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Quality of Life and the Nursing Approach in Cardiopulmonary Rehabilitation: Traditional Review

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ABSTRACT

Cardiac and pulmonary rehabilitation programs play a crucial role in improving the quality of life of individuals with cardiovascular and respiratory diseases. Cardiopulmonary rehabilitation is a comprehensive intervention that reduces cardiovascular risks, alleviates the physical and psychological effects of disease, prevents secondary cardiac events, and decreases symptoms such as dyspnea and fatigue. Moreover, it enhances exercise capacity, facilitates the return to an active lifestyle, stabilizes or reverses systemic manifestations of the disease, thereby improving quality of life and reducing healthcare costs. Nurses play a central role in promoting and maintaining health, identifying risk factors at an early stage, and providing patient education throughout the rehabilitation process. As key members of the multidisciplinary team, nurses collaborate with physicians, physiotherapists, clinical exercise physiologists, dietitians, and psychologists to ensure coordinated and patient-centered care, contributing significantly to patients' overall recovery and well-being. Interventions that enhance the effectiveness of cardiopulmonary rehabilitation and improve patients' quality of life include smoking cessation, physical activity promotion, nutritional and weight management, blood pressure and diabetes control, psychosocial support, sexual health counseling, return-to-work facilitation, adherence to medical therapy, airway clearance strategies, and cognitive-behavioral therapies. Increasing patient participation in rehabilitation programs and ensuring continuity of care should be considered primary goals for achieving optimal outcomes in cardiopulmonary rehabilitation.

1. INTRODUCTION

Cardiovascular diseases (CVD) continue to be the leading cause of death worldwide. Although advances in diagnostic and acute treatment strategies have reduced mortality rates in recent years, the global burden of CVD remains high. Considering that CVD is largely a preventable condition, secondary prevention strategies such as physical activity, healthy nutrition, adequate sleep, smoking cessation, and improved lipid and blood pressure control are of critical importance in reducing recurrent events and CVD-related mortality [1].

The cardiac rehabilitation program, designed to be evidence-based, multidisciplinary, and comprehensive, is a supervised, multidisciplinary intervention composed of individualized exercise, patient education, counseling, and psychosocial support focusing on lifestyle management and risk factor modification following an acute cardiovascular event or cardiac intervention [1,2,3]. The World Health Organization has defined cardiac rehabilitation for secondary prevention as "the sum of activities required to influence favorably the underlying cause of the disease, as well as to ensure the best possible physical, mental, and social conditions." Thus, the goal is to enable patients, through their own efforts, to achieve or regain as normal a place as possible in society [4]. Secondary prevention plays a crucial role in preventing disease progression and complications following cardiovascular disease. Cardiac rehabilitation programs, designed to be multidisciplinary and comprehensive, are structured to serve this purpose [5]. Cardiac rehabilitation programs reduce cardiovascular risks, mitigate the physical and psychological effects of the disease, improve clinical outcomes, enhance patients' quality of life, prevent secondary cardiac events, facilitate

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symptom management, support patients' return to an active lifestyle, and decrease healthcare costs (Table 1) [5,6].

Chronic lung diseases, such as COPD and interstitial lung disease, are among the leading causes of disability and premature death worldwide. Respiratory symptoms, particularly dyspnea and cough, are commonly reported by individuals with severe respiratory disease and negatively impact health-related quality of life (HRQoL) [7]. Pulmonary rehabilitation is defined as an evidence-based, multidisciplinary, and comprehensive intervention aimed at improving the physical and social performance of patients with chronic respiratory diseases who are symptomatic and often have reduced daily living activities [8]. Pulmonary rehabilitation is an intervention conducted by multidisciplinary teams, involving individualized exercise, education, and behavior modification following a comprehensive assessment of the patient [9,10]. Pulmonary rehabilitation, integrated into the individual treatment of the patient, reduces symptoms of dyspnea and fatigue, improves exercise capacity, increases participation, enhances quality of life by stabilizing or reversing the systemic manifestations of the disease, and decreases healthcare costs (Table 1) [10,11,12]. The literature indicates that pulmonary rehabilitation programs integrated into the individual treatment of patients are effective in reducing symptoms, improving functional status, increasing participation, and decreasing healthcare costs by stabilizing or reversing the systemic manifestations of the disease [8].

Table 1. Effects of cardiac and pulmonary rehabilitation

Effects of Cardiac Rehabilitation	Effects of Pulmonary Rehabilitation
-Reduces symptoms -Increases exercise tolerance -Improves lipid profile -Controls blood pressure and diabetes -Promotes weight loss -Reduces the incidence of sudden death -Decreases the recurrence of myocardial infarction -Reverses the pathological progression of atherosclerosis -Reduces depression and anxiety -Improves psychosocial well-being -Enhances quality of life	-Reduces dyspnea, fatigue, and other respiratory symptoms -Increases muscle strength and endurance -Improves exercise tolerance -Enhances knowledge about lung disease and its management -Encourages patient self-care -Increases independence in activities of daily living -Improves quality of life -Reduces depression, anxiety, and pulmonary exacerbations -Minimizes the use of medical resources -Decreases hospital readmissions -Facilitates return to work [5,11].

