During the weeks I had a flu I did not, because I did not go walking etcetera. Because I was not up for it at all.

Sometimes, environmental motivation cues can be part of a trade-off with intrapersonal motivation cues. An example of such a situation is shown in the quote below. The quoted patient stated that the cold weather was a reason for her not to walk outside, even though it was prescribed by the care professionals to go walking. The weather is obviously outside the control of the patients, but the attitude of the person towards the necessity of following the treatment prescriptions was not strong enough to outweigh the impact that the weather had on her intention to go walking.

Patient 2 – Oncology – 2nd interview

"...naja van de week vond ik het gewoon echt veel en veel te koud. Dus toen ik eenmaal binnen was dacht ik, ik ga echt niet meer lopen."

Last week it was way too cold. So the moment I came home I thought, I am not going to go out for a walk anymore.

It can be concluded that environmental motivation cues were capable of influencing patient intention and the ability to stay adherent. Environmental motivation cues that seem to have an impact on adherence to the treatment are: severity to the disease, barriers to, intensity of, and perceived benefits of the treatment. Next to these determinants, factors such as the weather outside or available time should be considered possible determinants for adherence to the treatment.

4.3 Determinants of portal acceptance and use by patients according to patients and care professionals

The rehabilitation treatment observed in this study was supported by a portal. Needless to say, any effects a portal could possibly have, will be neglected when it is not used. Therefore, it was important to analyse the considerations that patients make when choosing to use or not to use the portal within the treatment. In other words, what are, from the perspective of patients and care professionals, the determinants for the acceptance and use of the portal of patients in portal-supported rehabilitation treatments?

As could be seen, the usage of the portal declined over time. This was also mentioned during the interviews. During the first interview eleven out of the sixteen participants stated they had the intention to use the portal, while only two people stated they would not use the portal. As for the second interview, six patients explicitly stated they were not using the portal anymore, while two others stated they have noticed a decrease in their usage between the two interviews. During the third and final follow-up interview, in which five patients were approached, only one person stated she was still actively using the portal. In the following sections it will be discussed what the determinants are for the acceptance and use of the portal, so an explanation can be found for the decline in usage.

4.3.1 Perceived usefulness of the portal

First of all, perceived usefulness of the portal is discussed. There were 25 quotations that were assigned to both usefulness of the portal and adherence to the portal categories. Based on the literature, possible determinants that were expected to have an impact on perceived usefulness were interpersonal motivation cues (i.e. subjective norm) and the fit within the treatment (i.e. job relevance).

Interpersonal motivation cues seem to determine acceptance and use of the portal. Especially the communication from care professionals to patients through the portal is important. As one of the patients quoted below says, the portal would have been more interesting to use if care professionals would communicate through the portal. This is something that was not possible in the current version of the portal. Besides noticing that professionals are using the portal, patients state they were more likely to use the portal if care professionals were explicitly stimulating patients to use functions on the portal and linking the portal with other elements in the treatment.

A second determinant for perceived usefulness is the fit of the portal with the disease of a patient and the treatment. Especially in the lung treatment group the perceived usefulness was low due to a low perceived usefulness of the portal by both patients and care professionals. The portal was aimed at groups of patients, rather than individuals. This was useful in treatments where groups were generic, such as the oncology treatment. However, in the treatment that is aimed at patients with lung diseases, this approach seems non-applicable. The lung treatment group is a diverse and complex group, including patients with different diseases that were treated in different ways. An example is shown in the first quotation below. The quoted patient has sarcoidosis, a disease that is included in the lung diseases treatment group, but can also affect other parts of the body than the lungs. In this case, the patient has much more problems with his joints, making most of the content that can be found on the portal useless.

4.3.2 Perceived ease of use of the portal

According to TAM (Venkatesh & Bala, 2008), perceived ease of use is the second determinant of acceptance and use of technology. This can also be concluded from the interviews with both patients and care professionals. Based on the interviews, it can be said that ease of use is most likely to influence adherence in a negative way. This means that if patients perceive the portal as hard to use, they are less motivated to use it. Often mentioned reasons for not using the portal that were related to ease of use were the inability of the portal due to technical issues and the lack of possibilities to access the portal from different devices, such as a tablet. There were patients who stated that they were more likely to use the portal if it was available on a tablet.

Patient 1 – Oncology – 1st interview

"Dan geef ik het al haast geen kans. Zorg maar eerst eens dat het goed werkt, en dan kom maar eens weer terug."

Then I barely give it a chance. First make sure it works properly, and then ask me again.

Patient 13 – Oncology – 1st interview

"Jawel, ik kijk wel eens, maar ik moet nu elke dag een stuk lopen en ik moet elke dag wat in het logboek zetten. Dus dat moet ik op de computer doen. Dat vind ik wel heel lastig eigenlijk. Het is niet vervelend, maar ik doe het liever op de iPad."

Yes, I look every now and then, but currently I have to walk a distance every day and write something in the diary. Which I have to do on the computer. I find that pretty difficult actually. It is not unpleasant, but I would rather do it on the iPad.

Patient 2 – Oncology – 2nd interview

"Ja, dan dacht ik van, nou ik onthoud het wel even en dan vul ik het morgen wel in. Want dan moest ik ook voor iets anders achter de laptop. Ik wil niet 's avonds weer elke keer die laptop pakken. Een tablet pak je net iets makkelijker."

Yes, and then I thought, I will remember it for now and fill it in tomorrow. Because then I had to do something on my laptop anyway. I do not want to grab my laptop every night. A tablet is somewhat easier in that manner.

Patient 9 – Oncology – 1st interview

"Als ik het op mijn iPad kan, dan gaat het makkelijker, dan… Daar doe ik toch wel dingen op en daar bekijk ik op het ogenblik ook mijn mail op en dan… Maar als ik er echt voor moet zorgen dat mijn zoon er niet is en dat ik dan achter de laptop kan, en dan denk ik 's avonds nog van wat wil ik nog en dan is die bezet."

If it was possible to do it on my iPad, it would be easier, then... I use it more often and I also use it to check my e-mail and then… But if I have to make sure that my son is not at home so I can get on the laptop, and then I think about what I want to do at night, but then the laptop is taken.

Actual severity of the disease showed a capability to influence the perceived ease of use of the portal. People who were participating in the oncology treatment, often have a lot of things going on in their mind and find it hard to structure their thoughts, as was stated by patient quoted below. Therefore, it is undesirable to create a portal that is perceived as yet another challenge within the treatment, as it negatively impacts usage of the portal.

Patient 15 – Oncology – 2nd interview

"Nee, niet zo. Ik doe meestal via de extra oefeningen en dan... Die andere dingen gebruik ik bijna niet, nee. Ik zoek nou op dit moment eigenlijk de makkelijkste weg, daar ben ik heel eerlijk in. Ik neem niet de tijd om alles uit te zoeken, omdat mijn hoofd daar helemaal niet toe staat."

