Effectiveness of a multimodal telemedicine educational intervention, implemented in times of the COVID-19 pandemic, for patients with heart failure and coronary artery disease.

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Lay abstract

This study evaluated the effect of telemedicine interventions in patients with heart disease during the COVID19 pandemic. The results showed that with a multimodal educational intervention the participants could maintain the adherence to the recommendations about exercise, medication and nutrition.

Abstract

Aim: To evaluate the effectiveness of a multimodal telemedicine educational intervention for patients with heart failure (HF) or coronary artery disease (CAD), implemented in times of the COVID-19 pandemic, to maintain functioning, quality of life and achieve adherence to the recommendations.

Methods: Before and after quasi-experimental study. Outcomes included adherence to medications, exercise and nutritional recommendations; Duke– DASI; quality of life with the Minnesota Living With Heart Failure Questionnaire (MLWHF) in HF and the SF-36 in CAD.

Intervention: A multimodal telemedicine intervention (home cardiac rehabilitation), with educational videos on recommendations about exercise, nutrition and medication in the HF group and educational videos on exercise and delivery of the clinical practice guide for patients in the CAD group.

Results: Comparative before and after analyzes were performed in 23 patients in the HF group and in 25 patients in the CAD group. The patients in both groups maintained adequate adherence to the pharmacological, nutritional and exercise recommendations. In the HF group, there was improvement in the MLWHF emotional domain, and in the CAD group, there was improvement in the SF-36 emotional role domain, with a decrease in the general health score. The rest of the domains were maintained in the evaluations.

Conclusion: A multimodal educational intervention through telemedicine could be an alternative strategy to the face-to-face modality of cardiac rehabilitation, to maintain adherence to exercise, nutrition and medication and improve health related quality of life.

Key words: telemedicine, heart failure, coronary artery disease, cardiac rehabilitation.

Abbreviations

HF: Heart failure. CAD: Coronary artery disease. EF: Ejection fraction. CR: Cardiac rehabilitation. MLWHF: Minnesota Living With Heart Failure Questionnaire. DASI: Duke Activity Status Index. CPG: Clinical practice guidelines. PF: Physical functioning. PR: Physical role. ER: Emotional role. BP: Body pain. MH: Mental health. V: Vitality. SF: Social functioning. GH: General health. SMD: standardized mean difference.

Background

Pneumonia of unknown etiology first patients were reported in Wuhan China in 2019. In January 2020 a new type of coronavirus (SARS-CoV-2) was identified and in February 2020 the World Health Organization (WHO) named it COVID-19 disease [1]. On March 11, 2020, WHO officially declared the infection caused by SARS-CoV2 a pandemic [2]. In Colombia, emergency and mandatory social isolation were decreed from March 25, 2020, for which the phase II cardiac rehabilitation sessions were suspended at the Clínica Las Américas Auna in Medellín, Colombia [3].

Cardiovascular diseases have a high prevalence in the world. In Colombia, during the 1998-2011 period, mortality due to cardiovascular disease corresponded to 23.5% of all deaths, and of these 56.3% were due to coronary artery disease (CAD) [4]. Also, heart failure (HR) is the leading cause of hospital admission in adults over 65 years of age [5]. In a study carried out in the city of Bogotá, Colombia, it was reported that for the 2008 – 2015 period, mortality from CAD corresponded to 13.9% [6].

In Colombia, the Clinical Practice Guidelines (CPG) for acute CAD and for HF recommend comprehensive cardiac rehabilitation programs and exercise in all patients with these two conditions [7, 8].

Cardiac rehabilitation (CR) has shown effectiveness in reducing the number of hospitalizations, improving physical function and health-related quality of life (HRQoL) [9, 10]. Home-based programs in patients with HF with preserved or reduced ejection fraction (EF), have shown an improvement in functional capacity and quality of life without differences in mortality, hospitalization and abandonment rates with the face-to-face programs [11, 12].

In CAD, face-to-face and home cardiac rehabilitation have been evaluated in several studies, showing a decrease in hospitalizations and improving HRQoL and cardiovascular risk factors [13, 14].

In an observational study, it was reported that CR is still under implemented in the world [15]. The global survey showed that only 54% of the countries in the world had CR services, with data obtained from 93 countries. In 76.6% of the countries with CR a supervised program was offered, and in 45.9% a model alternative such as CR at home was also offered. In Colombia, before the COVID-19 pandemic, only supervised CR programs had been offered.

The confinement due to the COVID-19 pandemic implied a radical change in the lifestyle of people around the world. These isolation measures drastically increased physical inactivity, with greater risk of acute events, depressive symptoms and anxiety. Maintaining physical activity at home during the COVID 19 crisis is essential for patients with heart conditions [16].

According to recommendations published by the American Academy of Sports Medicine, CR programs can propose indoor activities such as dancing and walking around the house for 15 minutes, 2 to 3 times a day; and outdoor activities such as walking, cycling, gardening or playing active games with the family [17]. Also, for strength training, they recommend downloading a training app or using online strength exercise videos, among others.

