moveUP

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Effectiveness and safety of tele-rehabilitation after hip or knee replacement: the MORE study.

Abstract :

Tele-rehabilitation has the potential to improve or at least be as effective as some current care services, while increasing their accessibility. The objective of this study was to evaluate the safety and effectiveness of tele-rehabilitation after total hip or knee replacement surgery. 200 patients received a tele-rehabilitation programme after their surgery. The patients' progress was monitored by physiotherapists, who gave them personalised advice and adapted exercises. The number of complications, standardized patient reported outcome measures and satisfaction were measured three months after surgery. There have been no complications related to monitoring by the application. There were 7 unplanned consultations and 3 readmissions. Patient's scores of activities of daily living, pain, quality of life and symptoms improved after surgery. The scores of knee prosthesis patients were similar to a control group in the 3rd month post-operatively. This study showed that telerehabilitation can be organized safely and effectively after knee and hip arthroplasty. Those results are in line with latest research that showed that one-to-one therapy does not provide superior outcome compared to a self-directed home program or tele-rehabilitation

1. Introduction

The increasing availability of communication technologies is creating new opportunities to provide care at a distance. Tele-rehabilitation has the potential to improve or at least be as effective as some current care services, while increasing their accessibility. The objective of this study was to evaluate the safety and effectiveness of tele-rehabilitation after total hip or knee replacement surgery.

2. Methods

2.1. Model

Our data come from the MORE clinical study, which is part of the national mobile health programme for e-health in Belgium. Patients were followed by a rehabilitation application (moveUP NV/SA, based in Brussels) after the implantation of a knee or hip prosthesis. They were operated on between January 2017 and February 2018 in 3 Belgian hospitals (AZ Delta - Roeselare, AZ Maria Middelares - Ghent, Clinique Saint Jean - Brussels) by 16 surgeons. One week before the operation, an activity sensor and a 4G tablet were provided to the patient. All patients signed an informed consent for the use of their data for scientific purposes.

2.2. Participants

The 200 patients selected for the intervention had to reside in Belgium during the rehabilitation period, and were not to receive any physiotherapy care other than the tele-rehabilitation programme. The exclusion criteria were: previous surgery that could affect rehabilitation, an operation planned within three months after the intervention, a neurological condition that could interfere with rehabilitation, psychiatric disorders or drug or alcohol abuse

A control group of knee prosthesis patients was recruited for comparison at 3 months postoperatively. These patients underwent "standard" rehabilitation. They had no follow-up via the application and filled in the scores during their consultation at the hospital (AZ Maria Middelares).

The intervention group was composed of 54% women and 46% men. The average age was 61 years with a range of 33 to 87 years. 105 patients received a total hip prosthesis, 54 received a total knee prosthesis and 31 received a unicompartmental knee prosthesis.

The control group consisted of 113 patients which received a knee prosthesis, 56% women and 44% men. The average age was 65.2 years with a range from 41 to 91 years.

2.3. Outcome measures

2.3.1.Safety

The number of patients dropping out and their reasons, complications, unplanned consultations, and readmissions were collected at the postoperative consultation at 3 months.

2.3.2.Efficacy

The EQ5D, KOOS or HOOS questionnaires were collected before surgery and at 3 months postoperatively. After the operation, the duration of the use of anti-inflammatory drugs and crutches were recorded. These data were entered electronically by the patient via the tablet.

2.3.3.Satisfaction

Satisfaction was assessed using the Knee society score (KSS) satisfaction scale, while ease of use was assessed by asking the patient to assign a percentage score to the statement: "Give moveUP ease of use a score".

2.4. Remote rehabilitation programme

Rehabilitation was carried out using the application installed on the tablet. The patients' progress was monitored by physiotherapists, who gave them personalised advice and adapted exercises. The interaction took place by means of instant messaging within the app. The advice was adapted according to the number of daily steps, the pain and joint stiffness reported by the patient, as well as the objectives and characteristics of the patient (age, professional status, etc.)

2.5. Statistics

A t-test was used to compare the scores of the intervention group and the control group at 3 months postoperatively. An alpha error threshold of 0.05 was used.

3. Results

3.1. Safety

Of the 200 patients who started the study, 13 dropped out, 6 before the surgery because they refused to comply with the study conditions. 7 patients dropped out after surgery, 5 in the first week and 2 later due to lack of compliance. There have been no complications related to monitoring by the application. Only one patient reported a problem with the battery of his connected watch that was replaced during a home visit.