No, not like that. I usually do extra exercises and then... The other things I hardly use, no. I only go for the easy way at the moment, if I am honest. I do not take time to figure everything out, because I am not up for it at the moment.

Patient 14 – Oncology – 2nd interview

"Ik heb het portaal gebruikt, alleen de laatste week niet, omdat ik wat grieperig was en gewoon moeite met mezelf had. […] Maar ik ga het wel weer doen."

I used the portal, apart from the last week, because I had a flu and had some troubles with myself. […] But I will do it later on again.

Facilitating conditions also had a big impact on the usage of the portal in the treatment. As was mentioned in the method chapter, there were two patients who were unable to login to the portal. Despite efforts by the patients to fix this problem, the issue was not resolved before the end of the treatment. Eventually, the patients gave up on the portal and were also unwilling to further participate in the study. This incident shows the importance of good facilitating conditions and support when applying a portal in the treatment.

According to the professionals, experience with technology might influence the portal usage of patients. The patients at the rehabilitation centre vary quite a lot in age and internet skills. The professionals believed that persons who are more experienced with computers are more likely to make

use of the portal. However, support for this perception was not found in the portal usage data of patients and the interviews with patients.

4.4   Determinants of portal acceptance and use by care professionals

Interviews with the care professionals were used to identify the determinants for the use of the portal within the treatment. The coding of these twelve interviews in 759 codes assigned to 544 quotations. In this section, the most interesting findings from these interviews will be presented.

4.4.1   Perceived usefulness of the portal

The topic that was by far the most discussed in the interviews with the care professionals was the usefulness of the portal. A total of 142 quotes were assigned to this category, which means 18.7% of all quotes by professionals were assigned to perceived usefulness. The topic was discussed in each of the interviews. The importance of usefulness is made clear in the following quotes. The first quote states that physicians from the lung treatment will not even consider using the portal, unless they see use for it. Many factors can determine whether a portal is being perceived as useful or not, as is stated by the second professional quoted below. In this section several determinants of perceived usefulness are discussed.

An important factor of determining usefulness is the role that the portal has within the treatment, which was spoken about in 47 quotations (6.2% of all quotes by professionals). A portal can either have a supportive or a leading role in the treatment. The professionals subjected in this study were more in favour of a more supportive role of the portal in the treatment. In cases of self-management, which was a reoccurring theme during the interviews, professionals could foresee a role for the portal in creating an insight for the patients in the development of the disease and treatment over time.

Besides the role of the portal, the moment in time of appliance of the portal is important. While some professionals state that the portal usage should be woven into the twelve week program, other professionals see more benefits for the portal when it is applied after the treatment. Some professionals believe that using the portal in the treatment could cause an information overload for the patients, having negative consequences. Therefore, the moment of application of the portal should be thoroughly addressed before implementing a portal in a healthcare treatment.

The treatment group and discipline of the care professional were important determinants of the perceived usefulness of the portal. In the rehabilitation centre observed in this study, several disciplines were involved in the treatment of patients. Where social work focused more on mental health, physiotherapists and sport disciplines were much more focused on physical health. The interviewed psychomotor therapist was wondering how a portal could possibly benefit his discipline at all. In this discipline, professionals feel the need to see their patients face-to-face in order to be able to provide useful feedback. On the other hand, other professionals, such as the social worker in the oncology treatment, saw opportunities to support the treatment by providing particular information through the treatment.

"Wat kunnen wij nou als doe-discipline, nou toevoegen aan zo'n programma? Want wij willen mensen toch graag zien. Dat we denken van, goh, hoe doen ze de oefening nou? Hoe ervaren ze het? En hoe bedenk je dat nou in zo'n programma. Daar lopen wij heel erg tegenaan. Dat dat gewoon lastig is." [...] "Nee, dat zie ik in de toekomst nog niet gebeuren. Dus op ons vlak wordt het gewoon lastig."

What can we add to such a programme as a physical discipline? Because we would like to see the people in person. As we want to know, how are they executing the exercise? How are they experiencing it? And how can you apply that in such a programme? That is a challenge for us. It is just really complex. […] No, I do not see that happening in the future. For our discipline it is just really hard.

4.4.2   Perceived ease of use of the portal

The other determinant for behavioural intention, according to TAM, is perceived ease of use. Interestingly, perceived was most often mentioned by the professionals that claimed to use the portal actively in their treatments. 83% of all quotes about perceived ease of use were made by these two out of the six professionals. Ease of use was hardly mentioned by the other professionals, who were generally negative about the usefulness of the portal and therefore did not use the portal as much, whereas the professionals that mentioned ease of use were more positive about the usefulness of the portal and applied it in the treatment.

Other determinants that could possibly influence perceived ease of use were speed issues, organizational issues and the lack of accessibility across devices. These issues mentioned as problems which occurred for care professionals themselves and from what they have heard from patients included in the treatment groups. The interviewed movement teacher stated that the lack of speed in the portal and limited available time resulted in the inability to monitor the usage of all the patients in the treatment. Whereas the social worker stated that the design of some functionalities lacked usability which made it time consuming to work with.

"Ik heb een half uur staan om voor één groep te controleren van… hoe doen ze dat nou. En dat zijn acht mensen. Als ik zie hoe het portaal nu werkt, dat gaat allemaal niet zo snel. Dus als ik in moet loggen ben ik al twee minuten verder voordat ik in het programma zit. Als ik zo'n GA-schema per patiënt moet kijken, dan ben ik voor zes patiënten al een half uur kwijt."

I have half an hour to check one group to see… how they are doing it. Which are eight persons. And if I see how the portal works at the moment, it is really slow. When I login I need two minutes to get into the program. If I have to check a GA scheme per patients, it takes half an hour for only six patients.

"Dat is ook een kwestie van gebruikersgemak, dat je steeds van week tot week, moet je weer een nieuw scherm oproepen, wat langzaam loopt. Dat is jammer."

That is a case of usability, that if you need to do it week by week, opening new screens, which are loading slowly. That is a shame.

Where previous mentioned issues were mainly focused on the portal itself, there were also determinants of perceived ease of use, which were not directly related to the portal, such as facilitating conditions. Examples are a lack of technology support, insufficient instructions for the professionals, and a lack of availability of time to work with the portal. This shows that solid facilitating conditions are required in order to successfully implement a portal in the treatment.

Care professionals also mentioned ease of use as an important requirement for the patient side of the portal. Care professionals will not apply a portal in the treatments if they believe that the portal is yet another burden for the patient. One professional even stated she was unsure whether she would continue to use the portal in new treatment groups, as she noticed that two of the patients in the first oncology group were unable to access the portal.