The aim of this study was to evaluate the effectiveness of a telemedicine multimodal educational intervention for patients with CAD and/or HF, with preserved or decreased ejection fraction, implemented in times of the COVID-19 pandemic, to maintain functioning, quality of life and achieve adherence to the recommendations, three and six months after admission.

Materials and methods

Design

Quasi-experimental study of before and after intervention.

Participants

A convenience sample was included, consisting of a group of patients in waiting list to phase II CR at the Las Américas Auna clinic, in June, July, August and September 2020, and who were unable to initiate the face-to-face sessions due to the COVID-19 pandemic. The inclusion criteria were: 1. Patients older than 18 years, with HF and/or CAD with preserved or decreased EF (If a patient had both diagnoses, was assigned to the HF group). 2. NYHA I-III. 3. Having telephone and technological tools to receive the information. 4. Who accepted to participate and gave their informed consent. 5. Who lived in the Antioquia region and spoke Spanish. The exclusion criteria were: 1. Patients who could not receive telephone follow-up. 2. Decompensated or exacerbated cardiovascular disease, active infections, severe symptomatic aortic stenosis, atrial fibrillation with uncontrolled ventricular response. 3. NYHA functional class IV. 4. Limitation for physical activity due to musculoskeletal disease. 5. Cognitive and/or behavioral alterations that prevented understanding and following instructions. These criteria were verified by medical record. One of the researchers made the selection of patients who met the inclusion criteria, and then a physical therapist made phone calls to each patient to explain the study, the intervention to be performed and request verbal informed consent, which was recorded.

Intervention

The intervention included a telephone call made by the physiatrist, to give instructions about exercise, nutrition and pharmacological treatment. The physiatrist determined the patient's cardiovascular risk and prescribed aerobic exercise, consisting in walking or cycling, with moderate effort, without reaching maximum fatigue, 30 to 60 minutes per session, 3 to 5 times a

week. Instructions were given on methods to avoid fatigue, contraindications to exercise, and warning signs to consult. Then, four videos developed by physical therapy professionals, consisting of stretching, joint mobility, balance and coordination exercises, were sent through an instant telephone messaging application (WhatsApp). The four videos had a total duration of seven minutes and included written instructions on how to perform the exercise, the number of repetitions or performance time, as well as a demonstration by a physical therapist. These videos were sent twice, and the intervention was also complemented in patients with CAD, by sending the national CPG for patients with acute coronary artery disease and caregivers published in 2013 [18].

Two more videos were also sent to the patients of the HF group, one performed by a clinical cardiologist explaining the importance of pharmacological treatment, self-care, fluid control, low sodium diet and control of risk factors. The other video was made by a nutritionist with experience in managing patients with heart disease, lasted 10 minutes and addressed the issue of adequate nutrition in patients with HF, indications on how to lower the amount of salt consumed, among other aspects.

Both groups of patients were advised to watch the videos whenever they exercised and to contact the main researcher in case of doubts or complications.

Measures

Patients with HF completed the sociodemographic and clinical data format, the adherence format, the Duke Activity Status Index – DASI and the MLWHF for quality of life. Patients with CAD filled out the same forms and the generic instrument for quality-of-life SF-36. Two physical therapists (DS and DV) with training in Cardiac Rehabilitation conducted telephone follow-up three and six months after the initial contact.

Primary outcome

The primary outcome was adherence to the recommendations on exercise, medications and nutrition, using a questionnaire developed by the research group, which included questions about type and time of exercise in the last fifteen days, adherence to pharmacological treatment and, finally, smoking, alcohol, salt and liquids intake.

Adherence to HF medications was analyzed by grouping them as follows: group 1 ARB/ACEI/ARNI (Captopril, Enalapril, Ramipril, Losartan, Candesartan, Valsartan, Sacubitril/Valsartan); group 2 beta blockers (Carvedilol, Metoprolol, Bisoprolol); group 3 mineralocorticoid receptor antagonists (Spironolactone, Eplerenone); group 4 diuretics (Furosemide, Hydrochlorothiazide); group 5 others (Metildigoxin, Ivabradine). CAD medications were grouped into: group 6 Acetylsalicylic acid (ASA); group 7 P2Y2 receptor inhibitors (Clopidogrel, Prasugrel, Ticagrelor); group 8 lipid-lowering drugs (Atorvastatin, Rosuvastatin, Simvastatin, Lovastatin, Ezetimibe). To measure medication adherence, the pre-test (baseline) and the post-test (corresponding to the 3 or 6-month evaluation) percentages were compared.

Secondary outcomes

*DASI: The Duke-DASI Activity Status Index is a self-administered questionnaire that measures functional capacity. It has been validated in CAD [19] and HF [20, 21]. It has one domain and 12 items: take care of self, walk indoors, walk 1-2 blocks, climb up, run, light housework, moderate housework, heavy housework, yardwork, sexual relations, recreational activities, strenuous sports. The total score ranges from 0 (worst functional status) to 58.2 (best functional status) [21].

