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Exploring User Experience of a Telehealth System for the Danish TeleCare North Trial

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Abstract. The aim was to explore user experiences of using a telehealth system (Telekit) designed for the Danish TeleCare North trial. Telekit is designed for patients diagnosed with chronic obstructive pulmonary disease (COPD) in order to manage the disease and support patient empowerment. This article sums up COPD-participants' user experiences in terms of increased sense of freedom, of security, of control, and greater awareness of COPD symptoms. A consecutive sample of sixty participants (27 women, 33 men) were recruited from the TeleCare North trial. At home the participants completed a non-standardised questionnaire while a researcher was present. The questionnaire identified their health status, their use of specific technologies, and their user experiences with the telehealth system. Results from the questionnaire indicate that the majority of participants (88%) considered the Telekit system as easy to use. 43 (72%) participants felt increased sense of security, and 37 (62%) participants felt increased sense of control by using the system. 30 (50%) participants felt greater awareness of their COPD symptoms, but only 16 (27%) participants felt increased freedom. The study has provided a general picture of COPD participants' user experiences which is important to emphasise as it has a bearing on whether a given implementation will be successful or not.

Keywords. Handheld computers, questionnaires, quality improvement, chronic obstructive pulmonary disease, telemedicine, patient satisfaction

Introduction

Chronic obstructive pulmonary disease (COPD) places a huge burden on healthcare and the health of patients. The disease is a leading cause of dead worldwide and has significant impact on disability, quality of life and costs. The burden of COPD is intended to increase in the coming decades due to continued exposure to risk factors and the changing age structure of the world's population. COPD is a challenge for the health system, and we must transform the management of the disease by developing and implementing new and innovative treatment methods [1,2].

Telehealth can deliver a range of clinical services and shows promise for supporting patients in managing their chronic conditions, such as COPD. Telehealth has the potential to improve chronic disease outcomes, increase empowerment and

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reduce mortality- and admissions rates [3]. There is evidence that people are generally positive towards telehealth, and this evidence is important for having the opportunity to modify the telehealth systems to the patients' needs [4]. However, this evidence is rather unclear which argues for more robust studies of specific population groups [5]. As telehealth systems may present challenges, especially for elderly people, it is paramount to explore their use of and experiences with such systems. Many people, including elderly, may be resistant to change due to limited cognitive and physical capabilities. These limited capabilities can affect the interaction between the individual and the telehealth system and reduce the efficacy of telehealth systems [6].

A large-scale, pragmatic, cluster randomised Danish trial (TeleCare North) with 12-month follow up will be implemented from 2014 to 2015. The trial will provide evidence of the economic and health- and patient-related effects of telehealth. TeleCare North has designed a telehealth system (Telekit) targeted all COPD patients in the North Denmark Region with the aim of empowering patients to retake more charge and responsibility for their own lives. 1,225 patients are enrolled in the trial and half of them have received the Telekit system, and use it at home to help with the management of their disease [7].

In two previous usability studies, a heuristic evaluation and a think aloud test were performed on the Telekit system. Usability issues were identified through these studies, and this has resulted in several significant changes and updated versions of the telehealth system [8,9].

In this present study, we developed a questionnaire to explore participants' user experiences with the Telekit system in terms of increased sense of freedom, of control, of security and greater awareness of symptoms. Such research is important before a potential widespread implementation can take place throughout Denmark.

1. Methods

1.1. Participants

60 (27 women, 33 men) participants were recruited from a sample of the intervention group of the TeleCare North trial [7]. Participants were selected in a consecutive manner following the randomisation. The mean age was 70 (min 54, max 88) years (see Table 1). The participants had received the Telekit system including instruction in the use of the system two months earlier before data for this study were collected. The instruction from the TeleCare North trial consisted of two appointments with their healthcare provider or in groups at a health center.

1.2. The Telekit system

The Telekit system is a tablet (Samsung Galaxy TAB 2, 10.1, Samsung Electronics, Seoul, South Korea) containing information on how to manage COPD in general and software that automatically guides the patient in coping with their disease. The Telekit system can also wirelessly transmit disease specific data (blood pressure, pulse, oxygen saturation, and weight) using a fingertip pulse oximeter (Nonin, Onyx II% SpO₂, A&D Medical, Tokyo, Japan), a blood pressure monitor (Model UA-767, plus BT-C, Nonin Medical, Minnesota, US), and a precision health scale (UC-321PBT-C, A&D Medical, Tokyo, Japan). The COPD patients respond to precoded disease specific questions

through the Telekit system. They also perform daily measurements of their vital signs the first two weeks and then one to two times per week. Patients are monitored asynchronously by a healthcare provider which also responds and contacts the patients whose vital signs deviate from expected values [7,10].

1.3. Study design and data collection

Data collection for this study took place in the participants' homes, where they completed a non-standardised questionnaire consisting of 14 questions. The questionnaire was developed to explore participants' user experiences with the Telekit system and was in three parts; 1) *seven questions about their health status/patient characteristics*, 2) *two questions about their use of specific technologies (computer, mobile phone, smartphone, and tablet)*, and 3) *five questions referred to participants' user experiences with the telehealth system*. The last five questions about user experiences were coded as categorical variables with three categories: 1) *How do you think the Telekit system is to use?* (easy to use, fairly easy to use, difficult to use), 2-4) *Do you feel increased sense of control, of freedom, and of security by using Telekit?* (yes, no, do not know), and 5) *Do you have greater awareness of your COPD symptoms by using Telekit?* (yes, no, do not know).

