Knowledge Analysis of Pregnant Mothers About Newborn Treatment
(Diah Nurhidayati, Tuti Yanaarti)

The Relationship Between Nurse Supervision With Compliance Toward Handover During The Pandemic COVID-19 in Indonesia
(Dudi Mauludin, Lia Idealistiana)

The Effect of Father’s Education on Increasing Knowledge, Attitudes, and Practice of Health Protocols in Preventing COVID-19 in Nursing Students
(Sarman Eko Natalia Sinaga)

Behavior Prevention Modification of Non-Communicable Diseases During the COVID-19 Pandemic Using Android-Based Telemursing Application “SI-TELUR PETIS”
(Mei Rianita Elfrida Sinaga, Indrayanti, Muhammad Irfan)

The Effect of Touch Less Spiritual Therapy and Yin Yoga Toward Student’s Perceived Stress During Covid-19 Pandemic
(Debora, Sulistyono)

Mix Method Impact of Exposure of Inhalants Exposure “Glueing” on Street Children Community in Kendari City
(Ash Bath Said, Mikawati, Wa Ode Rahmadania, Sartini Risky)

Experiences of Aggressive Behavior Patient after Physical Restraint in Mental Hospital, A Qualitative Study
(Iyus Yosep, Ali Surya Medrawati, Al Mardhiyah)

The Relationship of Brith Ball Therapy on Primigravida Mothers With A Fair Delivery Process
(Novianti, Feva Tridiyawati)

The Effect of Three Good Things Technique on Self-Leadership to Nursing Students
(Diwa Agus Sudrajat, Andalis Munawaroh Alyah, Suci Noor Hayati, Tria Firza Kumala)

The Effectiveness of Soaking the Feet in Salt Water to Reduce the Degree of Edema in Pregnant Women Trimester III
(Purwati Pata, Feva Tridiyawati)

The Effectiveness of Fingerhold Relaxation Techniques and Lemon Aromatherapy Towards Reducing Pain Intensity in Post Section Caesarian Patients
(Fenta Ika Wardani, Elfrida Sri Furtiani)

Diabetes Distress: Assessment and Screening of Stress Levels Among People with Diabetes Mellitus
(Ash Bath Said, Mikawati, Waode Rahmadania, Ahmad Mudatsir)

Telehabilitation In Monitoring Treatment of Heart Disease Patients: Literature Review
(Wahyu Arni, Yuli Sumantri, Syahri)

Communication Therapy in Stroke Patients with Aphasia: A Narrative Review
(Sally Syamima, Urip Rahayu, Nur Oktavia Hidayati)

Combination of Music and Guided Imagery on Relaxation Therapy to Relief Pain Scale of Post-Operative Patients
(Nur Hidayat, Rudi Kurniawan, Yudisa Diaz Lutfi Sandi, Esti Andarini, Fidy Anisa Firdaus, Heri Ariyanto, Refi Nantia Khaerunnisa, Henri Setiawan)

The Effect of Tai Chi Exercise on Reduction the Risk of Falls in the Elderly: A Literature Review
(Novya Ashlahatul Mar’ah)
Review Article

Telerehabilitation In Monitoring Treatment of Heart Disease Patients: Literature Review

Wahyuni Arni1 | Yuliana Syam2* | Syahrul3

1,2,3Departemen Keperawatan Medikal Bedah, Fakultas Keperawatan, Universitas Hasanuddin, Sulawesi Selatan - Indonesia

*contact yulianasyamuh@gmail.com

Received : February 11, 2022
Revised : April 07, 2022
Accepted : April 28, 2022
Online : April 30, 2022
Published : April 30, 2022

Abstract

Aims: Heart disease is a chronic disease that affects the patient’s physical and psychological adaptation. Currently, cardiac rehabilitation focuses on delivering rehabilitation components remotely using technology via telerehabilitation.

Objective: The purpose of this review is to identify the use of telerehabilitation in monitoring signs and symptoms of heart disease.

Methods: Literature review method with four databases PubMed, Proquest, Ebsco, Cochrane Library, Taylor & Francis database, and identification of gray literature, spanning 2011-2021, and 24 articles were reviewed.