Scientific evidence indicates that the effectiveness of pulmonary rehabilitation (PR) components has been primarily demonstrated in COPD [13]. In this context, studies have included traditional outcome measures reflecting changes in exercise capacity, quality of life, symptoms, and levels of anxiety and depression. Meta-analyses and randomized controlled trials in the literature have shown that following pulmonary rehabilitation, significant improvements occur in maximal exercise capacity, measured by the 6-minute walk test, incremental shuttle walk test, or cycle ergometer test, compared to usual care. Pulmonary rehabilitation is recommended for patients with COPD to achieve clinically meaningful improvements in exercise capacity (Level of Evidence: A) [14].

A meta-analysis evaluating the effect of pulmonary rehabilitation on dyspnea and health status demonstrated a definite reduction in dyspnea following pulmonary rehabilitation [15]. Improvements have also been demonstrated in other areas such as fatigue, emotional function, and patients' sense of control. These findings indicate a significant clinical improvement in health status following pulmonary rehabilitation. Pulmonary rehabilitation should be offered to patients with COPD, as it leads to improvements in dyspnea and health status compared to usual care (Level of Evidence: A) [14].

Current data emphasize that supervised exercise training may have a small but statistically significant effect on activity. Pulmonary rehabilitation has been shown to produce moderate improvements in physical activity; however, there is a lack of sufficient randomized controlled trials [14,15,16].

Increased independence in activities of daily living (ADL) is an important goal of pulmonary rehabilitation. Prospective uncontrolled studies have shown that pulmonary rehabilitation positively affects ADL, with improvements in ADL

measures observed following the intervention. However, large-scale randomized controlled trials are still needed [14].

Muscle strength, particularly quadriceps strength, is an important systemic marker in COPD, and weakness has been associated with increased mortality and frequent hospitalizations. Exercise programs that include resistance training within pulmonary rehabilitation programs have been shown to increase quadriceps strength compared to usual care [14]. The literature emphasizes that pulmonary rehabilitation is more effective than standard care in reducing anxiety and depression [13,17,18]. In this context, guidelines recommend offering pulmonary rehabilitation to patients with COPD, as it improves psychological status compared to usual care and enhances psychological well-being (Level of Evidence: A) [14].

Individuals participating in pulmonary rehabilitation have different body compositions and, consequently, different goals within multidisciplinary rehabilitation. Pulmonary rehabilitation has only a small effect on body weight. It has been reported that nutritional status at the start of rehabilitation does not influence outcomes such as exercise capacity or health status [14]. However, a recent study demonstrated that in patients with stage 3–4 chronic obstructive pulmonary disease (COPD), comprehensive and intensive pulmonary rehabilitation (PR) combined with nutritional support (8 weeks of oral nutritional supplementation and individualized diet) significantly improved physical performance, quality of life, dyspnea levels, and body composition. Significant improvements were observed in functional status (6MWT: 86.72 m, ISWT: 76.24 m), quality of life, pulmonary function tests, arterial blood gases, respiratory rate, perceived dyspnea, upper extremity muscle strength, and body composition [19].

Prospective observational studies have also shown that self-efficacy scores increase following pulmonary rehabilitation. Improvements in self-efficacy levels have been reported after the completion of pulmonary rehabilitation [14]. In patients with COPD, self-efficacy has been shown to be directly associated with improvements in quality of life and physical activity, making it a factor that should be considered in pulmonary rehabilitation (PR). Recent studies have suggested that self-efficacy is highly correlated with the severity of dyspnea, the number of disease exacerbations, the degree of physical activity limitation, levels of anxiety and depression, and the environment experienced by patients with COPD [20]. The effectiveness of pulmonary rehabilitation programs is recommended to be regularly assessed, at a minimum demonstrating clinically meaningful improvements in exercise capacity, dyspnea, and health status (Level of Evidence: B). As part of regular evaluation, patient satisfaction and feedback should also be obtained [14].

2. What Should the Content of Cardiopulmonary Rehabilitation Programs Include?

A cardiac rehabilitation program traditionally consists of three phases. Phase 1 involves inpatient rehabilitation during the initial hospital stay. Phase 2 includes supervised physical activity under medical supervision after discharge. Phase 3 refers to the unsupervised outpatient phase, during which patients are expected to apply the knowledge and skills they have acquired through education and counseling to their daily lives [21].

Cardiac rehabilitation programs are offered to patients with various cardiac conditions, including coronary artery disease (CAD), coronary revascularization, heart failure, stable angina pectoris, peripheral artery disease, pacemaker or implantable cardioverter-defibrillator (ICD) implantation, ventricular assist device (VAD), percutaneous coronary intervention, heart valve surgery, and post-heart transplantation [22]. The exercise component of cardiac rehabilitation (CR) programs has been highlighted for its beneficial effects, including improvements in exercise capacity and quality of life, positive psychological outcomes, and reductions in morbidity, mortality, and costs. However, studies examining all components of CR programs are limited, with most focusing solely on exercise training. Therefore, it is recommended that individual needs be considered and a multidisciplinary approach be adopted in the design of rehabilitation programs [22,23,24,25].

In patient assessment for cardiac rehabilitation, factors such as physical activity, diet, smoking, overweight/obesity, disease knowledge, depression, return to work, lipid levels, blood pressure, medications, and diabetes mellitus should each be carefully addressed. Patients must be thoroughly evaluated to allow individualization of the rehabilitation program. Their readiness for behavior change, as well as their ability to perform daily activities such as driving, sexual activity, and household tasks, should also be assessed [26].

