

Technology Combined with a Counseling Protocol to Stimulate Physical Activity of Chronically Ill Patients in Primary Care

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Abstract. An iterative user-centered design method was used to develop and test mobile technology (the *It's LiFe!* tool/monitor) embedded in primary care, followed by a three months feasibility study with 20 patients and three nurses. The tool consists of an accelerometer that transfers data to an app on a Smartphone, which is subsequently connected to a server. Physical activity levels are measured in minutes per day compared to pre-set activity goals, which are set by patients in dialogue with nurses. Nurses can monitor patients' physical activity via a secured website. The counseling protocol is based on the Five A's model and consists of a limited number of behavior change consultations intertwined with interaction with and responses from the tool. The technology supports nurses when performing physical activity counseling. Provided that no connectivity problems occur, the *It's LiFe!* intervention is feasible, and its longitudinal effects will be tested in a cluster RCT.

Keywords. Physical activity, remote sensing technology, self-management support, primary care nursing

Introduction

The promotion of physical activity in primary care is a pillar of WHO's global physical activity plan [1, 2]. Nurses should take the opportunity, whenever possible, to identify inactive adults and advise them to aim for 30 minutes of moderate activity on five days of the week or more. Although patients often know that they have to improve their lifestyle in terms of physical activity, it remains a challenge to adhere to guidelines for healthy exercise [3]. By integrating physical activity counseling into routine practice, nurses can support patients in meeting this challenge [4-6]. Therefore, assessment of the physical activity levels of patients should be part of routine consultation and these levels should be considered as a vital sign [7]. In the project *It's LiFe!*, technology was developed and tested aimed at supporting patients and nurses in Dutch primary care to stimulate physical activity.

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1. Methods

An iterative user-centered design method was used to develop the *It's LiFe!* tool [8] / monitor [9] and a corresponding counseling protocol. The needs and preferences of future users (both patients and nurses) were identified by analyzing the literature, through interviews and focus groups, and by consulting experts. After several usability tests, the feasibility of the use of the tool embedded in primary care was tested in two practices with 20 patients and three nurses. This feasibility study took place from April until July 2012. The nurses were asked to include 10 patients per practice, aged above 40 years, five of whom were type 2 diabetes patients with a BMI >25 and five of whom were COPD patients with according to the GOLD-criteria stage 2 or 3, who could benefit from more physical activity. Patients with complex coexisting medical conditions, insufficient mastery of the Dutch language, or without an internet connection were excluded.

The leading principle of the tool is to change behavior by self-monitoring, goal-setting, and feedback. The tool connects three technologies: an accelerometer, a Smartphone app, and an Internet application (Figure 1). Two types of feedback are given by the tool, namely direct feedback on daily activity compared with a personal goal, and periodic feedback on historical performance through feedback messages and dialog sessions. A summary of physical activity levels is automatically sent to the general practice so that nurses can respond to this information.

The monitor consists of a server with two portals, one for nurses and one for patients. The nurse subscribes the patient to the system. The login name and password are sent to the patient by mail. At home the patient has to complete an additional questionnaire online (a session) concerning physical activity preferences. Each night, the Smartphone automatically connects to the server to store the physical activity data for the past day on the server. There is a pre-measurement period of two weeks. In the second week, patients receive short sessions every day to keep a diary. These can be accessed both on the Smartphone and on the website. Furthermore, patients receive two sessions concerning goals and activity planning based on the PACE [10]. The nurse can see the answers given by patients in the system on the individual chart of the patient and results of a group of patients are visible at the opening screen of the monitor.