Results: The results of the review show that cardiac rehabilitation components are provided through various tele media mobile phones, messenger applications (SMS, QQ, and WeChat), videoconferencing, online information (websites, emails), e-visit, and virtual reality (VR). Telerehabilitation is useful in monitoring exercise capacity, resting systolic blood pressure, blood pressure control, ECG monitoring media, monitoring of dysrhythmias (atrial fibrillation/AF), complaints of fatigue, monitoring of dyspnoea symptoms, hemoglobin and electrolyte levels (sodium and potassium), and depressive symptoms.

Conclusions: Telerehabilitation can be an alternative for continuous care of patients in monitoring signs and symptoms of heart disease, both physical and psychological aspects.

Keywords cardiovascular disease, physical, psychological, remote rehabilitation.

INTRODUCTION

Cardiac rehabilitation has evolved from an exercise-only program to a comprehensive program that includes education and social support in addition to addressing other cardiovascular disease risk factors, the comprehensive program includes nutritional, psychological, and smoking cessation counseling, as well as cholesterol and blood pressure control (1). However, several things cause obstacles to its utilization and availability of cardiac rehabilitation including access problems such as the location of services, long distances to rehabilitation centers, transportation problems, costs, lack of insurance coverage for rehabilitation costs for individuals who are not aware of existing services or feel they do not need cardiac rehabilitation,

https://doi.org/10.33755/jkk

This is an open access article under the CC BY-SA license
geographical problems such as people living in rural areas also experience obstacles in carrying out cardiac rehabilitation due to distance, cost and transportation problems (2–4).

To keep cardiac rehabilitation programs running, many cardiac rehabilitation centers are focusing on remote delivery of cardiac rehabilitation components, this increased attention, as well as insights learned over the years, can help improve telerehabilitation delivery and increase participation (5). Telerehabilitation is the use of information and communication technology to provide rehabilitation services (6–8). Improves the patient’s short-term prognosis as in heart failure after hospital discharge, telerehabilitation is as beneficial as outpatient rehabilitation (9).

However, the current challenge is other psychological aspects such as depression and anxiety are real illnesses that can affect the whole body, including the cardiovascular system, often overlapping symptoms of cardiovascular disease, such as palpitations, chest tightness, and shortness of breath, which occur in healthy people, including those caused by stress, making the determination of causal or mental health-related functions very challenging where so far the focus of treatment has been on managing symptoms and risk factors, rather than feelings and emotions (10). Cardiac rehabilitation for six weeks has been shown to improve quality of life, levels of physical activity, anxiety, and depression, which can be maintained after one year, with higher depression rates with lower quality of life (11), to improve health behavior, it is very important to overcome the possible psychological stress (12). Therefore, we conducted this review to evaluate the telerehabilitation program in its use to monitor signs and symptoms of heart disease, both physically and psychologically from the patient.

METHODS
Design
The design used is a literature review.

Searching strategies
Article searches in the 2011-2021 period were conducted through four databases, namely PubMed, EBSCO, ProQuest, Cochrane Library, Taylor & Francis Online, and gray literature, based on PICO elements (population, intervention, comparison, and outcome) (13), using the boolean “OR” and “AND”. Search keywords in each database using keywords, including Cardiac disease AND Telerehabilitation AND Stress, fatigue, sleep disorder, heart rate, anxiety, depression.

The inclusion criteria for searching were: 1) studies focus on telerehabilitation with the outcome include stress, fatigue, sleep disorder, heart rate, anxiety, depression. 2) studies published in English and Bahasa.

Data extraction
The information was gathered in accordance with the standard procedure of a researcher. Separate data collection was done by two reviewers. The process of cross-checking was carried out in the event that there were conflicting viewpoints. A dialogue will be held to try and reach an agreement, and if this could not be achieved, the third party would be consulted for consultation.

https://doi.org/10.33755/jkk This is an open access article under the CC BY-SA license
Searching results

A total of 892 titles/abstracts were identified, and an additional 5 titles/abstracts were identified through a gray literature search. After removing the duplication obtained 872 titles/abstract. Then the screening process was carried out, and 783 articles were excluded, so that 83 articles were obtained. In the next stage, the full-text is studied more deeply to determine its feasibility. Of the 83 articles that were screened, 60 were excluded because the outcomes did not meet the inclusion, review, and study protocol criteria. So, there are 23 articles that deserve to be reviewed and meet the inclusion criteria. The PRISMA flow diagram (figure 1) illustrates the inclusion process carried out.

