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Determinants of participation in cardiac telerehabilitation during the first surge of COVID-19

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Abstract

Background

Participation rates in cardiac rehabilitation (CR) are low. In multiple trials, telerehabilitation (TR) has been demonstrated to be effective. Still, real-life evidence is scarce. During the first surge of the COVID-19 pandemic our centre deployed a TR programme. This study aimed to characterise the patient population that had, for the first time, the opportunity to participate in cardiac TR and to analyse if there were determining factors for participation or non-participation in TR.

Methods

All patients enrolled in CR in our centre during the first wave of the COVID-19 pandemic were included in this retrospective cohort study. Data was collected from the hospital electronic records.

Results

369 patients were contacted in the setting of TR. 69 patients could not be reached and were excluded from further analysis. 208 (69%) patients that were contacted agreed to participate in cardiac TR. No significant differences in baseline characteristics were seen between TR participants and TR non-participants. A full model logistic regression did not reveal any significant determinants on participation rate in TR.

Conclusion

This study demonstrates that the rate of participation in TR was high (69%). Of the analysed characteristics, none was directly correlated with the willingness to participate in TR. Further research is needed to further assess determinants, barriers and facilitators of TR. Also, research is needed on better delineating digital health literacy and on how to reach also those patients that are less motivated and or less digitally literate.

Introduction

Cardiac rehabilitation (CR) is indicated in patients with a wide range of cardiovascular diseases. Its benefits are well-studied and participation in CR is thus stated as a Class IA recommendation in the 2021 guidelines on cardiovascular disease prevention published by the European Society of Cardiology (ESC) (1). However, in earlier EUROASPIRE studies and again in the most recent EUROASPIRE V study, it was shown that as little as 32% of patients with an indication for CR attended at least half of the sessions (2,3). Telerehabilitation (TR) is defined as the use of digital innovations such as smartphone applications, smartwatches, and teleconsultations to deliver CR from a distance (4). It enables the remote monitoring of patients and the remote provision of comprehensive rehabilitation using all CR modalities. The ESC guidelines recommend the use of home-based CR, telehealth and mobile health interventions to increase participation rates and long-term adherence (1). Multiple trials have already established that TR is effective, and a systematic review has recently confirmed the effectiveness and cost-effectiveness of TR in coronary artery disease and heart failure (4). Still, this is a class IIb recommendation as evidence about telerehabilitation (TR) is heterogeneous (5–9) and real-life evidence is scarce.

The first surge of the COVID-19 pandemic led to a discontinuation of non-urgent medical services in many countries, including a shutdown of CR centres. It is well established that a delay in initiation of CR after a cardiac event is associated with a reduced improvement in cardiopulmonary fitness and poorer uptake, attendance and completion rates of CR programmes (10,11). CR centres had to develop remote and innovative ways to deliver the core components of CR during this shutdown. In Belgium, 52% of CR centres converted to offering TR (12).

The rapid deployment and implementation of a TR programme in our centre led to a unique situation with, for the first time, a population being offered a comprehensive TR programme in a real-life situation without centre-based CR as an alternative.

Purpose

This study aimed to characterise the patient population that had, for the first time, the opportunity to participate in cardiac TR and to analyse if there were determining factors for participation or non-participation in TR.

Methods

Study design and population

All patients with cardiovascular disease enrolled in CR (centre-based CR up until the lockdown, and TR during the lockdown) at the Jessa Hospital in Hasselt, Belgium during the first wave of the COVID-19 pandemic were included in this retrospective cohort study. The CR facility was closed due to the lockdown from March 13, 2020 until May 18, 2020 (66 days).

Intervention

Patients were called for a first time between March 17 and April 30, 2020. In the initial call, it was explained to patients what the TR programme would encompass. They could then indicate if they wanted to participate in the TR programme or not and at what frequency (weekly, biweekly or monthly). Follow-up telephone contacts were then scheduled at the frequency that was agreed upon with the patient. Patients were contacted separately by the physical therapists, dieticians, psychologists and cardiologists for one-on-one telephone consultations. Also, live online group physical activity sessions were organised and led by the CR physical therapists through a videoconferencing platform. Lastly, patients could participate in online information sessions about CR, basic medical aspects of cardiac disease and healthy nutrition sessions. For each patient, frequency of TR, modality of the TR (physical activity only or combination with dietician and/or psychologist follow-up) and conversation content during the call was registered in the hospital medical record.

All patients in CR in the period of the 17th of March until the 30th of April 2020 were included in the initial study database. The following data was collected from the hospital electronic medical records: age, gender, length, weight, participation in TR, number of TR sessions, cardiovascular risk factors (smoking status, hypertension, obesity, diabetes mellitus, hypercholesterolemia, familial risk factors), cardiac hospitalisation prior to CR, cardiac procedures prior to CR, cardiac comorbidities (ischemic heart disease, heart failure, arrhythmia, valvular heart disease, other heart disease), presence of a cardiac implantable electronic device (CIED), whether or not the patient was included in the CIED telemonitoring programme, and other comorbidities (pulmonary disease [asthma, chronic obstructive pulmonary disease, other], chronic kidney disease, neurological disease impacting mobility [stroke, Parkinson's disease, other], dementia, peripheral vascular disease, orthopaedic disease impacting mobility and malignancy).

All data (participation in TR, number of sessions, age, gender, body mass index (BMI), index event, starting date of rehabilitation, cardiac and other comorbidities) was collected from the hospital electronic medical records.