Pulmonary rehabilitation is indicated for individuals with chronic lung disease who continue to experience symptoms such as dyspnea, low exercise tolerance, or activity limitation despite receiving optimal care. Pulmonary rehabilitation is generally delivered in hospital PR units or in pulmonary rehabilitation departments/units

within primary healthcare centers. Home-based pulmonary rehabilitation programs should be considered for patients who have difficulty accessing a facility-based PR unit (Level of Evidence: A). All patients who complete a PR program are recommended to continue an exercise plan at home (Level of Evidence: C) [8,13].

A pulmonary rehabilitation program consists of aerobic exercise, strength/resistance training, respiratory muscle training (8–12 weeks, 30 minutes per day, either a single session or 2 × 15 minutes) (Level of Evidence: B), physiotherapy techniques (at least 1 month, 2–3 sessions per week) (Level of Evidence: C), education (covering disease knowledge, alarm symptoms, energy conservation techniques, etc.; 8–12 weeks, 3–5 sessions per week, minimum 60 minutes per session, including 20–30 minutes of arm exercises and 20–30 minutes of leg exercises) (Level of Evidence: A), as well as nutritional and psychosocial support components [8]. For leg exercises, the workload is determined in proportion to the maximum value achieved in an effort test (Wmax) and is gradually increased according to the patient's tolerance (training progression). In general, high-intensity levels between 60% and 80% of Wmax are more effective and recommended. For arm exercises, these are usually performed with weights, starting with ½ kg per arm and progressively increased according to tolerance (Level of Evidence: A). In pulmonary rehabilitation, respiratory physiotherapy should include: techniques to improve bronchial patency (Level of Evidence: A); relaxation techniques (Level of Evidence: C); and respiratory re-education techniques (Level of Evidence: C). During physiotherapy and muscle training, oxygen saturation should be maintained above 90%, and supplemental oxygen should be used as necessary (Level of Evidence: B) (Table 2) [8].

Pulmonary rehabilitation programs should last a minimum of 8 weeks or 20 sessions (3–5 sessions per week) (Level of Evidence: A); exercise intensity should be set at 60–80% of the patient's maximal effort capacity; intensity should be monitored using a progressive exercise test or shuttle test, and if these are not feasible, it can be determined based on symptoms using the Borg scale (Table 2) [8,13].

The guideline states that pulmonary rehabilitation lasting 6–12 weeks provides significant benefits in exercise capacity, dyspnea, and health status for patients with chronic respiratory disease compared to usual care and is recommended (Level of Evidence: A). Pulmonary rehabilitation programs with supervised exercise lasting less than 6 weeks have been reported to offer benefits in exercise capacity and health status for individuals with COPD. Programs including at least 12 supervised sessions are recommended, although individual patients may derive some benefit from fewer sessions (Class A) [14].

The traditional view regarding pulmonary rehabilitation has been to refer patients with an MRC dyspnea score of 3 or lower. Most outcome studies, however, have included COPD patients with MRC scores between 3 and 5 participating in outpatient programs. Patients with chronic respiratory disease who are functionally limited due to dyspnea benefit from pulmonary rehabilitation compared to usual care. Patients with an MRC dyspnea score of 3–5 who are functionally limited by dyspnea should be referred to outpatient pulmonary rehabilitation (Level of Evidence: A). Patients with an MRC dyspnea score of 2 who are functionally limited by dyspnea should also be referred to pulmonary rehabilitation (Level of Evidence: D). Routine home-based supervised pulmonary rehabilitation is not recommended for patients who are housebound with an MRC dyspnea score of 5 (Level of Evidence: B) [14].

Currently, a review of the literature shows that some studies have examined the effects of rehabilitation programs on the physical, psychological, social, economic, and material dimensions of quality of life [27,28]; however, studies more frequently focus on their impact on physical and psychological domains, such as reductions in dyspnea, fatigue, mood disturbances, anxiety/depression, and improvements in quality of life [29,30]. In COPD, pulmonary rehabilitation primarily includes functional exercise, education, oxygen therapy, nutritional support, and psychotherapy [10,31]. The core components of pulmonary rehabilitation are multicomponent smoking cessation programs and exercise training programs. Smoking cessation programs involve counseling, support, and, when indicated, medical treatment [32]. Exercise training encompasses both walking and arm exercises [33]. Pulmonary rehabilitation programs that include muscle training have been scientifically shown to improve dyspnea, exercise capacity, and health-related quality of life (HRQL) in both COPD and other non-COPD respiratory diseases [8]. Patient education is primarily focused on nutrition, medications, recognition and management of symptoms, and energy conservation. Psychosocial support targets anxiety management, coping strategies, and depression. Patients are taught respiratory exercise techniques specific to their condition, such as chest physiotherapy for bronchiectasis, pursed-lip breathing for COPD, and postural drainage for cystic fibrosis (Table 2).