*MLFHQ: The Minnesota Living with Heart Failure questionnaire is a self-administered health related quality of life scale for patients with HF. It consists of 21 items and two domains: physical (8 items), emotional (5 items), other (8 items). Responses on a 6-point Likert-type scale from 0 ‘‘ no limitation ’’ to 5 ‘‘ very limited ’’. The total score ranges from 0 to 105, lowest to highest limitation. The scale was validated in Colombia in 2019 [22].

*SF-36: The SF-36 is a generic quality of life scale that includes 36 items grouped into 8 domains: physical functioning (PF), physical role (PR), body pain (BP), general health (GH), vitality (V), social functioning (SF), emotional role (ER) and mental health (MH). The eight domains are calculated from the transformation of the items on a scale ranging from 0 to 100, where 100 is the best quality of life and zero is the worst. The scale was adapted in Colombia in 2006 [23].

*NYHA: The New York Heart Association (NYHA) functional classification system was developed to evaluate the effect of cardiac symptoms on patients' activities of daily living. There are 4 groups (I to IV), depending on the limitation for physical activity [24].

Data analysis

A descriptive analysis of the demographic and clinical variables was carried out. Qualitative variables were described with relative and absolute frequencies, quantitative variables were described by measures of central tendency and dispersion. For comparing the DASI, MLWHF and SF 36 scores, the Wilcoxon nonparametric test for quantitative variables was used, with previous validation of non-normality of the data with the Shapiro-Wilk test. For the qualitative variables, comparisons were made using McNemar's non-parametric test if for dichotomous variables. Statistical analyzes were performed using the SPSS V.22 statistical program, licensed from the University of Antioquia.

This research complied with the research on standards of regulation of human beings, specifically those established in resolution No. 008430 of 1993 of the Ministry of Health of Colombia and in the declaration of Helsinki of 2013. Fulfilling the principle of respect for the autonomy of the participants who entered. It was approved by the ethics committee of Las Américas Auna clinic. The verbal informed consent given by the patients was recorded.

Results

Sixty-seven patients met the inclusion criteria, 54 patients agreed to enter the study, 24 with HF and 30 with CAD. At 3 months, 23 with HF and 25 with CAD were analyzed, and at 6 months, 21 with HF and 25 with CAD were analyzed (See Figure 1). In the sample, 45.8% of the HF group

and 36.7% of the CAD group were female (See table 1). In the HF group, 70.8% of the patients had NYHA functional class II or III, and there were no statistically significant differences at 3 and 6-month follow-up. An ejection fraction less than 40% was found in 58.3% of the participants. In the HF group, 26.1% of the patients required hospitalization at 3 months and 23.8% at 6 months, without statistically significant differences in the follow-ups. In the CAD group, 12% of the patients required hospitalization at 3 months and 16% at 6 months.

Regarding adherence to exercise, in the HF group, 75% of the patients reported exercising at baseline, which was maintained at 3 and 6 months (See table 2). Of the patients, 8.3% reported not exercising due to the quarantine isolation preventive measure. The most performed exercise was walking, in 75%, 78.3% and 66.7% of the patients in the baseline, 3 and 6 months respectively. At baseline, the most frequent symptoms during exercise were fatigue (17.4%) and other chest pain (16.7%). At 3 and 6 months, fatigue and other chest pain were also the most frequent symptoms. At the 3 months assessment, fatigue was present in 21.7% and at 6 months in 19%, and chest pain was present in 43.5% at the 3 months assessment and in 31,8% at 6 months assessment. None of the patients reported feeling bad about exercise.

In the CAD group, 90% of the patients exercised at baseline and this was maintained at 3- and 6-months follow-ups (See table 2). Exercise was not carried out in 6.7% due to the quarantine isolation prevention measure. The most performed exercise was walking in 86.7%, 92% and 92% of the patients at baseline, 3 and 6 months respectively. Regarding symptoms during exercise at 6 months follow-up, 29.2% of the patients reported chest pain and only 4% reported fatigue.

In the HF group, the most frequently ordered medications were from group 2 (Beta blockers). In the 3-month follow-up, one patient reported not talking Carvedilol (drug from group 2) due to administrative difficulties in the delivery of the drug. The rest of the patients had 100% adherence in the initial, 3- and 6-months evaluations (See tables 5 and 6). In the CAD group, the most frequently used medications were from group 8 (Lipid-lowering drugs). In the 3-month follow-up, two patients expressed not taking Clopidogrel due to administrative difficulties with the delivery of the drug and one patient reported not taking Atorvastatin due to intolerance. In the rest of the patients, at baseline and 6-months evaluations there was 100% adherence to medications (See table 4).