Figure 1. Prisma flow diagram
RESULTS

Study characteristics

Based on the results of a literature search found 24 review articles (18 RCTs, 2 cohort studies, 1 retrospective study, 1 feasibility study, 1 monocentric study, and 1 prospective study), with a total sample of 3,433 patients, the majority of respondents with a diagnosis of CHD, more study locations conducted in rural areas such as in the city of Poland (7 studies). Other studies were conducted in China (2 studies), Providence (1 study), Norway (1 study), United Kingdom (2 studies), Greenville (1 study), Czech Republic (1 study), Iowa City (1 study), Porto (1 study), Warsaw (1 study), California (1 study), Australia (2 studies), Leiden (1 study), India (1 study), and Italy (1 study).

Description of the type of use of tele media and the type of intervention

1. Mobile phone, SMS, We Chat, QQ, video conferencing
   A total of 16 articles used telemedia which combined telephone calls, smartphone applications, SMS, social media platforms such as We Chat, QQ, video conferencing, tele ECG and sports supervision tools. The telemonitoring application is installed on the patient's mobile phone, then connected to the heart belts to monitor HR, fatigue complaints via a computer, then follow-up and feedback is done through the We Chat application, SMS and phone calls (14). On research (15), Lifestyle-based cardiac support program education via SMS.

2. QQ and We Chat social media platforms, used for surveillance, combined with online webcam training training programs (16). On research (17), weight, blood pressure, heart rate, drug use, and other sports are all tracked using the Movn mobile phone application, and given activity motivation and education via messages in the application.

In addition to follow-up media, the use of telephone telemedia is also used to provide sports training rehabilitation counseling programs to maintain the patient’s physical activity behavior. (18), delivery of a phase 2 cardiac rehabilitation program based on American Heart Association guidelines in which patients were previously given a workbook to document exercise, a food diary, written equipment instructions, and an 'An Active Partnership for the Health of Your Heart' DVD, then telephone calls were made every week for 12 weeks to review program content to deliver program (19). On research (20) the use of mobile phones for monitoring patient blood pressure, maximizing the results of cardiac rehabilitation programs and patient treatment, coupled with an electronic outpatient visit program (e-visit). Telephone use in research Arjunan & Trichur (2021) as a reminder to practice the cardiac rehabilitation program from the booklet “Healthy Way to Healthy Heart”. Providing cloud/web-based physical activity behavior change interventions delivered via a smartphone application (Vire) (22).

Tele-EKG (mini EHO) is used to send ECG recordings via cell phone to monitoring centers in combination with psychological treatment via telephone (23); exercise monitoring telemonitoring tool combined with telephone monitoring by a doctor during exercise regarding the patient’s current clinical condition, symptoms, medication history, and transmission of...
resting ECG and exercise ECG data (24). On research (25,26) tele ECG combined with mobile phone, central monitor, and telerehabilitation (exercise training supervision) set along with blood pressure and weight monitoring devices. Tele ECG is also used in research (27) combined with daily follow-up via mobile phone by a doctor regarding medical history and exercise approval. On research (28), after doing home-based exercise, the ECG data is sent to the monitoring center by telephone, while providing answers regarding their subjective health data, blood pressure, weight and medications.

b. Virtual Reality (VR)

Three studies describe virtual cardiac rehabilitation programs. Sports training programs are provided virtually and the Kinect-RehabPlay VR program that has been installed at the participant’s home via a computer, where Kinect-RehabPlay consists of three modules namely the VR environment, Kinect sensors, and a software package for monitoring, “Exercise diary” as patient HR self-monitoring tool (32).

Another virtual rehabilitation program carried out on research (33) and (33) via a TierOne VR device. A VR set consists of a computer dedicated to 3D graphics processing, VR glasses (HTC VIVE PRO, 2017, New Taipei City, Taiwan) that allow the display of high-resolution images with high image quality (90 Hz), and a manipulator that translates the patient’s hand movements into the virtual world, the computer translates the user’s movements into a virtual environment in real time, plus surround sound effects. The therapy is based on the metaphor of a virtual therapy garden, allowing patients to rest and relax.
kinesthetic), strengthens virtual world immersion, calms and places the patient in a state of psychophysical relaxation, remembers associations associated with previous pleasant sensations, improves mood, reduces anxiety, increases motivation to participate actively in the rehabilitation process, cognitive activation, and stimulation of the patient's creativity are all goals of therapy (34).