Table 2. Quality standards in pulmonary rehabilitation: program components

Components	Quality Criterion for Improving Quality of Life
Upper and Lower Extremity Exercises	**All PR programs should include upper and lower extremity exercises under the following conditions:**
	-COPD (Level of Evidence: A)
	-Chronic respiratory diseases with limiting dyspnea (CRDLD) (Level of Evidence: B)
	-Lung transplantation (Level of Evidence: A)
	-Lung volume reduction surgery (Level of Evidence: A)
Respiratory Muscle Training	**All PR programs should include respiratory muscle training for patients with muscle weakness:**
	-COPD (Level of Evidence: B)
	-Bronchiectasis and cystic fibrosis (Level of Evidence: C)
	-CRDLD (Level of Evidence: C)
Respiratory Physiotherapy Techniques	**All PR programs should include respiratory physiotherapy under the following conditions:**
	-COPD and CRDLD (Level of Evidence: C)
	-Bronchiectasis and cystic fibrosis (Level of Evidence: A)
	-Neuromuscular diseases (Level of Evidence: C)
	-Thoracic surgery (Level of Evidence: C)
Education	**All PR programs should include the following education components (Level of Evidence: A):** -Understanding of the respiratory system -Understanding of the disease -Understanding of the treatment -Understanding of alarm symptoms -Understanding of energy conservation techniques (for diseases with limiting dyspnea)
Psychosocial Support	All PR programs should also include (Level of Evidence: B): -Counseling and support by the multidisciplinary team -Evaluation and treatment by a psychologist/ psychiatrist if necessary [8,13].

The initial assessment for pulmonary rehabilitation should include a detailed description of the program (e.g., the requirement for group-based exercise) and confirm that there are no contraindications to rehabilitation. The initial assessment provides an opportunity to evaluate comorbidities and risk factors and to refer patients for additional treatment to optimize benefits from the program. The pulmonary rehabilitation setting, the diversity of team skills, and other comorbidities should always be considered in the risk assessment of patients participating in the rehabilitation program [14]. Outcome evaluation for individuals participating in pulmonary rehabilitation includes assessment of dyspnea severity, exercise tolerance, overall health status, and activity level (Table 3) [8,31].

Table 3. Quality Standards in Pulmonary Rehabilitation: Patient Assessment (Level of Evidence: D) [8]

Assessment Steps	Quality Criterion
Initial Clinical Assessment	A complete medical assessment of the patient should be conducted, particularly focusing on symptoms such as dyspnea (mMRC), cough, and/or sputum.
Physical Examination	A thorough physical examination should be performed, focusing on: • Chest morphology and mobility, asymmetries • Respiratory rate • Respiratory auscultation • Peripheral muscle strength • SpO_2
Dyspnea Assessment	In activities of daily living: • Dyspnea assessment (mMRC) • Exercise assessment: Borg scale / VAS

Supplementary Investigations	The initial assessment should include: • Chest X-ray • ECG • Basic spirometry + cognitive-behavioral therapy • 6-Minute Walk Test (6MWT) + Borg scale • Nutritional assessment: BMI • Health-Related Quality of Life (HRQL) assessment
	Lung volumes, diffusion capacity, MIP/MEP; if respiratory insufficiency is present: arterial blood gas (ABG); progressive exercise test or Shuttle test
	Spirometry, MIP/MEP or SNIF/SNEFP, CFM, IC; if respiratory insufficiency is present: arterial blood gas (ABG)
Final Assessment (for Outcome Reporting)	mMRC dyspnea scale, 6-Minute Walk Test (6MWT) + Borg scale, Health-Related Quality of Life (HRQL) assessment

MIP: Maximum Inspiratory Pressure*; MEP:* Maximum Expiratory Pressure*; CFM:* Cough Flow Measurement*; CI:* Inspiratory Capacity*; SNIF/SNEFP:* Nasal Inspiration pressure */nazal ekspirasyon pressure; SpO2, oxyhemoglobin saturation; mMRC, modified Medical Research Council scale; ADL, Activities of Daily Life*

3. The Role and Importance of Nurses in Cardiopulmonary Rehabilitation

International guidelines emphasize the physiological and psychological benefits of CR programs conducted by multidisciplinary teams following a cardiovascular event or disease [5,21,34]. Nurses play a crucial role in CR by providing education and counseling throughout the entire process starting from hospitalization, supporting the exercise program, monitoring both positive and adverse effects, and ensuring communication and coordination within the team [21,25,35].

Cardiac rehabilitation benefits patients recovering from myocardial infarction, heart failure, and revascularization procedures, with strong evidence demonstrating reductions in mortality and recurrent events, as well as improvements in functional capacity and mental health [1]. Cardiac rehabilitation programs play a crucial role in enhancing quality of life among individuals with heart disease. Despite these benefits and strong international recommendations, participation in CR programs remains suboptimal, and awareness gaps persist [1,36]. Global trends indicate that only 20–30% of eligible patients are referred, and an even smaller proportion complete the full program [1]. Patients often face psychosocial, cultural, or logistical barriers such as transportation difficulties, caregiving responsibilities, or language differences [36]. Nurses are uniquely positioned to address these challenges by educating patients and families, identifying and reducing participation barriers, facilitating timely referrals, and leading the development of flexible, culturally appropriate models of care [1,36]. Therefore, it is recommended that healthcare professionals actively promote CR programs and refer patients to these interventions [37].

Nurses play a central role in cardiovascular prevention through health promotion, early detection of risk factors, and patient education [36]. As part of a multidisciplinary team, nurses are essential in providing coordinated and patient-centered care, working collaboratively with physicians, physiotherapists, clinical exercise physiologists, dietitians, and psychologists to support long-term recovery and cardiovascular health improvement [1]. Their close work with patients in both clinical and community settings enables them to implement individualized interventions across all levels of prevention, such as promoting healthy habits in the general population and providing discharge education [36].