The activity status measured by the DASI in the HF group at baseline and at 3 and 6 months had a score lower than 15, with no statistically significant differences in the follow-up assessments. In the CAD group, a 6.3-point worsening at 3 months and a 2.8-point worsening at 6 months were found, with statistically significant differences.

Regarding the quality of life (QoL) evaluated in the HF group, there was an improvement in the emotional domain of the MLWHF at 3 and 6 months, and these differences were statistically significant. In the global score, there was an improvement of 7 points at 3 months and 2 points at 6 months, but this difference was not statistically significant (See figure 2).

In patients with CAD, the QoL measured with SF36 was higher in the ER domain at the 6-month follow-up (66.7 -IR 50- vs. 100 -IR 37.5) and was statistically significant. The other domains of

the SF 36 remained without significant differences 3 and 6 months later, except for GH, which worsened significantly (See Table 5, Figure 3).

Discussion

This study was able to show the effectiveness of a multimodal telemedicine educational intervention during the COVID-19 pandemic. Patients with CAD and HF maintained adherence to medications, nutrition and exercise recommendations. QoL in patients with HF improved in the emotional domain of the MLWHF and was maintained in the other domains. In patients with CAD, an improvement in the ER of the SF36 was seen and the other domains were maintained, except for the GH domain.

The COVID-19 pandemic prompted governments to take sudden and drastic social distancing measures to stop the spread of the virus. In Canada, CR programs between April 23 and May 14 of 2020, were closed in 41.2% of the centers and almost half of the staff was relocated [25]. These programs went from group to individual delivery models, with more than 80% of contacts made by phone or email. Most barriers reported by these CR programs were related to technology. In the present study, of the 67 eligible patients, three of them could not be admitted due to lack of technological tools and one patient due to cognitive impairment.

Another study, by 313 providers between June and July 2020, reported that 49.3% of CR programs had been suspended by COVID-19 pandemic [26]. In 85%, the technology most used to evaluate the patient was the telephone. Also, 24.1% of these programs could not evaluate functional capacity. In 69.2% of 92 patients the physicians relied mainly on self-reported responses to estimate functional capacity. The intervention was prescribed by telephone in 64.7% of the patients. Furthermore, health service providers were not familiar with the use of online health service delivery. In our study, both physiatrists and physiotherapists were also not familiar with these service delivery methods, there were no technological tools to evaluate the functional capacity of patients, and therefore it was not possible to carry out an individualized prescription of exercise.

Kemps et al., gave recommendations on how to continue CR programs in the COVID-19 pandemic, by concentrating efforts on risk management, healthy lifestyles, psychosocial support, medical advice and education with an individualized approach [27]. They also recommended replacing face-to-face sessions with phone calls, text messages, emails, video consultations, and various web-based resources.

A study, published by the University of Tokyo in Japan, evaluated a CR program at home in patients with HF, compared with CR in a hospital center and no intervention. After inpatient CR closing on March 4, admission to the CR program at home went from 19% to 69% after hospital discharge. There was no dropout from the home program, the emergency rooms readmission rate in the next 30 days was lower in the CR groups: 3% in the inpatient group, none in the home group, and 12% in the non-RC group. The QoL measured by the EQ-5D was better in the home CR group compared to the inpatient group (0.87 ± 0.15 vs. 0.80 ± 0.14, $p= 0.03$) [28].

Before the COVID 19 pandemic, different studies compared cardiac rehabilitation at home with institutional programs. A systematic review and meta-analysis demonstrated improvement in VO2max (SMD 1.6 ml/kg/min, 95% CI 0.8 to 2.4), with improvement in quality of life (MLWHF) in favor of the home CR group (SMD -3.3, 95% CI -7.5 to 1.0) [11]. There were no differences in mortality, hospitalization and abandonment rates. In the present study, in the HF group, an improvement in the emotional domain of the MLWHF was found at 6 months and this difference was statistically significant. The improvement in emotional domains could be explained by the high anxiety load that confinement brought with it and the uncertainty due to COVID-19. At the time the initial surveys were carried out, the patients had had two or three months of strict isolation, which could have affected emotional role, with later improvement when confinement measures were eased.

One RCT on CAD patients with NYHA I or II, EF above 50% and functional capacity above 6 METS, compared exercise at home vs. usual care [29]. Patients were contacted every two weeks by the physician to monitor progress, assess adherence, and provide support. There was an improvement in quality of life (SF 36) in the intervention group, with worsening in five domains in the control group. Physical function showed improvement in O2 consumption (2.9ml/k/min, $p < 0.05$) in the intervention group, while in the control group there was a decrease of 1.8ml/kg/min. Adherence to exercise was 100%, with an average of 2.8 sessions per week (SD: 0.4). No adverse effects were reported in the home exercise group. In the present study, patients with CAD had lower SF 36 initial scores than those reported by Salvetti, with maintenance of these scores at 3 and 6-month follow-ups. A possible explanation for the worsening in the general health domain of SF 36 in our study, could be that the questions in this domain were complex to answer over the phone.

