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Pulmonary Rehabilitation: Importance And Components Of Rehabilitation Programs For Chronic Respiratory Diseases

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ABSTRACT

Pulmonary rehabilitation is a comprehensive, multidisciplinary intervention designed to improve the physical and psychological well-being of patients with chronic

respiratory diseases. This evidence-based approach combines exercise training, education, self-management strategies, nutritional support, and psychosocial interventions to reduce symptoms, optimize functional status, and enhance quality of life. Exercise training is a key component of pulmonary rehabilitation, with programs typically incorporating endurance and strength training exercises for both upper and lower extremities. The frequency, intensity, and specificity of exercise sessions are crucial factors influencing training outcomes. Educational interventions empower patients to understand their condition and manage symptoms effectively, while self-management strategies enable them to cope with daily challenges and maintain treatment adherence. Nutritional support is essential for addressing malnutrition, maintaining muscle mass, and meeting the increased metabolic demands associated with chronic respiratory diseases. Psychosocial and behavioral therapies help patients manage the psychological and emotional stress of chronic illness. Numerous randomized controlled trials have demonstrated the effectiveness of pulmonary rehabilitation in improving exercise capacity, dyspnea, and disease-specific quality of life, particularly in patients with severe chronic obstructive pulmonary disease (COPD). However, implementing pulmonary rehabilitation programs presents challenges, including a lack of awareness among healthcare professionals, limited resources, logistical barriers, and patient-related factors such as transportation difficulties and socioeconomic constraints. Addressing these challenges through standardized guidelines, enhanced awareness, and support for patient participation is crucial for ensuring the accessibility and effectiveness of this essential rehabilitation service.

KEYWORDS: Pulmonary Rehabilitation, Copd, Pulmonary Diseases

1. Introduction

Pulmonary rehabilitation is an evidence-based, multidisciplinary, and comprehensive intervention designed for patients with chronic respiratory diseases who experience symptoms and often have reduced daily life activities. This approach integrates various treatment modalities tailored to the individual's needs, focusing on several key objectives: reducing symptoms, optimizing functional status, increasing participation in daily activities, and minimizing health care costs. The American Thoracic Society and European Respiratory Society define pulmonary rehabilitation as a crucial component of care that not only addresses the physical aspects of chronic respiratory conditions but also enhances the overall quality of life for patients. By combining pharmacologic and non-pharmacologic therapies, pulmonary rehabilitation serves as an essential therapeutic option that complements standard medical treatments and significantly improves multiple outcomes relevant to patient health and well-being (Nici & ZuWallack, 2014).

Pulmonary rehabilitation has established itself as a key component in the management of chronic respiratory disorders and the care that should be provided following exacerbations (Vogelmeier et al., 2017). Rehabilitation evolved from an academic and research practice to a well-established profession of respiratory medicine. Major respiratory societies have incorporated pulmonary rehabilitation as

a scientific working group or assembly into their organizational structure, providing additional proof of the widespread acceptance of rehabilitation in the field of respiratory medicine.

All guidelines agree on the advantages of pulmonary rehabilitation. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) strategy promotes rehabilitation in symptomatic patients and those suffering from exacerbations. There are few, if any, therapies available to individuals with respiratory problems that provide comparable overall benefits in terms of exercise tolerance, symptoms, and health-related quality of life as those with respiratory diseases. Some countries provide adequate funding and equitable reimbursement for rehabilitation. In others, however, access to rehabilitation is more difficult1(Rochester et al., 2015), and funding prospects are not optimal and may even vary within a single hospital system, affecting the quality of the programs given (Janssens et al., 2019).

It is widely acknowledged that pulmonary rehabilitation involves a thorough interdisciplinary intervention (Janssens et al., 2019). A typical multidisciplinary rehabilitation team may include a chest physician with rehabilitation experience, a physiotherapist and/or exercise training specialist, a dietary expert, a psychologist, a social worker, an occupational therapist, and a nurse. Other fields, such as speech therapy, are less common. While there is abundant evidence for exercise training, the other disciplines are much less evidence based, although there is a clear rationale for their presence in specific patients.

Now that rehabilitation has become an acknowledged therapy, one of the issues is the lack of a blueprint approach. Clear guidance on the programme's minimum or optimal duration, important components, location, patient type, and so on is often lacking. Programmes vary in content, components, and duration around the world, and even within a country. Although exercise training is widely regarded as an important component of pulmonary rehabilitation, there is no agreement on how this single component should be delivered. One could argue that the program should be personalized, hence no standard program can be provided (Cui et al., 2019).

However, when seeking to create a labelling claim for pulmonary rehabilitation, it would be extremely beneficial to agree on some guidelines in terms of program duration, frequency, necessary components, and appropriate patients. This might then serve as the foundation for establishing financing guidelines. Exercise should be given appropriately because it is considered medicine. As with medicines, where the dose, frequency, and mode of administration are clearly defined and agreed upon with regulators and payers, there is an urgent need to align the rehabilitation community on the optimal delivery of pulmonary rehabilitation so that payers and patients have clear expectations, and the intervention can be properly reimbursed (Blair et al., 2012).