1. Outcome measurement
   a. Effects on physiological aspects
      Based on a review of the included articles, the study assessed the benefits of telerehabilitation on the physiological aspects of increasing exercise capacity (VO2peak, 6-minute walk test (6MWT), METs, ISWT), HR peak, HR rest, heart rate recovery (HRR), HR variability (HRV), blood pressure, dysrhythmia complaints, fatigue, dyspnoea complaints, hemoglobin, sodium and potassium levels of the patient. Three studies show benefit in increasing peak oxygen consumption (peak VO2) (14,23,26), one study assessed improvement METs (24), and three studies assessed an increase in 6MWT (16,17,35), one study assessed improvements in the Incremental Shuttle Walking Test (ISWT) (17). Other indicators that reflect the patient's exercise tolerance and cardiopulmonary function are peak HR, rest HR, and heart rate recovery (HRR). Two studies assessed HR peaks, which showed recovery in the study Song et al. (2020), but did not show a significant effect in the study of Szalewska, Niedoszytko, et al. (2015), however, the heart rate recovery indicator (HRR) showed improvement and a decrease in HR rest also occurred. One other study also showed a decrease in HR rest and HRR (26). Study (Peng et al., 2018 showed a significant reduction in HR rest. One study conducted an assessment of the function of the autonomic nervous system balance with indications of heart rate variability (HRV) and heart rate turbulence (HRT), which showed insignificant results. (26). One study showed a significant value for improving cardiorespiratory fitness (31).

      Three studies measured the benefits of blood pressure monitoring. Two studies showed results in lowering resting systolic blood pressure and one study showed controlled blood pressure results, patients can measure and transfer blood pressure accurately. (20), and significant effect on diastolic blood pressure (21). In addition, telerehabilitation is also a medium for monitoring ECG (20), atrial fibrillation (AF) dysrhythmias (25). Telerehabilitation also has a positive effect on complaints of fatigue (36), improvement of dyspnoea symptoms (Bernocchi et al., 2018), hemoglobin and electrolyte levels (natrium dan kalium) (21).

   b. Effects on psychological aspects
      A total of 14 studies reported on the assessment and monitoring of psychological symptoms/complaints such as depression, fatigue, anxiety, sleep disorders, and stress. Seven studies reported...
a symptom-reducing effect on depression (18,19,23,28,33,34,37), the two studies the effect is not significant but shows a change in the total score and the mean value of the DASS measurement dimension of 21\((22,32)\). Another study showed insignificant results in reducing depressive symptoms (32).

Seven studies reported an anxiety assessment; two studies reported a reduction in anxiety scores (HADS-Anxiety) (33,34), and four other studies reported no significant effect on reducing anxiety (Antypas & Wangberg, 2014; Brough et al., 2014; Peng et al., 2018; Vieira et al., 2018). One study reported a benefit in reducing fatigue symptoms (36), one study reported a reduction in sleep disorder scores (28). However, one study reported a non-significant effect on stress symptoms (32).

**DISCUSSION**

Heart disease is known to be the most common cause of death and disability worldwide (39). Several types of heart disease such as CHD and others are recommended, referred to cardiac rehabilitation, because it has been proven to be effective in reducing the risk of cardiovascular death, improving functional ability and quality of life, it is hoped that the continuity of this treatment can improve patient clinical outcomes. (40).

The results of this review show the benefits of telerehabilitation in monitoring signs and symptoms of heart disease from both physiological and psychological aspects. Various telemedia used showed significant benefits to changes in exercise capacity; increased peak oxygen consumption (peak VO2) (14,23,26), increase in METs (24), increase 6MWT (16,17,35), and incremental Shuttle Walking Test (ISWT) improvements (17), a decrease in resting systolic blood pressure and one study showed the results of controlled blood pressure, patients can measure and transfer blood pressure accurately (20), and significant effect on diastolic blood pressure (21), ECG monitoring media (20), atrial fibrillation (AF) dysrhythmias (25), reduction in fatigue complaints (36), improvement of dyspnoea symptoms (35), hemoglobin and electrolyte levels (sodium and potassium) (21). As for the psychological effect, it provides positive benefits for depressive symptoms (18, 19, 23, 28, 33, 34, 37), decrease in fatigue symptoms (36), decrease in sleep disorder score (28).