Regarding adherence to exercise, the self-report provided by the patients in the study by Salvetti and in this study was similar. In patients with CAD an adherence to exercise of 96% at 3 months and 100% at 6 months was found. In the study by Salvetti, patients underwent a test to determine their physical capacity and exercise was prescribed according to the target heart rate. In addition, follow-ups were performed every two weeks, which was not done in the present study.

In a published study for the validation of the DASI, in 135 patients with a diagnosis of HF, of which 70.4% also had a diagnosis of CAD, the average DASI score was 15.7 ± 9.62 [21]. In the HF group, functioning was maintained, while in the CAD group, a worsening of the scores was found. Although it is necessary to validate this measurement again since this population was not included in the validation of the DASI performed in Colombia.

Limitations

Due to the speed with which the pandemic and the mandatory confinement were established, the RC programs had to migrate to a method of providing the service at home that was not structured or evaluated.

In previous research, surveys have generally been applied in face-to-face encounters with physical forms and this was the first time that telephone contacts were made to fill out virtual questionnaires. It is important to evaluate the best way to fill out the questionnaires by phone.

Contact with patients was only made at 3 and 6 months, without having more frequent telephone follow-ups that would allow a closer evaluation of the health status of the patients. In addition, we did not use tools to monitor exercise, or vital signs, or more objective measurements of adherence to exercise, nutrition and medication recommendations.

Recommendations for practice and research

A multimodal educational intervention using telemedicine was able to maintain quality of life and adherence to exercise in patients with CAD or HF. Healthy lifestyle habits such as not smoking, not drinking alcohol and having adequate nutrition could be achieved, in accordance with the recommendations of the CPG. Good adherence to medications was also achieved and there was a low percentage of re-hospitalizations at 3 and 6 months in both clinical conditions. The development of a structured CR program at home is recommended, with training of health personnel in the use of telemedicine, with better monitoring to guarantee the safety and feedback of the patients and greater emphasis in defining exercise goals individually for each of the patients, in terms of intensity, frequency, duration and load. This would be ideal for people with difficulties in accessing the programs, due to barriers such as the place of residence, transportation problems, and low financial resources. These programs could maintain or improve adherence to exercise, nutrition, and medication recommendations, also improving functional capacity, health-related quality of life, and reducing re-hospitalizations.

It is important to develop research on CR programs to maintain and improve achievements; implement home-based CR and determine the optimal way to perform it and establish long-term follow-up for people with HF and CAD.

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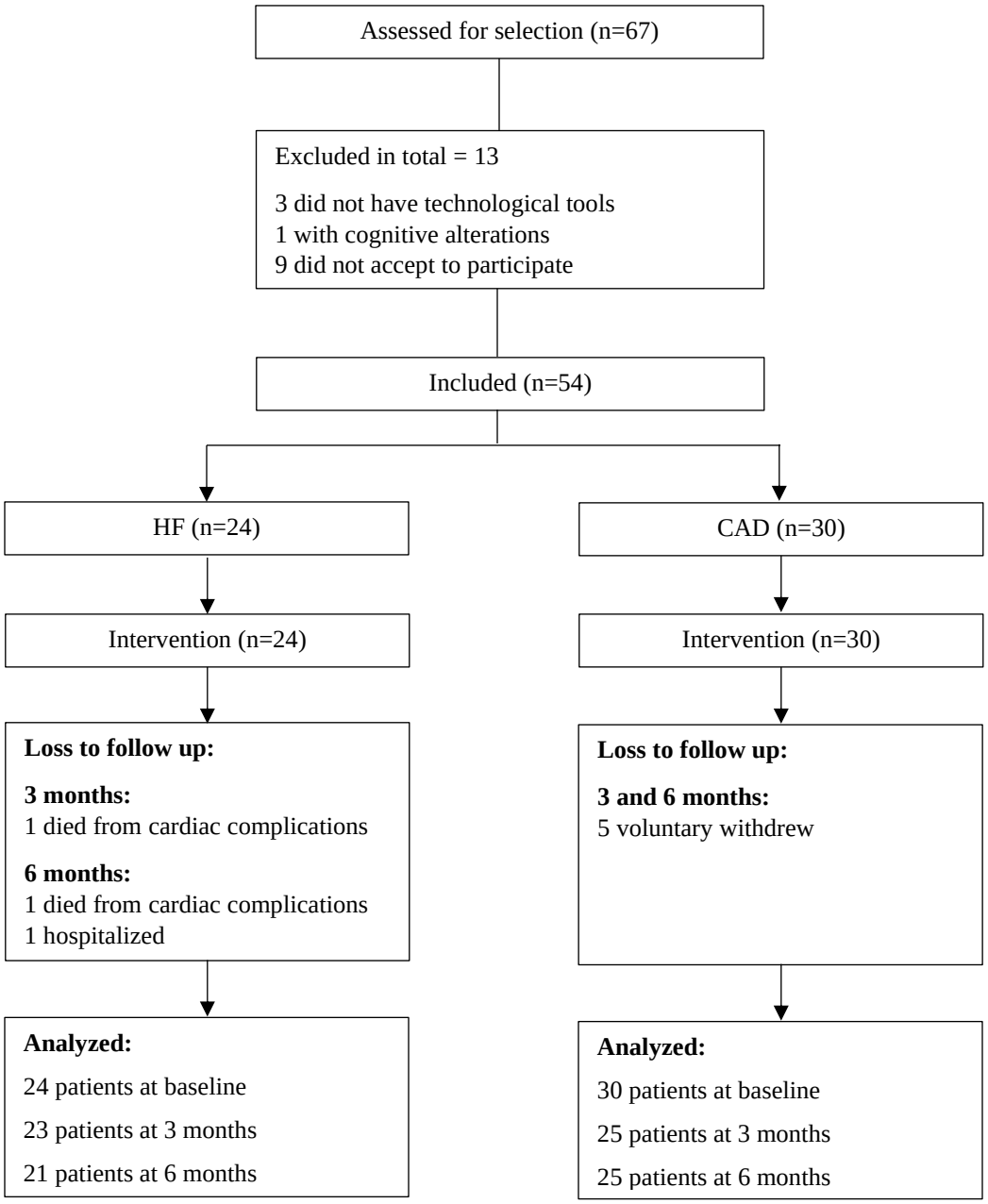