There were 7 unplanned consultations and 3 readmissions: one for anxiety on the 10th day, one for an injection on the 9th day, and one for manipulation under anaesthetic.

3.2. Efficacy

Rehabilitation is considered complete when the patient is free of pain, is no longer taking pain medication, has recovered his or her function and when the level of physical activity has returned to the pre-operative level. This decision was made in collaboration with the patient, after a clinical assessment. The average duration of rehabilitation with the application was 77 days. Patients stopped taking painkillers on average on the 17th post-operative day. There was a clear difference between hip replacement patients who stopped taking pain killers on day 10 and knee replacement patients who stopped taking pain killers on day 26. On average, patients used crutches for 34 days after the operation. The duration of crutch use was determined by the surgeon's protocol, not by the physiotherapist performing the follow-up.
The evolution of the scores over the 3 months can be seen in Figure 1. 81% of the patients completed their score in the 3rd month.

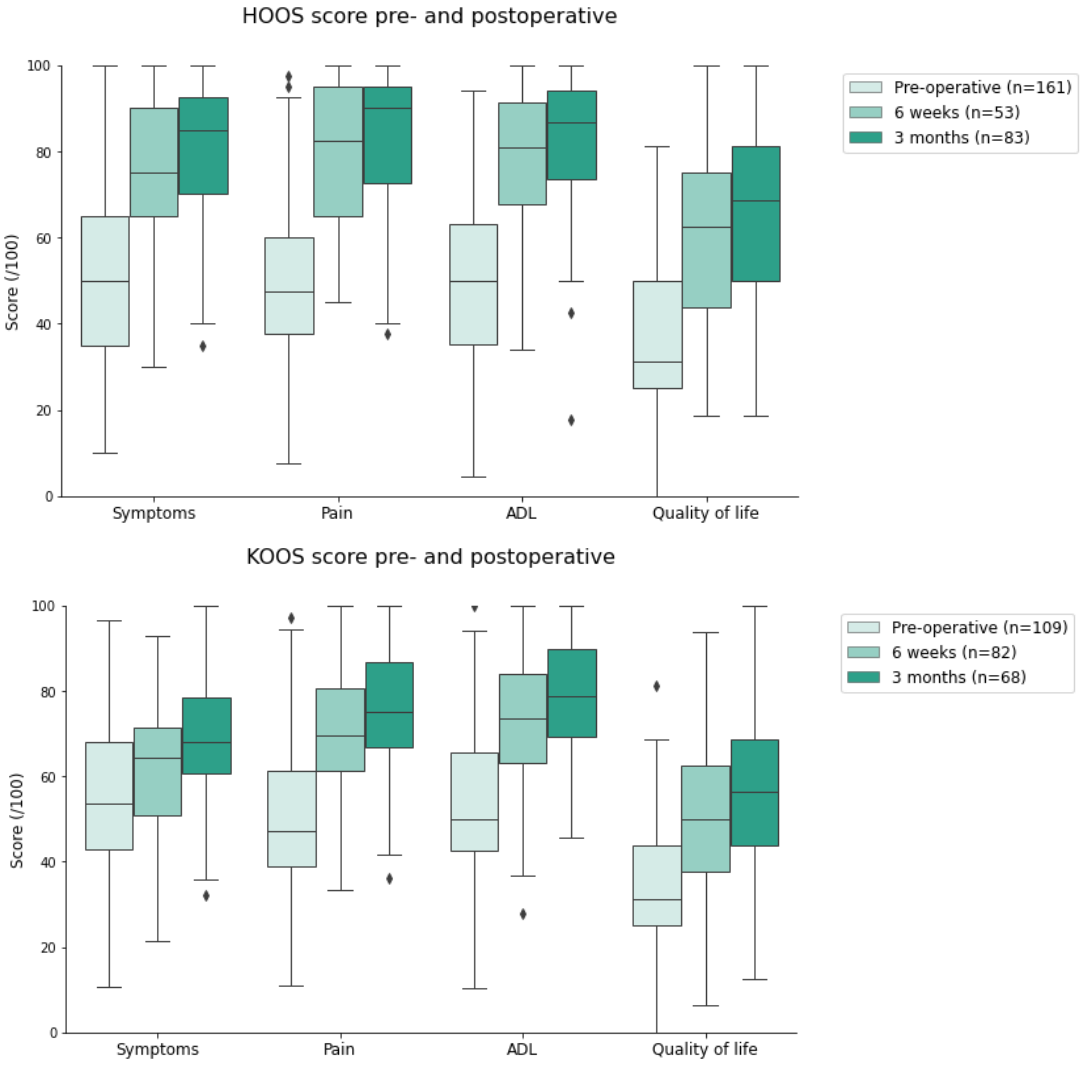

Figure 1: Evolution of KOOS and HOOS scores in preoperative, 6 weeks and 3 months postoperative. ADL: Activities of daily living