4.4.3   Interpersonal motivation cues for using the portal

Besides usefulness and ease of use of the portal itself, there were other determinants for the acceptance and use of the portal in the treatment, of which the first are the interactions between the patient and the professionals, both on and off the portal. Earlier, we saw that professionals were not keen on using a portal that increases the difficulty of the treatment for patients. Statements from professionals reveal that when patients are not actively using the portal, professionals are less motivated to continue to use the portal. On the other hand, the professionals do also believe that if they are not actively using the portal, the patients will not use the portal.

4.5 Summary

To summarize, the usage of the portal by patients was rather low. Nevertheless, usage data showed a peak between the third and the fifth week, which can be explained by the fact that the care professionals were stimulating portal usage at that time.

Patient adherence seems to be determined by six factors, which are: perceived benefits of the treatment, perceived severity of the disease, social influence from care professionals and other patients within the treatment group, intensity of the treatment, actual severity of the disease, and environmental factors such as the weather. When looking at social influence, it is important to note that monitoring of care professionals was perceived as being a sign they cared about the patients rather than as being controlling. Furthermore, patients believe that the treatment groups can have a big impact on the treatment and thus the adherence towards it. In other words, a treatment group can make or break the success of a treatment.

The acceptance and use of the portal by patients primarily influenced by perceived usefulness and perceived ease of use. Perceived usefulness was determined by social influence, which could increase portal acceptance and use in two ways. First of all, patients were more eager to use the portal when they would know that care professionals are also actively using it. Second, and also shown by the usage data, portal usage by patients was increased when care professionals were actively stimulating usage during the treatment. Perceived ease of use was the second determinant brought forward in the interviews. Especially the perceived effort to use the portal and facilitating conditions are important. The lack of the latter resulted in patients who stopped using the portal at all, due to insufficient support when encountering technical issues, whereas perceived effort concerns issues such as the availability across platforms. Finally, the actual severity of the disease was a possible explanation for a low perceived ease of use. Some people stated that using the portal was another challenge for them, which took a lot of effort due to issues directly related to their disease (e.g. lack of concentration).

Portal acceptance by professionals was primarily determined by perceived usefulness, perceived ease of use, and the interaction between patients and care professionals through the portal. The first issue that was important when it comes to perceived usefulness was the role that the portal played within the treatment. The care professionals in this study showed a preference for a portal that had a more supportive role and could support patients in self-management. Second, the moment of using the portal within the treatment was mentioned. Finally, the fit of the portal with tasks within the treatment is important. Perceived ease of use was only mentioned as an issue by care professionals

who were positive about the usefulness of the portal. Factors influencing perceived ease of use were technical issues such as the speed of the portal, and facilitating conditions coming alongside the portal, such as a lack of available time for working with the portal. Finally, care professionals will not use a portal within their treatment, if it is perceived as being another burden for the patient.

5   Discussion

The main objective of this study was to explore the determinants of patient adherence towards portal-supported rehabilitation treatments. Therefore, three sub questions were formulated concerning patient adherence, technology acceptance and use of patients, and technology acceptance and use of care professionals. In the next section, the findings from the study are presented.

Adherence to the treatment

The first objective was to explore the determinants of patient adherence, as perceived by both patients and care professionals. According to Mohr et al. (2011) intrinsically motivated patients have the biggest chance of long-term success of their treatment. Therefore, it was worth investigating the motivation types and attitudes of patients at the rehabilitation centre. In general, the patients who were included in the study were highly motivated to stay adherent to the treatment. This was stated by patients themselves, and confirmed by care professionals. Previous scholars showed that patients with chronic diseases often have problems staying adherent due to the fact that these patients do not always perceive their disease as being severe (Vermeire et al., 2001). This rule does not seem to apply to the context of the current study. This can be explained by the fact that the rehabilitation treatment period is relatively short and patients are actively involved in the treatment. Nevertheless, as predicted by Janz and Becker (1984), the study showed that perceived severity of the disease is a possible determinant of the intention to stay adherent.

Based on the interviews with both patients and care professionals, it can be concluded that there are two groups who have a social influence on the behavioural intention of the patients. These groups are care professionals and other patients in the treatment group. Possible determinants of an increase in adherence are care professionals legitimacy, care professionals' enthusiasm within the treatment, and an overall positive attitude to the treatment within the treatment group. Remarkable was the fact that family and friends where not often mentioned as a peer group with social influence. This can be explained by the fact that some patients have the feeling that only care professionals and fellow patients can understand the situation they are going through.

Sometimes, the behavioural intention to stay adherent is present, but actual adherent behaviour does not occur due to factors that are beyond a person's control (Ajzen, 1991). Therefore, questions about behavioural intention and actual behaviour were included in the study. In the case of a difference between the behavioural intention and actual behaviour, questions were asked about the reasons for this mismatch. Vermeire et al. (2001) stated that severity of the disease and complexity of the treatment might be possible reasons. This was confirmed in the interviews of the current study, as some patients stated they were unable to stay adherent due to mental or physical inabilities (e.g. concentration problems, fatigue, or a flu). Besides environmental motivation cues stemming from the disease and the treatments, other reasons, such as bad weather, can have a negative influence on patient adherence.

Acceptance and use of the portal

To explore the determinants of the acceptance and use of the portal within the treatment, the TAM3 theoretical framework by Venkatesh and Bala (2008) was used as guidance. The idea that subjective norms (Fishbein & Ajzen, 1975) and the relevance with the treatment (Venkatesh & Bala, 2008) were determinants for perceived usefulness, was confirmed in this study.

First of all, the relevance of the portal within the treatment (job relevance (Venkatesh & Bala, 2008)) is important. The use in the lung group was dramatically low because the content of the portal did not fit the needs of patients. The portal was aimed at groups of patients, while the lung group was too diverse to apply a similar portal for all patients. This problem was also mentioned by care professionals. More customization options for the portal could possibly counter this problem. Besides the mismatch of functionalities with the treatment group, some care professionals were unsure how the portal could be applied to their treatments at all, due to the fact that they require to see patients in person to provide feasible feedback.

As with adherence to the treatment, subjective norm (Fishbein & Ajzen, 1975) seems to determine portal usage. The interviews with patients showed that stimulation of portal use by care professionals was an important determinant for the use of the portal by patients. This finding was confirmed by actual usage data, which showed an increase in the amount of logins to the portal in weeks that care professionals were stimulating usage of the portal. On the other hand, the motivation of care professionals was partly determined by the portal use of patients. If care professionals perceive that patients are not actively using the portal, they are less motivated to use the portal themselves.

Based on the interviews with care professionals, it can be concluded that a portal that is perceived as being useful by the care professionals is the way to counter this problem. Care professionals state that they are more likely to promote a portal amongst their patients of which they believe it benefits the patients and the treatment. In order to increase the usefulness of the portal for care professionals, the supportive role of the portal should remain the same. However, the care professionals do emphasize a shift is needed from a portal that only has an informative function, to a portal that can serve as a self-management tool, giving the patients the ability to monitor their health over an extended period of time.