Statistical analyses

The data were analysed using JMP Pro 15 (SAS institute), R (R Core Team, 2021) and SPSS version 27 (IBM Corporation). For continuous data, mean and standard deviation were calculated. Data was tested for normality using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Brown-Forsythe tests were used to assess equality of group variances. Differences

between continuous variables were tested by either independent samples t-tests or Mann-Whitney U tests. The χ^2 test was used for comparison of categorical variables. Univariate and multivariate logistic regression was performed to identify factors that affect the odds of choosing to participate in TR. A p-value of less than 0.05 was considered to be statistically significant.

Ethical committee approval and data privacy

The study complied with good clinical practice in accordance with the Declaration of Helsinki and the laws and regulations applicable in our centre. Written approval from the appropriate ethics committee was obtained (study code 2020/150). All data remains stored on a secure drive owned by the research centre for a predefined period of time.

Results

Patient contact

All 369 patients were called in the setting of TR for a first time between March 17 and April 30, 2020. Sixty-nine patients could not be reached and were thus excluded from further analysis. Follow-up calls were made until June 26, 2020, which is when the CR facility could again be opened.

Distribution of participants

Baseline characteristics and main results are depicted in Table 1 for all patients, for those patients that participated in TR and for those patients that did not participate in TR. No significant differences in baseline characteristics were seen between TR participants and TR non-participants concerning the baseline characteristics depicted in Table 1. Of the 300 patients reached, 208 (69%) agreed to participate in cardiac TR. Of the 189 patients that were already included in centre-based CR before the start of the lockdown, 128 participated in TR (128/189, 68%). Of the 111 patients who had an indication for CR after the start of the lockdown, 80 participated in TR (80/189, 72%).

The CR facility was closed for a duration of 66 days, but the TR contacts were maintained for up to two months after reopening. Characteristics about training duration and training modalities during the TR programme are depicted in Table 2. A detailed analysis of subgroups based on frequency of participation in the TR programme is depicted in Supplementary table 1.

Determinants of cardiac telerehabilitation

A full model logistic regression did not reveal any significant determinants on participation rate in TR (Table 3).

Discussion

This retrospective study analysed a unique population of 300 patients that had the opportunity to participate in an implemented TR programme during the first surge of the COVID-19 pandemic. This study thus contributes to the real-life evidence base of the currently heterogeneous and scarce evidence of TR studies by evaluating the short-term implementation of a new intervention.

Our study demonstrates that of all patients that were offered TR, 69% participated in the TR programme. This finding is in line with previous prospective studies, in which the willingness to participate in TR or blended rehabilitation in patients that were already participating in CR was 60-70% (13).

Next to general baseline characteristics (age, gender, BMI), it was anticipated that some factors could be determining factors of the willingness to participate in TR. The index event is known to play a role in participation rates in conventional CR, with more invasive procedures leading to higher participation rates (14). It was also anticipated that those patients who started CR before the lockdown were familiar with the intervention and would thus show higher participation rates in the TR programme compared to those patients that started TR during the lockdown and were thus not familiar with CR. Lastly, it was anticipated that in those patients that were familiar with remote monitoring programmes, such as the CIED telemonitoring service, participation rates would be higher. However, in these retrospectively collected characteristics, logistic regression did not show any determinants that are directly correlated with participation in cardiac TR.

Interestingly, age is not directly correlated with participation in a TR programme. This is in line with other studies showing that not age but years in education and smartphone ownership are perhaps better indicators of digital literacy and thus participation in remote, digital interventions (15–17). Socio-economic factors such as race, type of insurance and household income have also been shown to be correlated with the uptake and utilisation of digital solutions and telemedicine (18).

Our study confirms that uptake of TR can be high and that a majority of patients is prepared to switch conventional care to a digital health solution when necessary. Our results also confirm that in order to address the digital divide and in order to keep healthcare solutions equally available to all, we should not focus on old age per se. Rather, we should focus on defining who is digitally literate and, in groups with low digital literacy and low digital uptake, how to address and improve digital literacy. Also, digital technology should be cocreated with patients in order to attain a maximal user-friendliness for all patients.

Future research should focus on better delineating digital health literacy and, more importantly, on how to reach also those patients that are less motivated or less digitally literate.

This study has certain limitations. The study was performed during the first lockdown period of COVID-19 in Belgium. Participating in centre-based CR was not an option. Other factors such as anxiety for COVID-19 or illness due to COVID-19 may have influenced the patients' decisions

on participation. Also, the remote intervention was new for the CR team, digital infrastructure for videoconferencing was new and there was a sudden partial reimbursement of the remote consultations as part of the TR intervention. This is in contrast to future interventions that will be more structured and planned in advance, and in which more time is available for the training of TR teams. Results can thus not be fully generalized to the current and future population of cardiovascular patients in times of COVID-19 vaccination and protection and in times of structured and planned TR.

Further limitations include the lack of data on socio-economic factors, educational level, technology access, digital literacy and the reasons of acceptance and non-acceptance of the TR intervention in this retrospective cohort. Also, information about the percentage of patients restarting regular CR after reopening the facilities is not available for this cohort.

Conclusion

This retrospective study demonstrates that participation in TR during the first lockdown due to COVID-19 was high (69%). Numbers were comparable in those who were already enrolled in centre-based CR (68%) and those starting TR during the lockdown (72%). Of the analysed characteristics, none was directly correlated with the willingness to participate in TR. Further research is needed to further assess determinants, barriers and facilitators of TR. Also, research is needed on better delineating digital health literacy and on how to reach also those patients that are less motivated or less digitally literate.

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