Evidence-based nursing interventions rooted in motivational interviewing, chronic disease management, and multidisciplinary collaboration have been shown in numerous studies to effectively reduce cardiovascular risk [36]. Literature indicates that nurse-led lifestyle counseling in cardiac rehabilitation effectively reduces hypertension, improves dietary habits in at-risk populations, and serves as a cost-effective and scalable intervention for controlling modifiable cardiovascular risk factors. Moreover, nurse-led interventions have been associated with improved blood pressure control, medication adherence, and patient satisfaction, as well as significantly reduced hospital readmissions in patients with heart failure, demonstrating the long-term effectiveness of structured care models [36].

Nurse-led cardiac rehabilitation programs have been shown to improve quality of life and lead to favorable changes in biophysiological parameters among patients with heart failure, emphasizing the importance of nurses' active involvement in cardiac rehabilitation processes [38]. Similarly, studies have demonstrated that pulmonary rehabilitation nursing improves quality of life, enhances respiratory function, reduces

dyspnea, increases exercise capacity, improves psychological well-being, and enhances patient satisfaction in individuals with chronic obstructive pulmonary disease [39,40].

4. The Effect of Cardiopulmonary Rehabilitation on Quality of Life

Various symptoms experienced by individuals with cardiovascular disease such as fatigue, dyspnea, edema, and sleep disturbances limit daily living activities and reduce quality of life. Additionally, side effects of pharmacological treatments administered as part of therapy, dietary restrictions, difficulties returning to work, decreased sexual performance, lack of self-confidence, and fear of death are among the factors that negatively affect quality of life. The decline in quality of life adversely impacts the course of the disease, frequently leading to hospital readmissions and increased mortality [1,8,36].

Cardiopulmonary rehabilitation programs play a significant role in improving individuals' quality of life. Cardiac rehabilitation programs aim to reduce cardiovascular risks, promote healthy lifestyle behaviors, and enhance overall quality of life [26]. Coronary artery disease (CAD) significantly affects individuals' lives. Research has shown that CAD negatively impacts patients' functional capacity, levels of kinesiophobia, and quality of life, with these effects increasing in parallel with disease severity. Functional capacity and quality of life are important predictors of survival in patients with CAD [41].

A study demonstrated that an exercise-based cardiac rehabilitation program effectively improves functional capacity and quality of life in patients with CAD [42]. Participation in a cardiac rehabilitation program following a cardiac event is expected to enhance exercise tolerance and optimize cardiovascular risk factors such as lipid and lipoprotein profiles, body weight, blood glucose levels, blood pressure, and smoking cessation [5,25].

Arjunan and Trichur (2020) showed significant improvements in diastolic blood pressure, high-density lipoprotein (HDL) levels, and serum electrolytes (sodium and potassium) in patients with heart failure following cardiac rehabilitation [38]. Similarly, Türen et al. (2024) reported significant reductions in patients' systolic and diastolic blood pressure, LDL, and triglyceride levels after cardiac rehabilitation, emphasizing the importance of these findings for secondary prevention and reducing potential complications [22].

5. Quality of Life Outcomes in Patients Undergoing Cardiopulmonary Rehabilitation

In secondary prevention, rates of lifestyle behavior change remain below the desired level. Modifying unhealthy lifestyle habits and maintaining those changes over time are often challenging. Major barriers to lifestyle behavior change include lack of support from family and friends, beliefs about lifestyle, competing life demands, and mental health issues such as depression and anxiety.

Self-management interventions aim to equip patients with the skills needed to take an active role in managing their chronic conditions and to function optimally. These interventions typically combine several behavioral strategies, beginning with information acquisition, and emphasize the promotion of independent symptom monitoring, medication adherence, and the development of problem-solving and decision-making skills for medical management. Additionally, they target behavioral modifications related to physical activity, nutrition, and smoking cessation, as well as psychotherapeutic and cognitive-behavioral approaches focused on stress management [3].

6. Interventions That Influence the Success of Cardiac Rehabilitation and Improve Patients' Quality of Life

6.1. Smoking Cessation Management

The use of tobacco and tobacco products is a major cardiovascular risk factor, and quitting smoking is among the most effective secondary prevention strategies. Therefore, controlling this risk factor is an integral component of all cardiovascular rehabilitation programs [26]. Smoking cessation reduces the risk of recurrent cardiovascular events by approximately one-third in individuals who quit during the course of their illness [3].

If a patient continues to use tobacco products, it should be clearly explained that they cannot proceed with the cardiac rehabilitation program. However, if the patient expresses readiness to make a behavioral change, support should be provided through the Ask, Advise, Assess, Assist, and Arrange framework. Additionally, patients should be educated about the importance of avoiding exposure to secondhand smoke.

To initiate and sustain behavioral change, both individual and group therapy sessions should be utilized, and pharmacological support should be provided when necessary [5,25,26]. Combining behavioral support with smoking cessation pharmacotherapies remains the most effective

strategy for achieving long-term abstinence, although further efforts are needed to increase their use among cardiac patients. Smokers should be referred to smoking cessation programs as early as possible after myocardial infarction. The use of electronic cigarettes is not recommended for smoking cessation, as evidence suggests they are harmful to health and may contribute to cardiovascular complications [3].