Figure 1. Flujogram for heart failure and coronary artery disease at baseline, 3- and 6-months assessments. Multimodal cardiac rehabilitation strategy, in times of the COVID-19 pandemic.

Table 1. Sociodemographic factors in patients with HF and CAD. Multimodal cardiac rehabilitation strategy, in times of the COVID-19 pandemic.

Sociodemographic factors	Heart failure		Coronary artery disease	
	n: 24	%	n: 30	%
Sex				
Male	13	54,2	19	63,3
Health system affiliation type				
Subsidized	4	16,7	6	20
Contributory	20	83,3	24	80
Educational level				
Elementary school	9	37,5	9	30
High school	10	41,7	10	33,3
College/University	5	20,8	11	36,7
Employment status				
Employee	5	20,8	6	20
Self-employed	2	8,3	5	16,7
Informal	1	4,2	0	0
Retired	13	54,2	14	46,7
Unemployed	3	12,5	5	16,7
NYHA				
I	7	29,2		
II	14	58,3		
III	3	12,5		
Ejection fraction				
<40	14	58,3		
40-49	10	41,7		
Percutaneous revascularization				
Yes			25	83,3
Surgical revascularization (CABG)				
Yes			6	20

Table 2. Adherence to physical activity in patients with HF and CAD. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.

Adherence to exerciese	Heart failure n (%)			Coronary artery disease n (%)		
	Baseline (n:24)	3 months assessment (n:23)	6 months assessment (n:21)	Baseline (n:30)	3 months assessment (n:25)	6 months assessment (n:25)
Exercise in the last 15 days						
Yes	18 (75,0)	21 (91,3)	20 (95,2)	27 (90,0)	24 (96,0)	25 (100,0)
Exercise session duration						
Mean (S.D)	39,1(20,6)	43,2(24,5)	39,0 (25,2)	37,9 (14,8)	35,1 (15,8)	38,2 (17,1)
Weekly exercise sessions						
Mean (S.D)	4,8 (1,4)	4,7 (1,4)	4,4 (1,6)	4,8 (1,9)	4,9 (1,7)	4,6 (1,9)
Exercise time or frequency (last 15 days)						
Has decreased	1 (29,2)	3 (13,0)	5 (23,8)	4 (13,3)	5 (20,8)	2 (8,0)
Has not changed	16 (66,7)	18 (78,3)	14 (66,7)	23 (76,7)	19 (79,2)	19 (76,0)
Has improved	1 (4,2)	2 (8,7)	2 (9,5)	3 (10,0)	0 (0,0)	4 (16,0)

S.D: standard deviation

Note: The Mcnemar statistical test for qualitative variables and the Wilcoxon nonparametric statistical test for quantitative variables were used for the analysis of differences. No significant differences were found in any of the comparisons.

Table 3. Adherence to salt and fluid restriction, smoking and alcohol intake in HF and CAD. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.