The current system of inpatient and outpatient rehabilitation must be maintained indefinitely (41). A coordinated approach is needed to maintain continuity and improve patient outcomes, continuity of care refers to the provision of services in a consistent, logical, and timely manner, covering three different domains: information, management, and relational continuity, flexibility of the cardiac rehabilitation model, referral process, appointment management appointments, and program availability (40).

Continuing nursing is a concern in the presence of COVID-19, so the implementation of adaptive strategies for cardiac rehabilitation is
recommended, including home-based cardiac rehabilitation (42), use of telehealth to ensure continuity of this essential service (42,43). Telerehabilitation is the use of information and communication technology to provide rehabilitation, where nurses act as educators, collaborators, and consultants in providing nursing care through high-tech interventions, requiring interdisciplinary collaboration across various health professionals. (41).

The benefits of telerehabilitation make it easy to conduct virtual outpatient visits (e-visit), monitoring, to maximize the results of cardiac rehabilitation programs and patient treatment (20), enables healthcare providers to track patient health and spot problems before they become serious (41). Patients included are at low to moderate risk, if the program is not ideal from an exercise point of view for high-risk patients, such as those with left ventricular assist devices and heart transplant recipients, but the program provides useful teaching about nutrition, the need for medication adherence, and other lifestyle adjustment methods (42).

LIMITATIONS

Limitations related to the heterogeneity of the types of diseases evaluated are diverse, it is necessary to study with a large number of homogeneous sample criteria for further systematic reviews.

CONCLUSION

Several methods of telerehabilitation intervention can be carried out in heart disease for monitoring signs and symptoms of heart disease from both physical and psychological effects, and preventing worse problems from occurring.

IMPLICATION

Telerehabilitation can be used by nurses who act as educators, collaborators, and consultants in providing nursing care through high-tech interventions, requiring interdisciplinary collaboration across various health professionals (41).

CONFLICT OF INTEREST

There is no conflict of interest in writing this review.

REFERENCES

1. McMahon SR, Ades PA, Thompson PD. The role of cardiac rehabilitation in patients with heart disease. Trends Cardiovasc Med. 2017;27(6):420–5.
2. Horwood H, Williams MJA, Mandic S. Examining motivations and barriers for attending maintenance community-based cardiac rehabilitation using the health-belief model. Hear Lung Circ. 2015;24(10):980–7.
3. Bakhshayeh S, Sarbaz M, Kimiafar K, Vakilian F, Eslami S. Barriers to participation in center-based cardiac rehabilitation programs and patients’ attitude toward home-based cardiac rehabilitation programs. Physiother Theory Pract. 2021;37(1):158–68.
4. Shanmugasegaram S, Oh P, Reid RD, McCumber T, Grace SL. Cardiac rehabilitation barriers by rurality and socioeconomic status: A cross-sectional study. Int J Equity Health. 2013;12(1):1.

https://doi.org/10.33755/jkk

This is an open access article under the CC BY-SA license
5. Scherrenberg M, Frederix I, De Sutter J, Dendale P. Use of cardiac telerehabilitation during COVID-19 pandemic in Belgium. Acta Cardiol. 2020;0(0):1–4.

6. Zahid Z, Atique S, Saghir MH, Ali I, Shahid A, Malik RA. A commentary on telerehabilitation services in Pakistan: Current trends and future possibilities. Int J Telerehabilitation. 2017;9(1):71–6.

7. Richmond T, Otr L, Peterson C, Cason J, Otr L, Billings M, et al. American telemedicine association’s principles for delivery telerehabilitation services. Int J Telerehabilitation. 2017;9(2):63–8.

8. Stanica IC, Moldoveanu F, Dascalu MI, Nemoianu IV, Portelli GP. Advantages of telemedicine in neurorehabilitation and quality of life improvement. Rev Roum Sci Techn–Électrotechn Énerg. 2021;66(3):189–93.

9. Nakayama A, Takayama N, Kobayashi M, Hyodo K, Maeshima N, Takayuki F, et al. Remote cardiac rehabilitation is a good alternative of outpatient cardiac rehabilitation in the COVID-19 era. Environ Health Prev Med. 2020;25(1):4–9.

10. Chaddha A, Robinson EA, Kline-Rogers E, Alexandris-Souphis T, Rubenfire M. Mental health and cardiovascular disease. Am J Med. 2016;129(11):1145–8.