6.2. Physical Activity Management

Physical activity programs in cardiac rehabilitation are recognized as the intervention strategy with the strongest scientific evidence for reducing morbidity and mortality [43]. The American Heart Association (AHA) and the American College of Sports Medicine (ACSM) guidelines recommend engaging in moderate to vigorous aerobic physical activity and muscle strengthening exercises to reduce the risk of chronic disease, premature death, and disability. This activity should be performed at least 30 minutes, five times per week (preferably seven days a week), or 20 minutes of vigorous activity three times per week**.** The physical activity program should include exercises aimed at improving muscle strength, endurance, and flexibility. The increasing incorporation of resistance training alongside aerobic exercise in cardiac rehabilitation programs has been shown to enhance muscle strength and promote greater independence in daily activities, particularly among older adults and patients with congestive heart failure (CHF)**.** Improvements in functional capacity achieved through these programs are also strongly associated with enhanced quality of life [45].

6.3. Nutrition Management

The dietary plan should be personalized according to specific target areas such as weight control, hypertension, diabetes, heart failure, and other comorbidities**.** Recommendations must be sensitive to cultural preferences and individualized [26]. Current guidelines and the latest meta-analytic evidence recommend adopting a Mediterranean or similar diet**.** Such dietary patterns are characterized by low or moderate intake of saturated fats, sodium, and simple carbohydrates**,** and are rich in fruits and vegetables, nuts, legumes, and healthy fats such as omega-3 fatty acids**.** Regarding alcohol consumption, no safe level has been established, and abstinence from alcohol is recommended for secondary prevention of cardiovascular disease (CVD) [3].

6.4. Body Weight Management

Weight management is an essential goal of effective lifestyle modification. Increased abdominal adiposity is closely associated with higher cardiovascular risk [3]. For patients with BMI > 25 kg/m^2 and/or waist circumference > 102 cm in men and > 88 cm in women, individualized short-term and long-term weight goals should be set, taking into account other risk factors [26]. Guidelines recommend achieving at least a 5% weight reduction within 6 months through tailored targets. Individual or group counseling sessions should support both weight loss and weight maintenance [44]. Lifestyle changes - including healthy nutrition, routine aerobic and resistance exercise - can lead to modest weight loss accompanied by improvements in blood pressure and cholesterol levels, yielding significant long-term cardiovascular benefits [3].

6.5. Blood Pressure Management

For patients with blood pressure within normal limits, lifestyle modifications are recommended to maintain and preserve optimal levels**.** These include: Regular physical activity or structured exercise; Weight management; Moderate sodium restriction and increased intake of fresh fruits and vegetables; Low-fat dairy consumption; Moderate alcohol consumption; Smoking cessation. These interventions collectively help sustain normotensive levels and reduce cardiovascular risk [5,22,26].

6.6. Lipid Management

The primary goal in lipid management is to maintain LDL cholesterol below 100 mg/dL [26].

6.7. Medication Adherence

Adherence to prescribed medications is fundamental for long-term success in cardiac rehabilitation**.** Ensuring patients consistently take their medications is a key focus of KR programs [26]. Cardiac rehabilitation encompasses not only physical activity but also strategies to enhance medication adherence, with health professionals monitoring patients regularly for compliance throughout the rehabilitation process [46].

6.8. Diabetes Management

Patients should be educated to: Avoid exercising during insulin peak times; Inject insulin in areas other than the muscles to be exercised (preferably abdomen); Monitor blood glucose before and after exercise. Both patients and their families should be trained to recognize and respond appropriately to signs of hypo- or hyperglycemia [26].

6.9. Psychosocial Management

Cardiac rehabilitation programs play a crucial role in improving health-related quality of life for individuals with heart disease. Their effectiveness is supported by the diversity of program components and a comprehensive, multidisciplinary approach [46]. Psychosocial interventions provided by a multidisciplinary team, including education, counseling, psychological support, group therapy, behavior modification, stress management, and relaxation techniques, have been shown to enhance psychological well-being, reduce stress and depression levels, and lower Type A behavior scores. These interventions collectively contribute to improved mental health outcomes and better adaptation to chronic cardiovascular conditions [22].

6.10. Sexual Health

It has been reported that most healthcare professionals in rehabilitation centers do not regularly address this issue, with factors such as lack of knowledge/skills and cultural or social barriers playing a role. Recommendations for integrating sexual counseling into cardiac rehabilitation (CR) programs include group sessions, informational booklets, and training for rehabilitation staff [47]. Sexual dysfunction is common among individuals with cardiovascular disease and negatively affects quality of life, relationship satisfaction, and psychological well-being [48]. Interventions related to sexual health in cardiac rehabilitation programs include sexual education and counseling, integration with physical exercise programs/cardiac rehabilitation (e.g., pelvic floor muscle exercises), psychological support (management of anxiety/depression and sexual concerns), and a multidisciplinary approach (cardiologist, rehabilitation physiotherapist, psychologist, sex therapist). Participation in cardiac rehabilitation programs and increased physical activity have positive effects on sexual function and frequency of sexual activity [48]. Sexual activity should not be restricted for patients who can reach 60 watts on a bicycle or comfortably climb two flights of stairs. For patients who engage in regular physical activity, the risk of acute coronary syndrome following sexual activity is low [26].

6.11. Return to Work

Vocational rehabilitation interventions designed to address patients' perceptions regarding their ability to return to work should be considered for patients in cardiac rehabilitation who have the potential to continue working [26]. The return-to-work plan should be individualized based on the patient's medical condition, exercise capacity (METs/VO_2), the physical and psychosocial demands of the job, and psychological readiness. The plan should be developed collaboratively by a cardiologist, physiotherapist/exercise physiologist, occupational therapist/return-to-work counselor, psychologist/psychiatrist, and social worker [49].