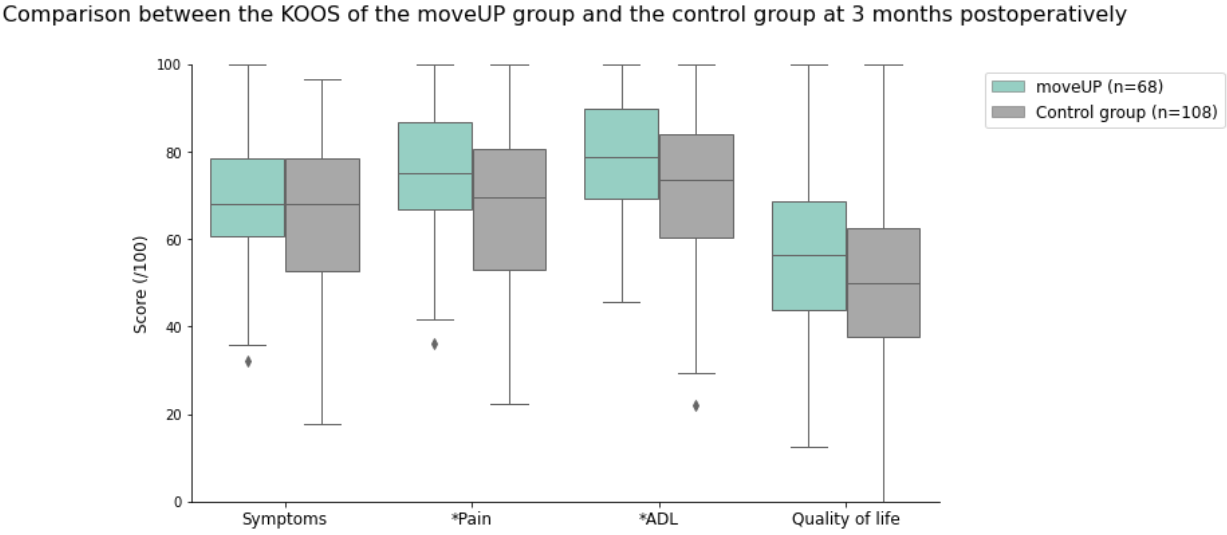

Figure 2: Comparison of the KOOS score between the control group and the group having benefited from tele-education. ADL: Activities of daily living