11. Yohannes AM, Doherty P, Bundy C, Yalfani A. The long-term benefits of cardiac rehabilitation on depression, anxiety, physical activity and quality of life. J Clin Nurs. 2010;19(19–20):2806–13.

12. Spindler H, Leerskov K, Joensson K, Nielsen G, Andreassen JJ, Dinesen B. Conventional rehabilitation therapy versus telerehabilitation in cardiac patients: A comparison of motivation, psychological distress, and quality of life. Int J Environ Res Public Health. 2019;16(3):1–15.

13. Eriksen MB, Frandsen TF. The impact of patient, intervention, comparison, outcome ( PICO ) as a search strategy tool on literature search quality: A systematic review. J Med Libr Assoc. 2018;106(October):420–31.

14. Song Y, Ren C, Liu P, Tao L, Zhao W, Gao W. Effect of smartphone-based telemonitored exercise rehabilitation among patients with coronary heart disease. J Cardiovasc Transl Res. 2020;13(4):659–67.

15. Nurhanjani N, Wahyudi H. Studi Deskriptif Mengenai Dimensi Religiusitas pada Mahasiswa yang Melakukan Kohabitasi di Tempat Kost X Bandung. 2019;

16. Peng X, Su Y, Hu Z, Sun X, Li X, Dolansky MA, et al. Home-based telehealth exercise training program in Chinese patients with heart failure: A randomized controlled trial. Med (United States). 2018;97(35).

17. Park LG, Elnaggar A, Lee SJ, Merek S, Hoffmann TJ, von Oppenfeld J, et al. Mobile health intervention promoting physical activity in adults post cardiac rehabilitation: Pilot randomized controlled trial. JMIR Form Res. 2021;5(4):1–12.

18. Pinto BM, Dunsiger SI, Farrell N, Marcus BH, Todaro JF. Psychosocial outcomes of an exercise maintenance intervention after phase II cardiac rehabilitation. J Cardiopulm Rehabil Prev. 2013;33(2):91–8.
19. Wakefield B, Drwal K, Scherubel M, Klobucar T, Johnson S, Kaboli P. Feasibility and effectiveness of remote, telephone-based delivery of cardiac rehabilitation. Telemed e-Health. 2014;20(1):32–8.

20. Treskses RW, van Winden LAM, van Keulen N, van der Velde ET, Beeres SLMA, Atsma DE, et al. Effect of smartphone-enabled health monitoring devices vs regular follow-up on blood pressure control among patients after myocardial infarction: A randomized clinical trial. JAMA Netw open. 2020;3(4):e202165.

21. Arjunan P, Trichur RV. The impact of nurse-led cardiac rehabilitation on quality of life and biophysiological parameters in patients with heart failure: A randomized clinical trial. J Nurs Res. 2021;29(1):1–9.

22. Freene N, van Berlo S, McManus M, Mair T, Davey R. A behavioral change smartphone app and program (ToDo-CR) to decrease sedentary behavior in cardiac rehabilitation participants: Prospective feasibility cohort study. JMIR Form Res. 2020;4(11):1–15.

23. Piotrowicz E, Piotrowski W, Piotrowicz R. Positive effects of the reversion of depression on the sympathovagal balance after telerehabilitation in heart failure patients. Ann Noninvasive Electrocardiol. 2016 Jul;21(4):358–68.

24. Szałewska D, Niedoszytko P, Gierat-Haponiuk K. The impact of professional status on the effects of and adherence to the outpatient followed by home-based telemonitored cardiac rehabilitation in patients referred by a social insurance institution. Int J Occup Med Environ Health. 2015;28(4):761–70.

25. Pluta S, Piotrowicz E, Piotrowicz R, Lewicka E, Zareba W, Koziel M, et al. Remote monitoring of cardiac implantable electronic devices in patients undergoing hybrid comprehensive telerehabilitation in comparison to the usual care. Subanalysis from telerehabilitation in heart failure patients (TELEREH-HF) randomised clinical trial. J Clin Med. 2020;9(11):3729.

26. Piotrowicz E, Buchner T, Piotrowski W, Piotrowicz R. Influence of home-based telemonitored nordic walking training on autonomic nervous system balance in heart failure patients. Arch Med Sci. 2015;11(6):1205–12.

27. Szałewska D, Tomaszewski J, Kusiak-Kaczmarek M, Niedoszytko P, Gierat-Haponiuk K, Haponiuk I, et al. Influence of a hybrid form of cardiac rehabilitation on exercise tolerance in coronary artery disease patients with and without diabetes. Kardiol Pol. 2015;73(9):753–60.