According to the results of various studies, participation in cardiac rehabilitation programs is expected to increase exercise tolerance after a cardiac event and optimize cardiovascular risk factors such as lipid and lipoprotein profiles, body weight, blood glucose, blood pressure levels, and smoking cessation (Table 4).

Table 4. Improvements in biophysiological parameters and psychosocial outcomes in cardiac rehabilitation: findings from studies

Improvements in Biophysiological Parameters:	References
In nurse-led cardiac rehabilitation (CR) programs, patients with heart failure (HF) and coronary artery disease (CAD) showed improvements in systolic and diastolic blood pressure (BP), HDL, LDL, triglycerides, serum electrolyte levels, and other biophysiological parameters.	[22,25,38]
Exercise-based CR programs in CAD patients improved exercise capacity, functional capacity, quality of life (QoL), and reduced depression levels.	[42,52]
Improvements in Functional Capacity and Quality of Life:	
In patients undergoing coronary artery bypass grafting (CABG), a 30-session exercise-based CR program improved exercise capacity and QoL, although no significant change in depression levels was observed.	[52]
Exercise-based CR following a cardiac event or revascularization surgery increased functional capacity and survival.	[53]
Patients post-aortic coronary bypass surgery showed significant improvements in physical function, physical role, bodily pain, and social functioning after CR.	[54]
Patients with CAD, myocardial infarction (MI), HF, percutaneous coronary intervention (PCI), and CABG demonstrated significant improvements in 6-minute walk test (6MWT) distances following CR programs.	[52,55-57]
Improvements in Depression and Anxiety in CAD, HF, and Cardiac Surgery Patients:	

Nurse-led CR post-cardiac surgery showed improvements in physical and mental dimensions of QoL.	[38]
Short- or long-term exercise programs (8–32 weeks) in patients with CAD, HF, heart transplants, or left ventricular assist devices (LVADs) improved functional capacity, pulmonary function tests, QoL, and depression levels.	[53,58]
A 12-week CR program consisting of aerobic endurance, strength training, and relaxation sessions improved depression and anxiety levels in CAD patients.	[59]
One of the expected outcomes of CR is improvement in the psychological impact of heart disease. Most studies evaluating QoL showed reductions in depression and anxiety levels after CR.	[22,38,60,61]
DASS-21 subscale scores significantly decreased after CR.	[62]
However, in a randomized controlled trial, CR had no effect on mental health in patients who underwent heart valve surgery at the fourth month post-program.	[63]

7. Interventions Affecting the Success of Pulmonary Rehabilitation and Improving Patients' Quality of Life

Scientific evidence shows that the effectiveness of pulmonary rehabilitation (PR) components is primarily established in COPD [13]. In studies conducted within this context, traditional outcome measures include changes in exercise capacity, quality of life, symptoms, anxiety, and depression [14]. Health-related quality of life (HRQL) in pulmonary diseases reflects not only symptoms such as dyspnea, fatigue, and cough but also psychological burden, self-efficacy, and social participation. PR is a comprehensive, individualized intervention that includes exercise training, education, and behavior modification. While it does not directly improve lung function, it mitigates systemic outcomes such as muscle dysfunction, nutritional deficits, and psychological burden. Retrospective studies have shown that patients completing PR, particularly post-exacerbation, have longer survival. In COPD patients, exercise capacity is an important indicator of quality of life, and the two main goals in COPD management are improving HRQL and prolonging survival [50,51].

Improving quality of life in pulmonary rehabilitation requires addressing non-pharmacological interventions alongside pharmacological treatment in an interdisciplinary approach.

7.1. Smoking Cessation

Within PR, patients should be supported to quit smoking. Smoking cessation alleviates symptoms, halts disease progression, and reduces lung function impairment. A combination of psychosocial and pharmacological interventions is effective for smoking cessation [64]. PR programs should integrate smoking cessation support with exercise, education, and behavioral modification components. This integration promotes stronger improvements in both lung function and quality of life. Smoking cessation should not be limited to information provision but should involve structured counseling combined with nicotine replacement therapy or other cessation supports [65].

7.2. Anxiety and Depression Management

Psychological disorders such as anxiety and depression are common among patients. One of the expected outcomes of rehabilitation programs is the improvement of the psychological effects of the disease [38]. Psychosocial support interventions have demonstrated measurable improvements in mental health, which can be particularly beneficial for patients with initially impaired psychosocial status [43]. Most studies in the literature report reductions in depression and anxiety levels following rehabilitation interventions, along with improvements in patients' overall mental health [38,60,61]. Poor mental health is associated with frequent hospitalizations and worsened overall health, which can further reduce quality of life and increase mortality. Patients should therefore be assessed for anxiety and depression [64].

7.3. Treatment Adherence

Multicomponent interventions, including counseling, monitoring of inhaler medication use, self-management, and care coordination, improve treatment adherence and are effective strategies for enhancing quality of life [64].

7.4. Airway Clearance

Teaching patients techniques to maintain and optimize airway patency is essential [64]. Airway clearance methods include postural drainage, chest percussion and vibrations, cough exercises, cough assistance using mechanical insufflation-exsufflation devices, and bronchoscopy. These techniques can reduce symptoms, alleviate airway obstruction, and thereby improve quality of life. When integrated into a PR program alongside exercise, breathing training, postural drainage, and device-assisted interventions, these airway

clearance techniques enhance overall treatment efficacy [66].