Another determinant of portal acceptance and usage by patients is perceived ease of use. Patients do not want to use a portal which is perceived as a challenge or something new that requires studying. Care professionals, who feel that the patients already have enough going on in their minds, also believe that the portal should only be used when it makes the treatment easier. This also means that the portal should be accessible from different devices, such as tablets and mobile phones. Several patients stated that the lack of this possibility really influenced their intention to use the portal.

Finally, when implementing a portal into a treatment, it is very important that the support from the hosting organization, in this case the rehabilitation centre, is sufficient and that every person involved knows where to go and who to contact when problems occur. In other words, a portal requires sufficient facilitating conditions such as technical support and training of the end-users of the portal.

Adherence to the treatment and acceptance and use of the portal

Overall, the interviewed patients showed a high adherence to the treatment. This was stated by the patients themselves and confirmed by care professionals during the interviews. However, the usage data showed that the usage of the portal decreased over time. This means that a patient with high intrapersonal motivation, who is adherent to the treatment, is not automatically accepting and using the portal within the treatment. Unfortunately, there were not enough respondents who actively used the portal to make any statements about a possible influence of portal usage on patient adherence.

Possible determinants of patient adherence to the treatment that were mentioned in this study are interpersonal motivation cues and environmental motivation cues such as treatment intensity and disease severity, whereas acceptance and usage of the portal is primarily determined by perceived usefulness, perceived ease of use and interpersonal motivation cues. Making it likely that in this particular context, in which the portal is supportive and usage is voluntary, adherence to the treatment and acceptance of the portal are separately determined.

Implications

The general perceptions in the study were that patient adherence was high, whereas portal usage by patients was falling behind. Most determinants that had a negative influence on the patient adherence to portal-supported treatments were concerning the acceptance and usage of the portal. The most important determinant in the current context seems to be the lack of stimulation to use the portal from care professionals.

The only professionals that spoke of ease of use, were the ones that claimed to use to portal already. Professionals that did not perceive the portal as being useful, did not even mention ease of use, because they were not bothered to use the portal at all. This study showed that, in this particular context, care professionals attach more value to perceived usefulness than to ease of use. Even more so, if care professionals do not perceive a portal as useful, they will not stimulate and use a portal in their treatments. This is a major problem, as patient usage of the portal is primarily determined by stimulation from the care professionals. Where the adherence to the treatment is high, patient usage of the portal remained low throughout the treatment. Thus, in order to increase portal usage by patients, it is necessary to increase the perceived usefulness of the portal by care professionals.

Especially the treatment relevance of the portal seemed to determine perceived usefulness. The study showed that portals require a large variety of functionalities in order to be relevant across different treatments. It was shown that different treatments, and even patients within treatments, require different functionalities. Therefore, further analysis on the portal should focus on the relevance within the treatment of specific functionalities, rather than relevance of the portal as a whole. In other words, analysing acceptance and use of the portal is too broad in this context. When determining the usefulness, the various functionalities should be approached as tools which serve specific tasks within a treatment. A practical implication that stems from this finding is the fact that a portal should offer more options for customization and personalization to increase relevance within the treatment.

Limitations and future research

There were some limitations to this study. First of all, the patients who participated in the study did so voluntarily due to rules for patient recruitment in the Centre subject to the study. This means that some treatment groups are overrepresented compared to others. Due to the number of sign-ups by patients, this could not be avoided. Second, not all treatments groups were monitored during the entire treatment and follow up. This meant that a comparison of all included groups across the entire timespan was impossible. It is of interest that future studies measure patient adherence to portal-supported treatments over of a period of several months or even years. Third, the portal used in the study was brand new. This might be a threat for external validity, as the results might be influenced by problems coming along a new portal. In this case, the care professionals, who were supposed to use the portal within the treatment, had no chance of getting accustomed to it and did not see the benefits of the portal within the treatment. Next to that, the portal had technological problems and lacked proper support, which might influence perceptions about and usage of the portal subject to this study. Therefore, future studies on patient adherence to portal-supported rehabilitation treatments should be done using portals that are fully accepted by the care professionals who provide the treatments. Finally, future research should look into the change of determinants of both adherence and the usage of a portal over time.

Conclusion

Patient adherence to portal-supported treatment is determined in two different ways. In this study the portal had a supportive role and the treatment did not lose quality if the portal was not used. Therefore, adherence to the treatment and acceptance and use of the portal were separately determined. Where adherence to the treatment was determined by perceived benefits of the treatment, (perceived) severity of the disease, normative beliefs, and environmental factors, acceptance and use of the portal was determined by normative beliefs, relevance to the treatment, and perceived effort to work with the portal.

The current study showed the importance of the interaction between care professionals and patients in the case of portal-supported rehabilitation treatments. This interaction has proven to be a determinant for both patient adherence and patient acceptance and use of a portal within a rehabilitation treatment. Where patient adherence to the treatment was sufficient, the acceptance and use of the portal by patients was low. This was explained by the fact that the care professionals did not stimulate portal usage, due to the fact that they did not perceive the portal useful. Therefore, when implementing a portal, it is vital to make sure that the care professionals perceive the system as being useful, by making sure the functionalities that are relevant to the treatment, providing sufficient instructions and full support, such as time and education, when implementing and using the portal. By doing so, care professionals will be motivated to stimulate usage of the portal within the treatment and usage by patients will increase.

Acknowledgements

References

Ajzen, I. (1991). The Theory of Planned Behavior. *Organization behavior and human decision processes, 50*, 179-211.

Bourbeau, J., & Bartlett, S. J. (2008). Patient adherence in COPD. *Thorax, 63*(9), 831-838. doi: 10.1136/thx.2007.086041

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101.

Dainton, M., & Zelley, E. D. (2011). *Applying communication theory for professional life: A practical introduction*. Thousand Oaks, CA.: SAGE Publications, Inc.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982-1003.

DiMatteo, M. R. (1994). Enhancing patient adherence to medical recommendations. *Journal of the American Medical Association, 271*(1), 79-83.

Downs, C. W., & Adrian, A. D. (2004). *Assessing organizational communication: Strategic Communication Audtis*. New York: The Guilford Press.

Eysenbach, G. (2001). What is e-health? *Journal of medical Internet research, 3*(2).

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Haskard-Zolnierek, K. B., & DiMatteo, M. R. (2009). Physician Communication and Patient Adherence to Treatment: A Meta-analysis. *Medical Care, 47*(8), 826-834.

Haynes, R. B., Ackloo, E., Sahota, N., McDonald, H. P., & Yao, X. (2008). Interventions for enhancing medication adherence. *The Cochrane Library*(2). doi: 10.1002/14651858.CD000011.pub3

Holden, R. J., & Karsh, B. (2010). The Technology Acceptance Model: Its past and its future in health care. *Journal of Biomedical Informatics, 43*(1), 159-172. doi: 10.1016/j.jbi.2009.07.002

Janz, N. K., & Becker, M. H. (1984). The Health Belief Model: A Decade Later. *Health Education Quarterly, 11*(1), 1-47.