A researcher was present during the completion of each questionnaire to help participants with any comprehension issues. Data from the questionnaire were quantified, analysed and presented in terms of frequency, mean or percent using software SPSS Statistics, version 22.

2. Results

2.1. Participants' characteristics

The majority of participants (83%) were familiar with the specific technologies and used more than one of these technologies: *computer, mobile phone, smartphone or tablet* for sending/receiving emails, searching information, paying bills, reading news, sending SMS/MMS, and making phone calls. The largest number of participants were skilled trained (45%) or had an elementary school education (35%). More than half (55%) were not able to classify their disease severity into mild, moderate, severe or very severe stage. The participants who knew their disease severity classified themselves mostly within the stages moderate (15%) to severe (18%) COPD. About half of the participants scored a Medical Research Council (MRC) score 2 and 3 (53%), where the score is the degree of a patient's breathlessness [11] (see Table 1).

Table 1: Participants' characteristics.

Descriptive characteristics	n (%) or mean (range)
Female, n (%)	27 (45%)
Male, n (%)	33 (55%)
Age, mean (min, max)	70.10 (54, 88)
Highest education, n (%)	
Elementary school (9th or 10th grade) or less	21 (35%)
High school	4 (7%)
Higher education	8 (13%)
Skilled worker – craft, industry etc.	27 (45%)

Severity of COPD, n (%)	
Mild	5 (8%)
Moderate	9 (15%)
Severe	11 (18%)
Very severe	2 (3%)
Do not know	33 (55%)
MRC dyspnoea classification, n (%)	
MRC 1	9 (15%)
MRC 2	20 (33%)
MRC 3	12 (20%)
MRC 4	10 (17%)
MRC 5	7 (12%)
Use of specific technologies (computer, tablet etc.), n/(%)	
One	50 (83%)
More than one	9 (15%)
None	1 (2%)

2.2. Participants' user experience of the Telekit system

53 (88%) of the participants considered the Telekit system as easy to use. Five (8%) participants agreed that the system was fairly easy to use, and the last two (3%) perceived the Telekit system as difficult to use. The majority of the participants responded that they experienced increased sense of control (62%) and of security (72%) by using the Telekit system. Half of the participants (50%) experienced also a greater awareness of their COPD symptoms, but only 16 (27%) responded positive about feeling increased sense of freedom (see Table 2).

Table 2: Participants' answers to their user experiences with the Telekit system.

	Increased control n/(%)	Increased security n/(%)	Increased freedom n/(%)	Greater awareness of symptoms n/(%)
Yes	37 (61.7)	43 (71.7)	16 (26.7)	30 (50)
No	21 (35)	11 (18.3)	37 (61.7)	25 (41.7)
Do not know	2 (3.3)	6 (10)	7 (11.7)	5 (8.3)
Total (n)	60	60	60	60

3. Discussion

A systematic review clarifies that telehealth interventions still need to be adjusted to the target population by assessing patient characteristics, user experiences and acceptance of telehealth systems [4]. In spite of the considerable quantity of telehealth satisfaction and user experience studies available in the literature, we do not believe that it makes sense to transfer the results obtained by these studies to our study.

This study explored the participants' user experiences with the Telekit system from the Danish TeleCare North trial. Results demonstrate that the majority of the participants (88%) considered the Telekit system as easy to use. The participants experienced increased sense of control, of security, and greater awareness of COPD symptoms by using the Telekit system. In contrast the participants' responses to whether they felt increased freedom by using the Telekit system were less convincing.

Previous studies have also evaluated the use of the Telekit system in terms of usability and satisfaction. Findings from these two studies reinforce our results because

they confirm that the participants are positive and satisfied with the Telekit system and nearly all participants (both usability experts and COPD patients) perceive the functionalities in Telekit as easy to use [8,9].

This study had some strengths and limitations. One strength is that the study took place in the participants' own homes, which provided a more comfortable environment and lessened the stressful situation for the participants. This may have increased the quality of the questionnaire responses. Another strength may be that we used a paper-based questionnaire, which can be an advantage for especially COPD patients who might need to make a great cognitive effort in filling out the questionnaire. Furthermore, lack of understanding questions could be a problem, but this was prevented by the researcher's presence to clarify problems. The researcher's presence also ensured a high response rate.

A limitation of this study was the relatively small sample size ($n=60$) which may limit the generalisability of our results. Future research should include more participants from the intervention group of the TeleCare North trial. In addition, studies should also include other disease groups as little is known whether these results can be generalised to other diseases. Furthermore, this study was also limited in the fact that the participants had used the Telekit system for only two months, and their user experiences can change as they become more familiar with the system. Future research should explore the participant's user experiences when they have used the Telekit system for a longer period.

In conclusion, this article has generated knowledge regarding the participants' user experiences with the Telekit system. This knowledge is essential in order to determine whether the system will be implemented to other parts of Denmark. We recommend to explore users' experiences when new telehealth systems are developed and before widespread implementations, as it has huge influence on the outcomes of these implementations.

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