Adherence to salt and fluid restriction, smoking and alcohol intake	Heart failure n (%)			Coronary artery disease n (%)		
	Baseline (n:24)	3 months assessment (n:23)	6 months assessment (n:21)	Baseline (n:30)	3 months assessment (n:25)	6 months assessment (n:25)
Active smoker						
Yes	2 (8,3)	3 (13,0)	3 (14,3)	2 (6,7)	2 (8,0)	3 (12,0)
No	22 (91,7)	20 (87,0)	18 (85,7)	28 (93,3)	23 (92,0)	22 (88,0)
Alcohol intake						
Yes	0,(0,0)	0,(0,0)	0,(0,0)	2 (6,7)	1 (4,0)	0 (0,0)
No	24(100,0)	23(100,0)	21(100,0)	28 (93,3)	24 (96,0)	25 (100,0)
Fluid restriction						
Yes	15 (62,5)	19 (82,6)	18 (85,7)	8 (26,7)	3 (12,0)	4 (16,0)
No	9 (37,5)	4 (17,4)	3 (14,3)	22 (73,3)	22 (88,0)	21 (84,0)
Fluid intake						
< 1.5 liters	12 (50,0)	18 (78,3)*	17 (81,0)*	8 (26,7)	3 (12,0)	3 (12,0)
> 1.5 liters	12 (50,0)	5 (21,7)*	4 (19,0)*	22 /73,3)	22 (88,0)	22 (88,0)
Salt restriction						
Yes	24 (100,0)	23 (100,0)	21 (100,0)	27 (90,0)	24 (96,0)	25 (100,0)
No	0 (0,0)	0 (0,0)	0 (0,0)	3 (10,0)	1 (4,0)	0 (0,0)

Note: The Mcnemar statistical test was used to analyze the differences.

Values with asterisk * showed statistically significant differences.

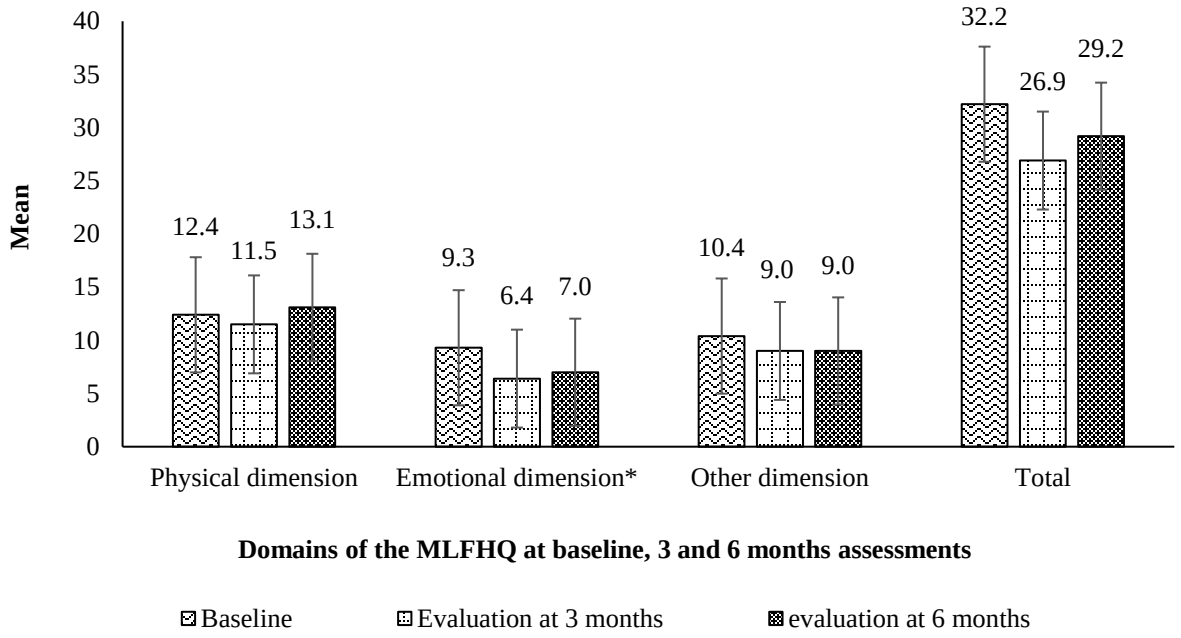
Table 4. Medication adherence in patients with HF and CAD at baseline, 3- and 6-months assessments. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.

Adherence to medications	Heart failure n (%)			Adherence to medications	Coronary artery disease n (%)		
	Baseline (n:24)	3 months assessment (n:23)	6 months assessment (n:21)		Baseline (n:30)	3 months assessment (n:25)	6 months assessment (n:25)
ARA/IECA/ARNI				**Acetylsalicilic Acid**			
Yes	20(83,3)	20(87,0)	18(85,7)	Yes	27(90,0)	24(96,0)	23(92,0)
No	4(16,7)	3(13,0)	3(14,3)	No	3(10,0)	1(4,0)	2(8,0)
Betablocker				**P2Y12 receptor inhibitor**			
Yes	22(91,67)	21(91,3)	19(90,5)	Yes	18(60,0)	14(56,0)	12(48,0)
No	2(8,3)	2(8,7)	2(9,5)	No	12(40,0)	11(44,0)	13(52,0)
Mineralocorticoid receptor antagonist				**Lipid treatment**			
Yes	14(58,3)	15(65,2)	13(61,9)	Yes	29(93,5)	23(92,0)	22(88,0)
No	10(41,7)	8(34,8)	8(38,1)	No	1(6,5)	2(8,0)	3(12,0)
Diuretics							
Yes	14(58,3)	12(52,2)	11(52,4)				
No	10(41,7)	11(47,8)	10(47,6)				
Metildigoxin - Ivabradine							
Yes	3(12,5)	1(4,3)	2(9,5)				
No	21(87,5)	22(95,7)	19(90,5)				

Table 5. Quality of life measured with SF36 at baseline, 3 and 6 months later in patients with CAD. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.