Landis, J. R., & Koch, G. G. (1977). The Measurement of Observer Agreement for Categorical Data. *Biometrics, 33*(1), 159-174.

Linn, A. J., Vervloet, M., Van Dijk, L., Smit, E. G., & Van Weert, J. (2011). Effects of eHealth interventions on medication adherence: a systematic review of the literature. *Journal of medical Internet research, 13*(4), e103. doi: 10.2196/jmir.1738

Mohr, D. C., Cuijpers, P., & Lehman, K. (2011). Supportive Accountability: A Model for Providing Human Support to Enhance Ahderence to eHealth Interventions. *Journal of medical Internet research, 13*(1).

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Thousand Oaks: SAGE Publications, Inc.

Van Es, S. M., Kaptein, A. A., Bezemer, P. D., Nagelkerke, A. D., Colland, V. T., & Bouter, L. M. (2002). Prediciting adherence to prophylactic medication in adolescents with asthma: an application of the ASE-model. *Patient Education and Counseling, 47*, 165-171.

Vance Wilson, E., & Lankton, N. K. (2004). Modeling Patients'Acceptance of Provider-delivered E-health. *Journal of the American Medical Informatics Association, 11*(4), 241-248.

Venkatesh, V. (2000). Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11*(4), 342-365. doi: 1047-7047/00/1104/0342$05.00

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. *Decision Sciences, 39*(2), 273-315. doi: DOI 10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Davis, F. D. (2000). A Theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186-204. doi: DOI 10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-478.

Vermeire, E., Hearnshaw, H., Van Royen, P., & Denekens, J. (2001). Patient adherence to treatment: three decades of research. A comprehensive review. *Journal of Clinical Pharmacy and Therapeutics, 26*(5), 331-342.

Yin, R. K. (2003). *Case study research: Design and Methods* (3rd ed.). Thousand Oaks: SAGE Publications, Inc.

Appendix

Appendix A – Interview topics extended (Dutch)

Interview 1 - Patients

- Introductie
  - o Informatie onderzoek (wie, wat en waarom)
  - o Demografische gegevens
- Leven met de ziekte
  - o Invloed op het dagelijks leven
    - *Op wat voor manier beïnvloed de ziekte uw dagelijks leven? Hoe gaat u hier mee om?*
    - *Heeft u gedurende de afgelopen maanden actie ondernomen om uw gezondheid te verbeteren?*
- De behandeling
  - o Doelen
    - *Wat zijn voor u de belangrijkste redenen om beter te worden?*
    - *Wat zijn voor u de belangrijkste redenen om deel te nemen aan het revalidatieprogramma van Roessingh?*
  - o Verwachtingen
    - *Verwacht u dat de behandeling aan zal sluiten op uw doelen? Waaroxm wel/niet?*
    - *Hoe ziet u de rol van de behandelaar en van uzelf in de behandeling?*
  - o Invloed van anderen
    - *Vind u normaalgesproken de mening van anderen belangrijk wanneer u keuzes maakt?*
- Rol van het portaal
  - o Acceptatie van technologie
    - *Denk terug aan uw laatste aankoop van een telefoon, TV, tablet, computer, laptop.*

      Waarom heeft u juist voor dit product gekozen ten opzichte van andere producten? Is dit typerend voor hoe u technische producten koopt?
  - o Verwachtingen
    - *Wat verwacht u als het gaat om het gebruik van een internet portalen in de revalidatie-behandeling?*
    - *Verwacht u problemen bij het gebruik van het portaal?*
  - o Doelen
    - *Wat moet volgens u het belangrijkste doel zijn van het portaal?*
    - *Wat zou voor u de belangrijkste reden zijn om het portaal te gaan gebruiken?*
- Nabije toekomst
  - o Intentie behandeling
    - *Verwacht u de afspraken die tijdens de behandeling gemaakt worden n ate kunnen komen?*
  - o Intentie gebruik portaal
    - *Verwacht u het portaal te gebruiken tijdens de behandeling? Zo ja, hoe vaak? Zo nee, waarom niet?*
  - o Verwachtingen
    - *Verwacht u tijdens de komende periode uw gestelde doelen te kunnen realiseren?*

Interview 2 - Patients

- Terugblik op de ziekte en de behandeling
  - o Invloed op het dagelijks leven
    - Uitspraken uit vorige interview kort benoemen
    - Wat is er sinds toen veranderd?
  - o Behandeling
    - Hebt u voor de behandeling doelen gesteld in samenspraak met uw behandelteam?
    - Hoe moeilijk of gemakkelijk vond u het om de deze doelen te halen, waarom?
    - Wat vond u sterke / zwakke punten van de behandeling?
    - Zijn er dingen die u gemist heeft in de behandeling?
    - In hoeverre zijn de doelen die u had gesteld voorafgaande aan de behandeling gerealiseerd?
  - o Normative beliefs/Motivatie
    - Werd u door de behandelaren gestimuleerd om de behandeling te volgen? (eventueel ingaan op de communicatie tussen behandelaar en patiënt).
    - Zijn er anderen die u hebben gestimuleerd om de behandeling te volgen? Wie?
    - Hebt u de indruk dat uw medepatiënten actief bezig waren met de behandeling? Maakte dat uit voor u?
- Rol van het portaal
  - o Gebruik van het portaal
    - Hebt u het portaal actief gebruikt in de behandeling?
      - Wel:
        - o Functionaliteiten van het portaal
          - Wat hebt u allemaal met het portaal gedaan?
          - Vond u dat het portaal u voldoende kon ondersteunen bij de behandeling?

- Niet:
  - Redenen
    - Waarom hebt u het portaal niet actief gebruikt?
    - Perceived ease-of-use
      - Hoe moeilijk of gemakkelijk vond het portaal in het gebruik? Waarom?
      - Vond u het gemakkelijk om het portaal te gebruiken of hebt u problemen ondervonden?
    - Perceived usefulness
      - Vond u dat het portaal een toegevoegde waarde had binnen de behandeling?
      - Vond u dat het portaal aansloot bij de behandeling?
      - Zijn er dingen die u echt gemist heeft in het portaal?
    - Normative beliefs
      - Werd u door de behandelaren gestimuleerd om het portaal te gebruiken? Zo ja, hoe? Heeft dat uw motivatie ook beïnvloed?
      - Hebt u de indruk dat uw medepatiënten actief bezig waren met de portaal? Heeft dat uw motivatie ook beïnvloed?
    - Op- of aanmerkingen
      - Wanneer u de baan zou hebben van de ontwikkelaars van het portaal. Wat zou u dan aan het portaal veranderen?
- Vooruitblik
  - Stelt u zich eens voor dat we elkaar over 2 maanden weer zouden spreken. Hoe ziet uw situatie er dan uit? (nog steeds oefeningen etc.?)
  - Bent u denkt u voldoende voorbereid op een terugval van uw gezondheid?
    - Wat als zich er een terugval voordoet, hoe zal u daarmee omgaan?
  - Denkt u na de behandeling baat te hebben bij het gebruik van het portaal?
  - Bent u van plan om het portaal na de behandeling bij het Roessingh te gebruiken?
    - Wel: Wanneer wel?
    - Niet: Wat is hier de reden voor?
- Op- of aanmerkingen
  - Hebt u nog op- en/of aanmerkingen met betrekking tot de behandeling of het portaal?