7.5. Exercise Management

One consequence of reduced physical activity is its effect on skeletal muscles; loss of conditioning leads to early signs of skeletal muscle fatigue during exercise, premature lactic acid release, and an undesired increase in pulmonary ventilation for a given exercise, causing dyspnea. This, in turn, leads patients to avoid further physical activity. Improving skeletal muscle function delays fatigue and reduces ventilatory demands and symptoms during exercise. Participation in exercise training programs may also have additional benefits on comorbidities, health-related quality of life, and overall health. Therefore, exercise training is considered a fundamental component of pulmonary rehabilitation [43].

Before providing exercise training to patients enrolled in pulmonary rehabilitation, the patient's physical capacity should be assessed. Continuing an exercise program tailored to the patient's functional capacity and exercise tolerance is a crucial step in improving quality of life [64]. Healthcare professionals should focus on educating COPD patients, who may be reluctant or fearful to exercise due to dyspnea. Explaining that the disease does not prevent exercise and alleviating exercise-related fear can help patients adhere better to the PR program [20].

7.6. Nutritional Support

Patients with limited exercise often experience muscle mass loss due to nutritional deficiencies, which negatively affects quality of life and physical function. Nutritional support should be provided to patients enrolled in PR [64]. Nutritional interventions should be integrated with PR exercises, educational modules, and behavioral interventions; nutritional support alone may have limited effects [67].

7.7. Cognitive Behavioral Therapy (CBT)

This therapy aims to improve coping skills, emotional regulation, and thought patterns. It helps patients enhance their ability to manage the disease process and supports adherence to the rehabilitation program [64].

According to the results of various studies, participation in pulmonary rehabilitation programs is expected to improve respiratory and overall health outcomes, including improved exercise tolerance and reduction of symptoms such as dyspnea and fatigue, improved physical function, enhanced quality of life, and better adherence to self-management strategies such as medication use and smoking cessation (Table 5).

Table 5. Research findings related to pulmonary rehabilitation programs

PR Program Example Research Outcomes	References
PR programs in patients with interstitial lung disease, lasting >8 weeks, fully supervised, and including high-intensity interval training, improve exercise capacity and quality of life.	[68]
In patients with stable COPD, pulmonary rehabilitation programs increase exercise endurance, improve quality of life, positively affect psychological status, and enhance nursing satisfaction.	[40]
Randomized controlled trials and meta-analyses show that PR significantly improves quality of life, with effects greater than most pharmacological interventions.	[50]
Home-based pulmonary rehabilitation applied for 2 months after discharge in COPD patients during the early post-acute exacerbation period significantly improves exercise tolerance and quality of life. • *During hospitalization, 4 sessions were conducted,* - Patients were provided with information on lung anatomy/physiology, - medication use, - infection prevention, - lifestyle recommendations, - oxygen therapy, and other related topics. • *An exercise program was designed and implemented,* • *After discharge, patients were instructed to perform daily:* - Diaphragmatic and pursed-lip breathing exercises, - Endurance exercises (walking, cycling), - Strength and stretching exercises.	[69]
In a randomized controlled trial, COPD patients participated in a face-to-face, individual pulmonary rehabilitation (PR) program conducted over three consecutive days.	[70]

Each day included 30–45 minute sessions covering walking, pursed-lip breathing, diaphragmatic breathing, and effective coughing techniques. The study found a significant reduction in fatigue and a marked improvement in quality of life.	
A meta-analysis including 65 randomized controlled trials concluded that pulmonary rehabilitation (PR), based on Chronic Respiratory Questionnaire scores, was more effective than standard community-based care in four key areas of quality of life: dyspnea, fatigue, emotional function, and mastery.	[71]

8. Conclusion

In conclusion, this study showed that approximately half of the participants had an ideal cardiovascular health status and that their mean LS7 scores were high. The fact that women had a more favourable profile than men in key risk factors such as blood pressure, body mass index and smoking reflects the impact of gender differences on cardiovascular health. However, inadequate healthy eating behaviours in both sexes confirm that "ideal diet" remains the weakest component of LS7.

The generally high levels of both cardiovascular health and wellness highlight once more the importance of regular physical activity, non-smoking and normal fasting blood glucose levels. The lack of a statistically significant effect of wellness on cardiovascular health may indicate that wellness is more strongly related to long-term lifestyle change and should be examined in greater detail through longitudinal studies.

Our findings have important implications for nursing practice. Nurses working in internal medicine and cardiology settings can perform comprehensive assessments that consider blood pressure, BMI, smoking, physical activity, diet, cholesterol and fasting glucose together, and monitor patients' LS7-based cardiovascular health status. Strengthening patient participation is a key element in this process. Patients' understanding of their own cardiovascular risk, setting personalised goals and actively engaging in lifestyle modification are essential for sustainable behaviour change.

Through counselling, motivational interviewing and patient education, nurses can involve individuals in shared decision-making and support both cardiovascular health indicators and wellness. Integrating LS7 components into routine assessments in community-based programs, primary care and clinical follow-up may enhance patient engagement and help reduce the burden of cardiometabolic disease. Therefore, it is recommended that nursing interventions promoting healthy lifestyle behaviours at both individual and population levels be further strengthened.

Conflict of Interest

No conflict of interest is declared by author. In addition, no financial support was received.

Author Contributions

Conception and design of the study: HU; Data collection: HU; Data analysis: HU; Data Interpretation: HU; Drafting the article and/or its critical revision: HU; All authors have read and agreed to the published version of the manuscript.

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