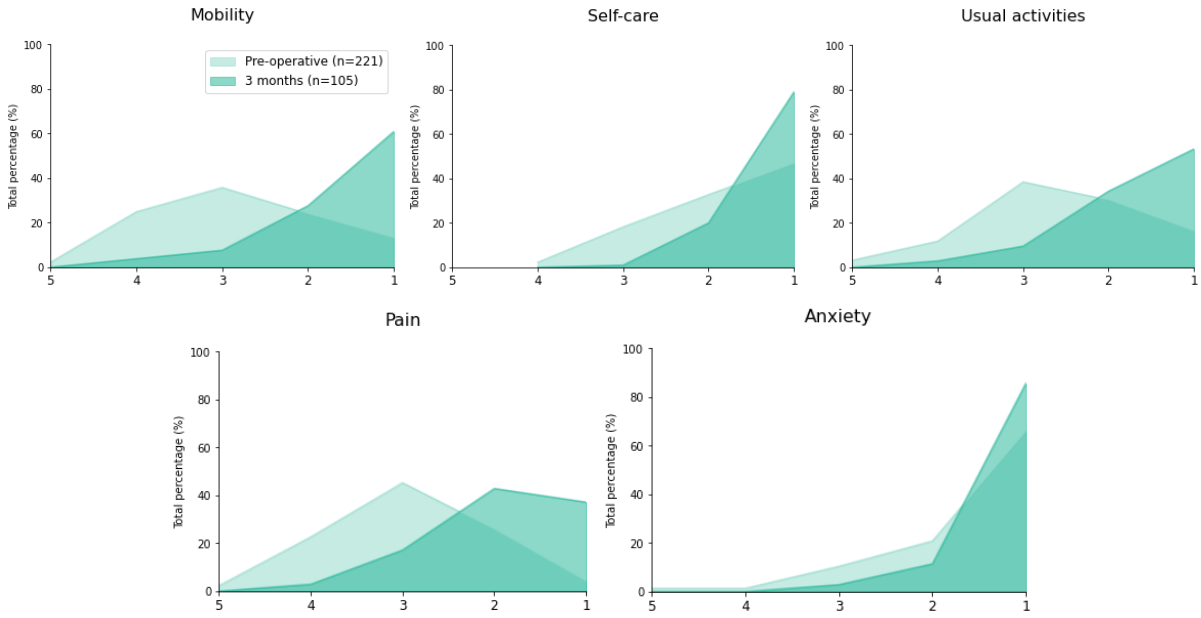

Figure 3: Quality of Life Score (EQ5D) in pre- and post-operative

The scores of knee prosthesis patients were compared to the control group in the 3rd month post-operatively. There were no significant differences between the groups for symptoms (p=0.515) and quality of life (p=0.191). The score for pain (mean difference: 5.6, p=0.020) and activities of daily living (mean difference: 5.2, p=0.006) are significantly higher for the tele-rehabilitation group compared to the control group (*Figure 2*). The EQ5D questionnaire scores show a positive evolution of patients for each sub-score (Figure 3).

3.3. Satisfaction

The satisfaction of knee surgery patients (KSS) at 3 months did not differ significantly from the satisfaction of the control group (p=0.111) (Figure 4). Ease of use was rated at 81%.

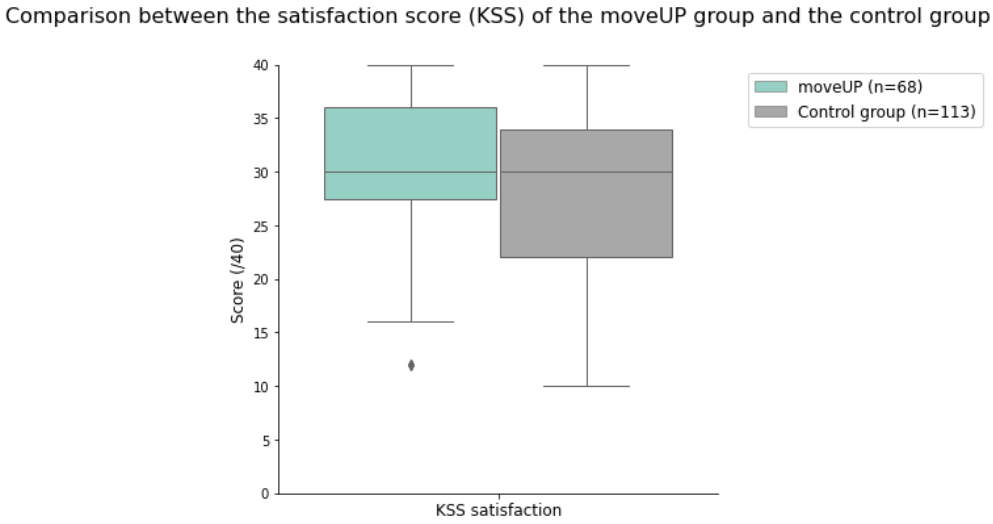

Figure 4 : Comparison of the satisfaction score (KSS) between the control group and the group having benefited from tele-rehabilitation

4. Discussion

This study showed that telerehabilitation can be organized safely and effectively after knee and hip arthroplasty. The shortcomings of this first study in Belgium such as the study design or the small sample size is counterbalanced by the fact that those results are in line with systematic reviews that showed that one-to-one therapy does not provide superior outcome compared to a self-directed home program [1-2] or telerehabilitation [3-5]. This is also in line with the latest NICE guidelines on total hip and knee arthroplasty where self-directed rehabilitation is recommended [6].

Therefore, telerehabilitation is a safe and practical alternative to conventional face-to-face rehabilitation therapy for patients who underwent TKA or THA.

5. References

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