Interview 3 - Patients

- Toestemming vragen
- Gesprek openen en korte toelichting
- Ingaan op de oefeningen, en de conditie
  - Heeft u nog steeds baat bij de dingen die u bij het Roessingh geleerd hebt?
    - Hoe vaak maakt u hier gebruik van?
    - Doet u nog oefeningen etc?
    - Hoe stimuleert u uzelf om bezig te blijven?
    - Mist u daarin de stimulatie van behandelaren?
- Heeft u het portaal nog gebruikt nadat u weg bent gegaan bij het Roessingh?
  - Ja – Gebruikt u het portaal anders dan toen u actief bij het Roessingh onder behandeling stond?
    - Heeft u veel baat bij het gebruik van het portaal?
    - Op welke manier gebruikt u het portaal?
    - Wordt u thuis op een andere manier gestimuleerd om het portaal te gebruiken dan bij het Roessingh het geval was?
    - Zijn er nog dingen die u mist in het portaal?
  - Nee
    - Wat zijn hier de belangrijkste redenen voor?
      - Ervaart u barrières bij het gebruik van het portaal?
    - Mist u de stimulatie door professionals en medepatiënten om het portaal te gaan gebruiken?
    - Hoe zou het portaal aangepast moeten worden zodat u het portaal wel zou gebruiken?
- Vragen of opmerkingen over het portaal?
- Bedanken voor de tijd

Interview 1 - Care professionals

- Introductie
  - Introductie onderzoek
  - Demografische gegevens
    - Leeftijd, functie , hoe lang werkzaam bij Roessingh
- Het werk
  - Wat was voor u de belangrijkste reden om dit werk te gaan doen?
- De behandeling
  - Verwachtingen
    - Wat is volgens u de belangrijkste motivatie voor patiënten om een revalidatietraject bij Roessingh aan te gaan?
  - Behandelplan
    - Op welke manier bepaalt u het behandelplan? Laat u zich hierbij leiden door de mening van anderen?
    - Wie is er volgens u primair verantwoordelijk voor het eindresultaat van de behandeling?
  - Match
    - In hoeverre denkt u dat het behandelplan aansluit bij de motivatie en wensen van de patiënten?
    - Denkt u dat het inzetten van communicatietechnologie deze match zou kunnen versterken?
- Rol van het portaal

- o Ervaring technologie
  - ▪ Wat is doorgaans uw mening ten opzichte van nieuwe technologieën?
  - ▪ Hebt u ervaring met het gebruik van portalen in de behandeling?
- o Keuze portaal
  - ▪ Bent u betrokken geweest bij de keuze voor/ontwikkeling van het portaal of heeft u de indruk dat het portaal u is opgelegd?
- o Doel
  - ▪ Wat moet het doel zijn dat het portaal dient?
    Moet een patiënt de behandeling zelfstandig kunnen volgen aan de hand van het portaal? Of moet het portaal een ondersteunende functie hebben?
- o Voor-/nadelen
  - ▪ Wat zouden voor u redenen zijn om het portaal actief toe te passen binnen de behandeling?
  - ▪ Wat zouden voor u redenen zijn om het portaal niet toe te passen binnen de behandeling?
- o Verwachtingen
  - ▪ Verwacht u dat het portaal een toegevoegde waarde heeft binnen de bestaande behandeling? Waarom wel/niet?
  - ▪ Verwacht u dat patiënten baat zullen hebben bij het gebruik van het portaal? Waarom wel/niet?
  - ▪ Verwacht u problemen bij het gebruik van het portaal? Waarom wel/niet?
- o Verwacht gebruik
  - ▪ Wat vindt u van de inzet van het portaal in de behandeling?
  - ▪ Verwacht u dat Roessingh u voldoende kan ondersteunen in het gebruiken van het portaal?
  - ▪ Verwacht u dat Roessingh uw patiënten voldoende kan ondersteunen in het gebruiken van het portaal?
  - ▪ Bent u van plan om het portaal te gebruiken tijdens de behandeling? Zo ja, hoe vaak? Zo nee, waarom niet?
- Nabije toekomst
  - o Verwachting therapietrouw
    - ▪ Verwacht u de afspraken die tijdens de behandeling gemaakt worden (zoals het uitvoeren van oefeningen of het lezen van informatie), na worden gekomen door de patiënten?
    - ▪ Verwacht u dat de patiënten actief gebruik zullen maken van het portaal? Waarom wel/niet?
    - ▪ *Mocht het zo zijn dat de beide vragen over therapietrouw tegenstrijdige antwoorden opleveren. Waarom bestaat deze mismatch?*
  - o Motivatie
    - ▪ Wat zijn volgens u de belangrijkste redenen dat patiënten wel/niet trouw zijn aan hun behandeling?
    - ▪ Ziet dit plaatje er anders uit als er technologie aan te pas komt?
- Hebt u nog vragen/opmerkingen?

Interview 2 - Care professionals

- **Terugblik op de afgelopen periode**
  - o **De behandeling**
    - ▪ Wat is uw mening over de groep patiënten die u de afgelopen periode begeleid heeft?
    - ▪ Zijn er nog bijzonderheden te melden over deze groep ten opzichte van groepen die het portaal niet gebruikten?
  - o **Therapietrouw**
    - ▪ Zijn er specifieke redenen gegeven waarom mensen uit de groep wel of niet trouw bleven aan de behandeling?
    - ▪ Hebt u de indruk dat kennis over de ziekte invloed heeft op de therapietrouw? Zo ja, op welke manier?
    - ▪ Hebt u de indruk dat de patiënten in de groepen waar het portaal werd toepast meer therapietrouw waren dan andere groepen patiënten?
  - o **Op- of aanmerkingen**
    - ▪ Hebt u nog op- en/of aanmerkingen met betrekking tot de behandeling?
- **Het portaal**
    - ▪ Hoe verliep de communicatie binnen de behandeling?
    - ▪ Wat voor rol heeft het portaal gespeeld in de behandeling?
    - ▪ Hebt u geprobeerd om patiënten te stimuleren om het portaal te gebruiken?
    - ▪ Hebt u de indruk dat patiënten elkaar probeerden te motiveren om het portaal te gebruiken?
  - o **Problemen**
    - ▪ Tijdens de afgelopen periode zijn er nog wel eens technische problemen geweest met het portaal. Hebt u hier iets van gemerkt, en wist u hoe u met deze problemen om moest gaan?
  - o **Instructies**
    - ▪ Bent u door Roessingh voldoende geïnstrueerd over hoe het portaal te gebruiken en wat de voordelen zijn voor de patiënt?
  - o **Therapietrouw**
    - ▪ Hebt u de indruk dat patiënten het portaal hebben gebruikt tijdens de behandeling?
    - ▪ Wat is volgens u de belangrijkste reden geweest dat patiënten het portaal wel of niet gebruikten?
    - ▪ Op wat voor manier denkt u dat het mogelijk is om patiënten te stimuleren om het portaal toe te passen?
  - o **Op- of aanmerkingen**
    - ▪ Hebt u nog op- en/of aanmerkingen rondom het portaal?