28. Smoliś-Bąk E, Dąbrowski R, Piotrowicz E, Chwyczko T, Dobraszkiewicz-Wasilewska B, Kowalik I, et al. Hospital-based and telemonitoring guided home-based training programs: Effects on exercise tolerance and quality of life in patients with heart failure (NYHA class III) and cardiac resynchronization therapy. A randomized, prospective observation. Int J Cardiol. 2015;199:442–7.

29. Antypas K, Wangberg SC. An internet- and mobile-based tailored intervention to enhance maintenance
of physical activity after cardiac rehabilitation: Short-term results of a randomized controlled trial. J Med Internet Res. 2014;16(3):1–20.

30. Brough C, Boyce S, Houchen-Wolloff L, Sewell L, Singh S. Evaluating the interactive web-based program, activate your heart, for cardiac rehabilitation patients: A pilot study. J Med Internet Res. 2014;16(10):1–12.

31. Batalik L, Konecny V, Dosbaba F, Vlazna D, Brat K. Cardiac rehabilitation based on the walking test and telerehabilitation improved cardiorespiratory fitness in people diagnosed with coronary heart disease during the COVID-19 pandemic. Int J Environ Res Public Health. 2021;18(5):1–11.

32. Vieira Á, Melo C, Machado J, Gabriel J. Virtual reality exercise on a home-based phase III cardiac rehabilitation program, effect on executive function, quality of life and depression, anxiety and stress: A randomized controlled trial. Disabil Rehabil Assist Technol. 2017;13(2):112–23.

33. Szczepańska-Gieracha J, Jóźwik S, Cieślik B, Mazurek J, Gajda R. Immersive virtual reality therapy as a support for cardiac rehabilitation: A pilot randomized-controlled trial. Cyberpsychology, Behav Soc Netw. 2021;24(8):543–9.

34. Jóźwik S, Cieślik B, Gajda R, Szczepańska-Gieracha J. Evaluation of the impact of virtual reality-enhanced cardiac rehabilitation on depressive and anxiety symptoms in patients with coronary artery disease: A randomised controlled trial. J Clin Med. 2021;10(10):2148.

35. Bernocchi P, Vitacca M, La Rovere MT, Volterrani M, Galli T, Baratti D, et al. Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: A randomised controlled trial. Age Ageing. 2018 Jan;47(1):82–8.

36. Kim YJ, Radloff JC, Crane PA, Bolin LP. Rehabilitation intervention for individuals with heart failure and fatigue to reduce fatigue impact: A feasibility study. Ann Rehabil Med. 2019;43(6):686–99.

37. Islam SMS, Chow CK, Redfern J, Kok C, Rådholm K, Stepien S, et al. Effect of text messaging on depression in patients with coronary heart disease: A substudy analysis from the TEXT ME randomised controlled trial. BMJ Open. 2019;9(2):1–7.

38. Houchen-Wolloff L, Gardiner N, Devi R, Robertson N, Jolly K, Marshall T, et al. Web-based cardiac rehabilitation alternative for those declining or dropping out of conventional rehabilitation: Results of the WREN feasibility randomised controlled trial. Open Hear. 2018;5(2):1–8.

39. CDC. About chronic diseases. National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP). 2021.

40. Giuliano C, Parmenter BJ, Baker MK, Mitchell BL, Williams AD, Lyndon K, et al. Cardiac rehabilitation for patients with coronary artery disease: A practical guide to enhance patient outcomes through continuity of care. Clin Med Insights Cardiol. 2017;11:1–7.
41. Prayoga DH, Aridamayanti BG, Trisnawati I, Ronalia MF. Telerehabilitation system in nursing post stroke: A systematic review. J Nurs. 2019;14(3):182.

42. Khera A, Baum SJ, Gluckman TJ, Gulati M, Martin SS, Michos ED, et al. Continuity of care and outpatient management for patients with and at high risk for cardiovascular disease during the COVID-19 pandemic: A scientific statement from the American Society for Preventive Cardiology. Am J Prev Cardiol. 2020;1(April):100009.

43. Bhatia RT, Gati S, Papadakis M, Sharma S. The impact of COVID-19 on the continuity of cardiovascular care. Eur Heart J. 2021;42(3):215–7.