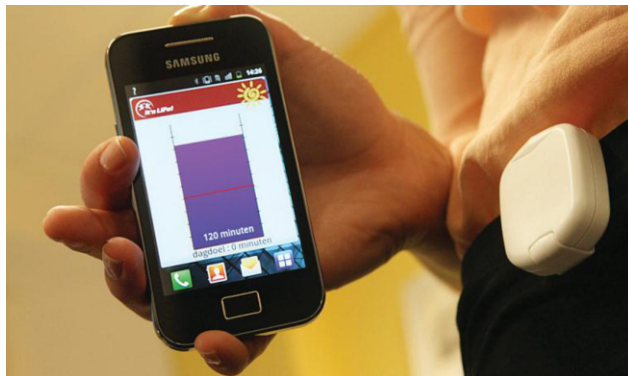


Figure 1. *It's LiFe!* tool

The counseling protocol is based on the general ‘Five A’s’ model [11,12] and on specified models for physical activity promotion [13,14]. These models and different behavior change theories, such as the Theory of Planned Behavior [15], the Goal-Setting Theory [16], the Self-Determination Theory [17] and Motivational Interviewing [18], formed the basis for this protocol. The intervention consisted of three behavior change consultations intertwined with interaction with and responses from the tool (figure 2). The boxes indicate the behavioral change counseling consultations and the different dialog session’s patients can complete.

The aim of the intervention is to increase physical activity in daily living and to prevent longer periods of continuous inactivity. The intervention is characterized by collaboration between patient and nurse. It is a patient oriented, flexible way to support self-management of patients who are willing to change their lifestyle. During a maximum of three consultations, the nurse performs an assessment of the patient’s activity pattern using the SQUASH [19] self-assessment questionnaire, supported by information from the pre- measurement and a diary supplied by the tool. The nurse provides information about the risks of a sedentary lifestyle and the benefits of physical activity on disease prognosis, using an information card. In collaboration with the patient, an activity goal in minutes per day is set, based on personal abilities. Both the nurse and interactive sessions supplied by the tool facilitate the patient in writing a SMART plan on how to become more physically active. The patient receives a list of local exercise opportunities. Feedback on physical activity performance is given by the nurse during consultations, while the tool gives automatic feedback on this performance in between.

Before the start of the study, the nurses were provided with detailed instruction charts for the course of the consultations, with a theoretical underpinning of the intended counselling techniques [20]. They received a personal account for the monitor, and received a personal instruction at the workplace (two hours) in how to use the system by the researchers (RV, SvdW). Furthermore, the nurses were advised to try out the tool themselves beforehand to get familiar with it.

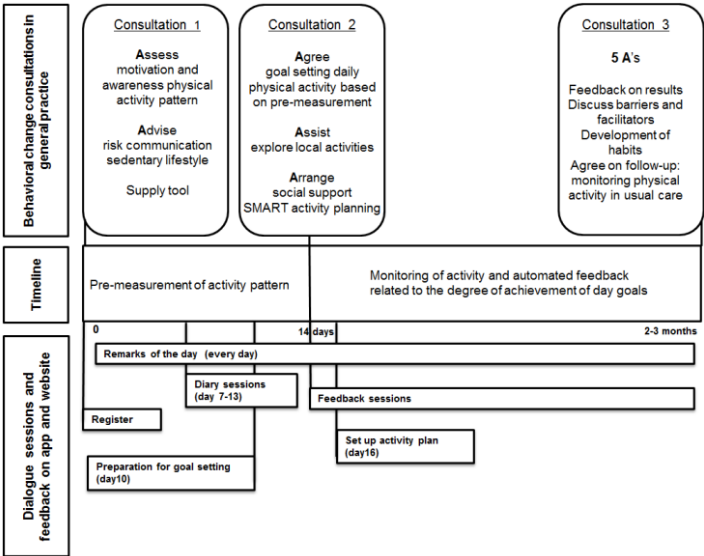


Figure 2. The *It's LiFe!* intervention

All patients and nurses were interviewed (0.5–1 hour) in three rounds, shortly after every consultation. Questions were asked about the technical functioning, acceptability, and user satisfaction of the tool, the monitor and the consultations. A directed content analysis method was followed by coding and organizing the data into categories that reflected the emerging feasibility themes, per aspect of the intervention [21]. At the end of the study, a focus group interview took place with the participating nurses to discuss and complement the analysed results. We collected physical activity data (minutes per day moderate-intense >3.5 km per hour walking), measured by the accelerometer and responses given by the patients on the sessions from the server. We registered technical problems in a log file. Patients could call the researchers during working hours if there were technical problems.

2. Results

A total of 20 patients (50% COPD, 50% DM2) participated in the study and completed data collection at baseline. A total of 18 patients completed data collection directly after the intervention period. In all, 19 participants were interviewed after consultation 1, 18 participants after consultation 2 and 17 participants after consultation 3. Reasons for drop-out were: the tool had not worked from the start (n=1), the patient accidentally threw the meter in the washing machine (n=1), and the patient used the tool for only six weeks because of a planned holiday (n=1).