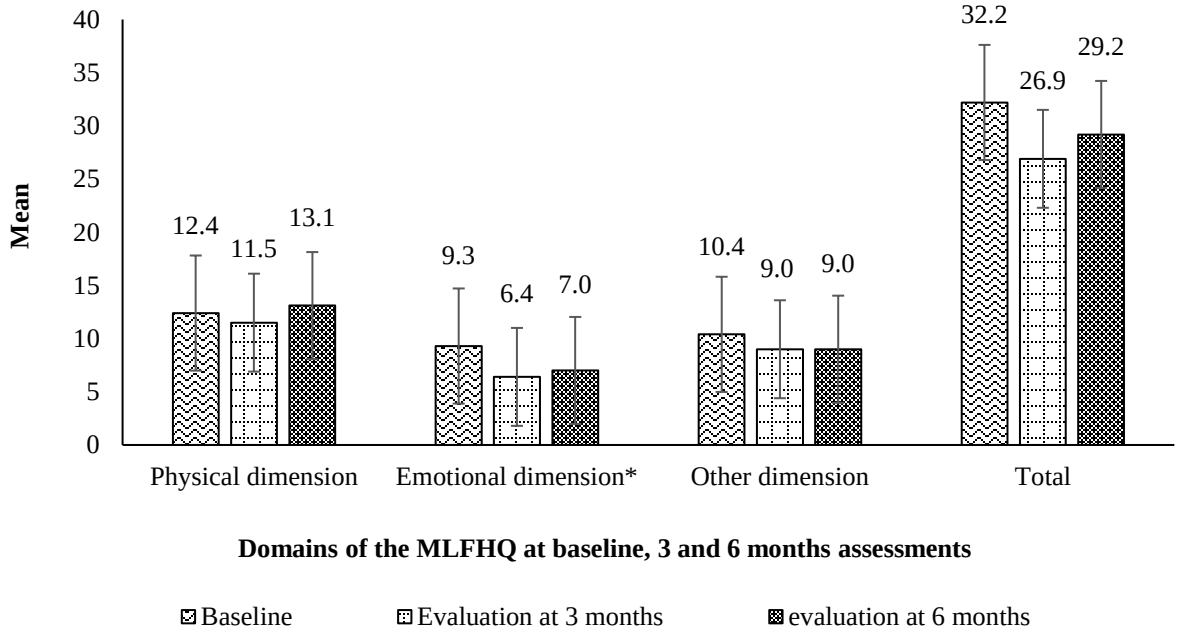
SF-36 Domains	Baseline Median (I.R)	Baseline VS 3 months assessment (n:25)		Baseline VS 6 months assessment (n:25)	
		3 months assessment Median (I.R)	p*	6 months assessment Median (I.R)	p*
Physical functioning	65,0 (30,0)	65,0 (32,5)	0,24	70,0 (17,5)	0,94
Physical role	62,5 (43,8)	75,0 (50,0)	0,91	100,0 (37,5)	0,12
Emotional role	66,7 (50,0)	83,3 (50,0)	0,31	100,0 (33,3)	0,01*
Body pain	74,0 (27,5)	62,0 (32,5)	0,05	64,0 (12,0)	0,31
Mental health	65,0 (27,5)	65,0 (22,5)	0,28	65,0 (12,5)	0,82
Vitality	68,8 (18,7)	56,3 (21,3)	0,12	62,5 (6,2)	0,18
Social functioning	62,5 (31,3)	62,5 (25,0)	0,11	62,5 (25,0)	0,42
General health	72,0 (30,0)	47,0 (37,0)	0,04*	52,0 (15,0)	0,00*

I.R: Interquartile range; p: Wilcoxon test for differences of medians.
Values with asterisk * showed statistically significant differences.



* Domains that presented statistically significant changes in one or more of the comparisons.
† Standard error bars.

Figure 2. Quality of life as measured by the Minnesota Living With Heart Failure Questionnaire (MLFHQ) at baseline, 3- and 6-months assessments in patients with HF. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.



* Domains with statistically significant changes in one or more comparisons.

† Standard error bars.

Figure 3. SF 36 domains of Physical Function, Physical Performance, Emotional Performance, Mental Health, and General Health at baseline, 3- and 6-months assessments in patients with CAD. Multimodal cardiac rehabilitation strategy in times of the COVID-19 pandemic.