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Introducing telemonitoring for diabetic patients: Development of a telemonitoring 'Health Effect and Readiness' Questionnaire

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ABSTRACT

Purpose: Till now no validated instrument exists to measure the readiness and attitude of diabetic patients towards the use of telemonitoring. The purpose of the described study was to develop a Telemonitoring Attitude and Readiness Questionnaire and to check its validity and reliability.

Methods: After performing in-depth interviews in two separate sessions, the Telemonitoring Attitude and Readiness Questionnaire was completed by a convenience sample of 138 patients with type 1 and type 2 diabetes to determine internal consistency. Test–retest reliability was further evaluated with a subsample of 21 patients.

Results: Analysis supports the validity and reliability of the 13-item Telemonitoring Health Effect and Readiness Questionnaire (THERQ) with three subscales: Communication with peers or during holidays with a professional (Cronbach's $\alpha = 0.84$), telemonitoring health effect (Cronbach's $\alpha = 0.87$), and communication with a professional from home (Cronbach's $\alpha = 0.88$). Test–retest reliability is satisfactory (intraclass correlation coefficients between 0.58 and 0.92).

Conclusions: The results of this study provide preliminary evidence that the Telemonitoring Health Effect and Readiness Questionnaire is a valid and reliable instrument to measure the readiness and subjective feelings of health effect towards the use of telemonitoring. The THERQ could be used before the implementation of telemonitoring to check if diabetic patients are interested in the use of it but it could also be used in (randomized) controlled trials as the questions are put in such a way that also patients not (yet) using telemonitoring can answer the questions.

1. Introduction

Chronic (non-communicable) diseases are leading causes of death [1]. In 2005, according to the World Health Organisation, cardiovascular disease, cancer, respiratory disease and diabetes caused 58 million deaths worldwide [2]. Technology can help to empower patients [3] and telemonitoring, defined by Meystre [4] as 'The employment of information technology with the goal of monitoring patients over dis-

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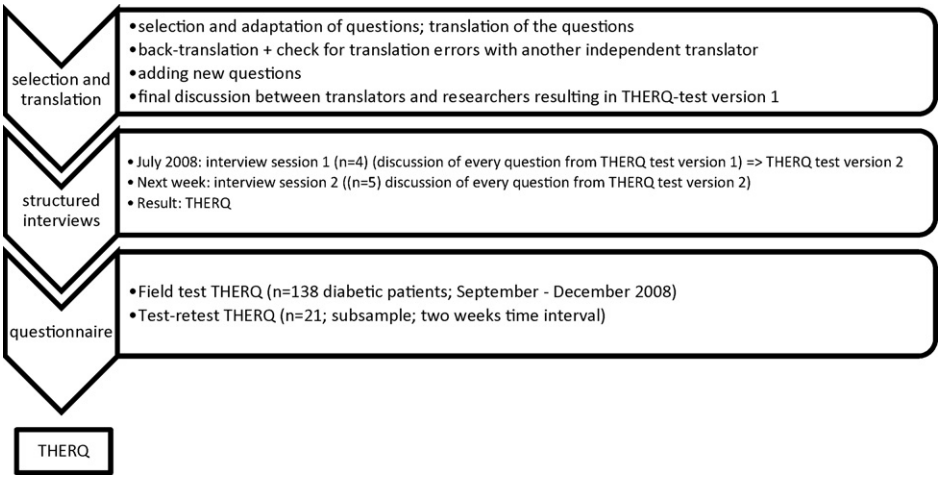

Fig. 1 – Main stages in the development-process of the Telemonitoring Health Effect and Readiness Questionnaire (THERQ).

tance', is becoming a universally used technique. Before introducing telemonitoring on a large-scale, it is however important to know if specific patient populations are interested in using it. As Roig and Saigi [5] mention in their study, till now, most telemedicine projects do not succeed in getting beyond the project-phase. An important actor in the use of telemedicine is the patient himself. The European Commission also focuses on patient-centred care [6]. If patients however are not interested in the use of telemonitoring, it seems money down the drain. Recently, some studies were conducted to assess the expectations and perspectives of these actors. Chang et al. [7] assessed expectations and perspectives for the use of telemedicine but focused specifically on elderly in nursing homes, on their families and on the caregivers. Courtney et al. [8] also focused on elderly in continuing care retirement communities. They studied the factors influencing the willingness to adopt smart home technology. Trief et al. [9] used a qualitative approach in which the focus was on elder diabetic patients participating in a telemedicine case management intervention program.

In this study, the focus is on telemonitoring with insulin-dependent diabetic patients. This patient group was chosen because of the expansion of diabetes. According to the International Diabetes Federation [10], the estimated prevalence of diabetes in the age group 20–79 years was 5.2% in 2006 and will be 6.6% in 2025, which corresponds with an alarming fast growth. Telemonitoring is especially promising in these disease cases where patients are treating themselves with multiple daily insulin injections, and who may thus benefit from new supporting technology.

Once telemonitoring is introduced, it is important to measure the impact of the introduction of such new method. Although quite some studies [9,11] focused on implementation of telemonitoring, most of them did not use validated questionnaires to measure telemonitoring-related aspects, e.g. attitude towards the use of it.

The purpose of this study is the development of a reliable and valid Telemonitoring Health Effect and Readiness Questionnaire (THERQ) allowing measurement of the interest in and subjective feelings of health effect towards the use of a telemonitoring platform.

2. Research design and methods

2.1. *Stages*

This study has been divided in three major stages (Fig. 1), mainly based on the work of Bradley [12], Mortelmans and Dehertogh [13], Streiner and Norman [14] and the study design of Shiu et al. [15]. The first (selection and translation of questions into Dutch and further development of the questionnaire) and second stage (structured interviews) are more qualitative in nature. The third stage and quantitative component of this study focused on establishing the psychometric properties: i.e. construct validity, internal consistency and test–retest reliability.

2.2. *First stage*

In a first stage, a thorough research was done through the available questions and questionnaires. A number of questions from the Telemedicine Satisfaction and Usefulness Questionnaire [16,17], the Telemedicine Perception Questionnaire [18], and the ATA Home Telehealth Satisfaction Item Bank [19] were useful for the development of this questionnaire. Because in this study the questionnaire is also targeted at the population still not using telemonitoring but with a potential interest in it, the selected questions were rephrased in such a way that they could be used in a pre-telemonitoring setting, as well as during the implementation or in a post-telemonitoring setting: e.g. the original question 'My health is better than it was before I used the technology' was rephrased as 'since I log/send my diabetic data, my health is better'. Rephrasing the questions in such a way makes it possible to measure the impact of implementation of telemonitoring without having to rephrase the question in the different stages of the study. The diabetic patient can answer the question if