- **Vooruitblik**
  - o **Hoe verder?**
    - ▪ Verwacht u dat de patiënten het portaal nog zullen gebruik na de behandeling?
    - ▪ Als u de mogelijkheid had om het portaal te veranderen. Wat zou u dan veranderen?
  - o **Nazorg**

- Bent u een voor- of tegenstander van het beschikbaar maken van het portaal voor patiënten die geen revalidatieprogramma meer volgen bij Roessingh?
- Zou u bereid zijn om doormiddel van een portaal tijd te investeren in patiënten die op dat moment weg zijn bij Roessingh?
  - **De toekomst**
    - Hoe ziet u de toekomst voor zich, wanneer we kijken naar de inzet van patiënten-portalen binnen revalidatiebehandelingen?
- Hebt u nog vragen/opmerkingen?

Appendix B – Coding crosstabs

Patient_Coder1 * Patient_Coder2 Crosstabulation

Count

Patient_Coder1 \ Patient_Coder2	accountability	adherence_portal	adherence_treatment	att_technology	disease	ease_of_use	environmental mot-c	experience	facilitating condit	interpersonal mot-c	intrapersonal mot-c	role_portal	role_professional	treatment	trust	usefulness_other	usefulness_portal	voluntariness	Total
?																			1
accountability																			4
adherence_portal			18														5		24
adherence_treatment	2		7	2													1		17
att_technology				2															3
disease					15									2					22
ease_of_use						12				1		2				1			16
environmental mot-c						1	9									1			11
experience								4											5
facilitating condit									4										5
interpersonal mot-c							1			15	10			1				1	18
intrapersonal mot-c					1						10	9							17
role_portal													1						3
role_professional			2							4	3	2				1		2	47
treatment											25					1			3
trust						1						1			2	2			4
usefulness_other	2			1		3	4			3	1	5		1		1	32		54
usefulness_portal																			4
voluntariness	1																	4	4
Total	5	3	28	11	3	17	21	19	4	4	30	17	20	1	32	2	7	42	270

Pro_coder1 * Pro_coder2 Crosstabulation

Count

Pro_coder1 \ Pro_coder2	accountability	adherence_portal	adherence_treatment	att_technology	disease	ease_of_use	environmental mot-c	experience	facilitating condit	interpersonal mot-c	intrapersonal mot-c	non-codeable	role_portal	role_professional	treatment	trust	usefulness_other	usefulness_portal	usefulness_treatment	voluntariness	Total
accountability	14	1										2	1								20
adherence_portal	20										4				1		1	2		2	37
adherence_treatment	4	5		2						1	1							1		1	13
att_technology		1	5															3			10
disease	3			3							2							1			9
ease_of_use					14													2			15
environmental mot-c			1	1						1				1							6
experience	1			2			7						1								12
facilitating condit		1				4						1								1	10
interpersonal mot-c		2						7	1												9
intrapersonal mot-c			1		3		1	12			15							2			28
role_portal								1				9						5			18
role_professional	3		1		1		1			3		1		3	15			3		6	37
treatment										2	1			1	1						2
trust							1										1			1	4
usefulness_other	1	6		2		1	1	2		2			4	1				65			94
usefulness_portal																					2
usefulness_treatment							1			1					1			1			15
voluntariness		2		2			1					1								7	20
Total	21	39	15	13	9	25	11	10	7	32	29	1	18	5	19	1	3	86	5	20	369

Appendix C – Coding overview interviews

Coding overview

Interview 1 patients	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total	Percentage
Accountability	0	0	0	0	0	1	1	1	1	3	3	0	1	1	1	1	14	2,07%
Adherence to the portal	4	6	3	4	3	1	5	1	2	3	4	8	5	2	5	5	61	9,02%
Adherence to the treatment	2	1	1	1	0	2	3	1	2	1	2	5	2	1	1	2	27	3,99%
Attitude towards technology	3	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	7	1,04%
Disease	2	2	1	5	0	5	4	5	10	6	3	4	4	3	5	0	59	8,73%
Ease of use	8	3	5	1	7	1	6	1	4	0	9	1	4	2	4	2	58	8,58%
Environmental motivation cues	0	3	1	0	1	0	5	0	3	1	0	4	1	1	1	0	21	3,11%
Experience	1	2	1	0	2	1	1	0	0	0	1	1	1	1	1	1	14	2,07%
Facilitating conditions	0	3	0	1	0	1	1	0	1	1	1	0	0	0	1	0	10	1,48%
Interpersonal motivation cues	10	5	4	7	5	2	3	6	5	10	7	13	13	7	8	3	108	15,98%
Intrapersonal motivation cues	3	3	1	3	6	3	5	1	3	3	3	7	3	0	3	3	50	7,40%
Role of the portal	1	1	1	3	5	2	4	0	2	3	2	2	2	3	2	4	37	5,47%
Role of the professional	0	0	0	0	0	1	0	3	3	3	2	0	2	2	2	1	19	2,81%
Treatment	4	5	4	9	5	4	5	5	4	5	7	10	5	6	6	6	90	13,31%
Trust	2	0	0	0	0	2	0	6	0	0	0	0	0	0	1	0	11	1,63%
Usefulness other	0	3	0	1	1	0	1	0	1	3	2	2	1	1	1	2	19	2,81%
Usefulness of the portal	1	4	3	3	6	8	3	3	1	8	2	1	1	4	4	5	57	8,43%
Voluntariness	2	3	0	2	0	0	1	0	0	0	0	1	3	0	0	2	14	2,07%
Total	43	45	25	40	42	35	48	33	42	50	49	59	48	34	46	37	676	100,00%
Percentage	6,36%	6,66%	3,70%	5,92%	6,21%	5,18%	7,10%	4,88%	6,21%	7,40%	7,25%	8,73%	7,10%	5,03%	6,80%	5,47%	100,00%	