Patients' experiences with the intervention

Participants (12 out of 17) were positive about the tool. They felt encouraged to be more active and mentioned three aspects: the awareness of one's physical activity performance, the stimulating effect of the daily target goal and the positive effect on self-efficacy.

It motivates me to become more active. I am now aware of what I do and that is, as a matter of fact, far less than expected, especially in the evenings (female patient, aged 62).

The patients' ideas about the usefulness of the intervention did not change over time; most participants who were enthusiastic in the first interview confirmed this opinion in the third. There were four participants who indicated that they regretted having to hand in the tool at the end of the study. A total of 12 patients were positive about the effect of the intervention on their physical activity performance and five patients were neutral about it; the latter were patients who were already sufficiently active. More than 50% of the patients mentioned the added value of the consultations and the involvement of the nurse.

Good that she (nurse) could look at my results. She forces nothing, but she talks in a way that it arouses your interest (female patient, aged 53).

During the first consultation, attention to the tool dominated the consultation, and less attention was paid to the counseling protocol. The majority of the patients indicated that the nurse did not talk about the benefits of being more active because this was a topic which had already been frequently discussed before. Overall, patients were satisfied with the course of the first consultation, they said: they felt there was a good

atmosphere and it was informative and clear. The second consultation was partly executed as planned, with the main focus setting goals in collaboration with the patient. Patients were satisfied about goal-setting. In some cases the nurses had to temper patients' overly ambitious goals. There was less attention to setting up the plan and to the leaflet containing locally organized physical activities. Most patients simply intended to increase their walking and cycling activities, and the nurse did not advise them to write their intentions down in a SMART way. In the final consultation the use of the tool was evaluated and patients talked about how to maintain their physical activity performance at a higher level. Positive feedback was given on this performance and patients appreciated this.

Yes, she (the nurse) saw progress and I said: that's because of the phone and because you keep me on my toes, if else I could not have managed this (male patient, aged 64).

For 13 patients it was possible to calculate the mean activities for five days or more, at the start and at the end of the intervention, whereas for the other seven patients this was not possible due to drop-out and/or because of connectivity problems between the smartphone and the server. Mean physical activity significantly increased by 10.6 minutes per day, from 28.7 (SD 21.1) minutes per day in the first two weeks compared to 39.3 (SD 24.2) in the last two ($P=0.02$).

Information on the server indicated that adherence regarding the use of the tool was high (on average 80%). Although most of the patients were positive about the tool, for some patients motivation dropped when technical problems occurred. Those problems occurred frequently (18 out of 20 participants) and had to do with log-in (small keyboard) and connectivity errors (not recognizing if Bluetooth was off or flight mode was on). A total of six patients needed some extra advice on how to log in, which was given to them during the first interview and during consultations with the nurse. The connectivity problems were twofold: between the meter and the smartphone, as a result of which the app indicated the amount of activity not immediately but some time later, and between the smartphone and the server.

Nurses' opinion about the intervention

All nurses agreed on the usefulness of obtaining objective physical activity data via the tool, indicating that it is difficult to assess this level otherwise. They saw that patients reacted positively to reaching their target goals, which was stimulating.

It is an added value to see objective data; this gives me the opportunity to give more personalized advice (nurse, aged 28).

The most critical remarks were made regarding the fact that the nurses received a lot of queries from patients because of the technical problems; they spent more time explaining the tool than on physical activity counseling.

My overall opinion? It was fun. I would do it again, but without the technical problems! (nurse, aged 48).

On the one hand, all nurses indicated that when looking at the data together with the patient, it was much easier to talk about barriers and facilitators for becoming more active. But on the other hand, this often resulted in a longer consultation time.

3. Conclusion

Participants were merely positive about the intervention and average physical activity levels increased significantly, although the technical problems dominated the course of the consultations. Without those problems, the *It's LiFe!* tool embedded in primary care is a feasible intervention. On the basis of this study, the tool and the counseling protocol were improved, with attention paid to the connectivity problems and time investment by the nurse. In January 2013, a cluster randomized controlled trial started, with 24 practices in three different groups, including 240 patients to measure the effects of the *It'sLiFe!* intervention on the long term.

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