Coding overview

Interview 2 patients	1 (17)	2 (18)	4 (20)	6 (22)	7 (23)	8 (24)	9 (25)	10 (26)	11 (27)	12 (28)	13 (29)	14 (30)	15 (31)	16 (32)	Total	Percentage
Accountability	1	0	0	0	1	0	0	0	0	0	0	0	0	1	3	0,44%
Adherence to the portal	7	7	9	6	5	7	3	6	6	9	7	3	6	8	89	12,97%
Adherence to the treatment	3	10	1	3	5	5	2	0	4	8	4	5	3	3	56	8,16%
Attitude towards technology	2	0	0	1	0	0	1	0	1	0	0	0	0	0	5	0,73%
Disease	3	2	4	7	1	6	6	4	3	9	5	4	9	2	65	9,48%
Ease of use	4	3	1	0	1	3	9	1	2	2	6	2	6	3	43	6,27%
Environmental motivation cues	0	4	1	3	3	2	5	6	1	2	4	3	0	1	35	5,10%
Experience	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0,29%
Facilitating conditions	4	0	0	0	4	0	3	0	1	0	0	0	0	0	12	1,75%
Interpersonal motivation cues	16	5	6	8	7	11	10	4	11	10	8	8	6	4	114	16,62%
Intrapersonal motivation cues	0	5	2	0	2	2	2	0	2	7	3	2	2	2	31	4,52%
Role of the portal	2	1	2	0	3	1	2	1	1	1	4	2	4	9	33	4,81%
Role of the professional	3	2	2	1	2	6	2	0	3	3	4	0	1	1	30	4,37%
Treatment	6	2	5	6	5	7	6	2	1	6	3	7	5	4	65	9,48%
Trust	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	0,29%
Usefulness other	0	0	1	1	0	0	3	1	0	1	0	0	1	0	8	1,17%
Usefulness of the portal	2	5	8	10	10	5	4	11	9	2	5	3	3	10	87	12,68%
Voluntariness	1	1	0	1	0	0	0	0	1	0	0	0	1	1	6	0,87%
Total	54	47	42	47	49	56	59	37	46	60	53	40	47	49	686	100,00%
Percentage	7,87%	6,85%	6,12%	6,85%	7,14%	8,16%	8,60%	5,39%	6,71%	8,75%	7,73%	5,83%	6,85%	7,14%	100,00%	

Coding overview

Interview 3 patients	1 (33)	2(34)	4(35)	6(36)	10(37)	Total	Percentage
Accountability	0	0	3	0	0	3	3,37%
Adherence to the portal	1	5	3	1	2	12	13,48%
Adherence to the treatment	5	0	1	1	4	11	12,36%
Attitude towards technology	0	0	0	0	0	0	0,00%
Disease	0	2	1	2	1	6	6,74%
Ease of use	0	0	0	0	0	0	0,00%
Environmental motivation cues	1	3	1	0	0	5	5,62%
Experience	0	0	0	0	0	0	0,00%
Facilitating conditions	0	1	0	0	0	1	1,12%
Interpersonal motivation cues	2	6	4	1	0	13	14,61%
Intrapersonal motivation cues	3	0	4	0	1	8	8,99%
Role of the portal	0	2	0	1	0	3	3,37%
Role of the professional	0	3	0	0	0	3	3,37%
Treatment	1	2	0	1	0	4	4,49%
Trust	0	0	0	0	0	0	0,00%
Usefulness other	1	2	0	1	0	4	4,49%
Usefulness of the portal	1	5	2	5	3	16	17,98%
Voluntariness	0	0	0	0	0	0	0,00%
Total	15	31	19	13	11	89	100,00%
Percentage	16,85%	34,83%	21,35%	14,61%	12,36%	100,00%	

Coding overview

Interview 1 care professionals	Professional 1 (1)	Professional 2 (2)	Professional 3 (3)	Professional 4 (4)	Professional 5 (5)	Professional 6 (6)	Total	Percentage
Accountability	2	6	2	3	9	1	23	5,53%
Adherence to the portal	7	5	4	1	8	9	34	8,17%
Adherence to the treatment	5	1	4	3	3	6	22	5,29%
Attitude towards technology	2	3	1	4	3	4	17	4,09%
Disease	0	3	1	5	1	7	17	4,09%
Ease of use	4	11	0	1	1	1	18	4,33%
Environmental motivation cues	3	3	0	2	0	3	11	2,64%
Experience	3	6	7	4	1	0	21	5,05%
Facilitating conditions	0	2	2	5	3	8	20	4,81%
Interpersonal motivation cues	7	2	3	4	6	5	27	6,49%
Intrapersonal motivation cues	6	7	6	6	6	2	33	7,93%
Role of the portal	4	2	4	3	2	1	16	3,85%
Role of the professional	0	3	5	2	5	4	19	4,57%
Treatment	3	6	6	7	8	15	45	10,82%
Trust	0	0	0	1	0	1	2	0,48%
Usefulness of the portal	9	8	4	14	9	19	63	15,14%
Usefulness other	0	0	1	1	0	6	8	1,92%
Voluntariness	4	1	1	3	3	8	20	4,81%
Total	59	69	51	69	68	100	416	100,00%
Percentage	14,18%	16,59%	12,26%	16,59%	16,35%	24,04%	100,00%	

Coding overview

Interview 2 care professionals	Professional 1 (7)	Professional 2 (8)	Professional 3 (9)	Professional 4 (10)	Professional 5 (11)	Professional 6 (12)	Total	Percentage
Accountability	1	0	0	3	1	2	7	2,04%
Adherence to the portal	13	7	0	3	3	2	28	8,16%
Adherence to the treatment	2	1	1	3	0	1	8	2,33%
Attitude towards technology	2	1	0	2	1	3	9	2,62%
Disease	3	3	3	1	5	0	15	4,37%
Ease of use	6	9	0	1	0	2	18	5,25%
Environmental motivation cues	0	0	4	4	0	2	10	2,92%
Experience	3	1	5	3	0	1	13	3,79%
Facilitating conditions	3	5	2	4	3	2	19	5,54%
Interpersonal motivation cues	13	12	3	4	0	5	37	10,79%
Intrapersonal motivation cues	4	6	1	3	1	5	20	5,83%
Role of the portal	3	13	1	9	4	1	31	9,04%
Role of the professional	0	5	2	1	1	4	13	3,79%
Treatment	1	10	5	1	6	0	23	6,71%
Trust	0	0	0	0	1	0	1	0,29%
Usefulness of the portal	15	15	6	18	11	14	79	23,03%
Usefulness other	1	0	4	1	0	3	9	2,62%
Voluntariness	0	1	1	1	0	0	3	0,87%
Total	70	89	38	62	37	47	343	100,00%
Percentage	20,41%	25,95%	11,08%	18,08%	10,79%	13,70%	100,00%	