This ideal should not be simplistic, but rather reflect the genuine demands of patients to fulfil the aims of reversing the non-respiratory implications of their disease and increasing physical activity. This does not imply that all programmes should be the same. Rather, it calls for a standardized screening method, as well as information that is tailored to a patient's specific needs and preferences by well-trained healthcare providers. Today, programs are frequently adjusted to local possibilities, and

although this is undoubtedly a pragmatic approach, it has resulted in a reductionist perspective of rehabilitation, with shorter programmes and a lack of true interdisciplinary involvement, all bundled under the banner of rehabilitation.

To maximize the physiological benefits of rehabilitation, there is widespread agreement that exercise programs should follow the well-known rules of exercise training. These also apply to healthy people in terms of progressive overload (a gradual rise in training intensity), specificity (what you train is what you get), and reversibility (if you stop training, the advantages will wear off) (Garber et al., 2011).For patients with lung disease, it has been demonstrated that supervision of programmes at least twice per week enhances the effects of a programme (Nici et al., 2012), and that programmes should be long enough to provide significant and measurable benefits while also motivating patients to continue exercise training beyond the programme. The American Thoracic Society and European Respiratory Society did not reach a consensus on the minimum duration of pulmonary rehabilitation (Spruit et al., 2013). However, a minimum of 16 weeks is recommended for elderly individuals to improve aerobic fitness (American College of Sports Medicine et al., 2009). There is no reason to expect that this period will be shorter in patients with respiratory diseases who have considerable deconditioning at baseline.

Alternative approaches to pulmonary rehabilitation have also been explored in study. Most of these efforts aimed to make programmes more accessible to patients. As transportation and a lack of rehabilitation facilities are cited as the most common impediments to prescribing or following rehabilitation programs, attempts have been undertaken to bring rehabilitation closer to patients' homes. Home (Wijkstra et al., 1994, 1996), or primary care-based (Cambach et al., 1997) rehabilitation was adopted in the late 1990s, and early trials in the Netherlands demonstrated its efficacy. Later, it was discovered that home-based fitness training was less beneficial in patients with severe dyspnoea (Wedzicha et al., 1998).

True interdisciplinary treatment poses a problem in primary care in terms of structure (and finance). Patients may also notice a lack of variation when performing workouts at home. While most patients prefer the home setting, others prefer an outpatient (managed) environment (Lahham et al., 2018). An alternative is to establish pulmonary rehabilitation in the community (Zwerink et al., 2014), which would eventually be monitored by experts from a rehabilitation center. When other criteria (such as experience overseeing patients with lung illness and broad rehabilitation concepts are effectively managed), the setting does not appear to have an impact on the overall outcome of the rehabilitation program. This was demonstrated in a large non-inferiority experiment in the United Kingdom comparing hospital-based and community-based rehabilitation options (Waterhouse et al., 2010).

A recent study coupled a community-based walking program with a behaviour modification program and found significant and clinically relevant impacts on both walking performance and physical activity levels (Varas et al., 2018). It is uncertain whether such regimens can address other common problems in people with respiratory illnesses, such as skeletal muscle weakness, respiratory muscle

dysfunction, dietary issues, or inadequate self-care.

Components of Pulmonary Rehabilitation

Exercise Training

Almost all pulmonary rehabilitation programs incorporate exercise training as a key component. Regular exercise is necessary for improvement in performance.

This is typically done in a group environment with personalized fitness plans overseen by therapists. While some programs provide one-on-one exercise supervision by therapists, the cost-effectiveness of this strategy is questionable. Most programs provide various training regimens to improve strength and endurance. The frequency, intensity, and specificity of exercise sessions are key factors influencing training outcomes.

As for frequency, for practical reasons, most pulmonary rehabilitation programs only hold sessions twice or three times per week.

Research suggests that two weekly sessions may not be sufficient for effective training. However, most programs that meet just twice a week require patients to exercise at home in between sessions. Although the best frequency of exercise sessions is unknown, a consensus group recommends twice-weekly supervised sessions with additional unsupervised sessions at home.

As for intensity, most research suggest a threshold for the training effect. Sustaining an intensity level of 60-75% of maximum oxygen uptake for at least 20-30 minutes on a few days per week can improve endurance. However, patients' ability to stick to a high-intensity regimen has been questioned. Clark and colleagues studied the effectiveness of low-intensity isotonic workouts for upper and lower extremities in a group of 40 COPD patients at home. The researchers noticed a significant improvement in treadmill walking time and believe their approach can benefit COPD patients with various functional abnormalities. Punzal et al. found that a high-intensity exercise program at 85% of patients' maximal baseline treadmill walking speed resulted in considerable endurance benefits. Vallet et al. compared an exercise routine adjusted to the individual's anaerobic threshold to a normal lower intensity regimen targeting 50% of maximum heart rate. The personalized regimen improved O2 pulse and decreased lactate buildup relative to the standard regimen. Many programs lack oxygen monitoring facilities and instead rely on symptom guidance. Patients exercise at a level that causes moderate dyspnea but is sustained. Training at these levels has been linked to improved endurance at the end of a program.

As for specificity, Training regimens vary depending on the sort of exercise used, resulting in different types of gains. Training the lower limbs can improve walking endurance, but not the upper extremities. Endurance exercises enhance endurance more than strength training, while weightlifting may improve strength but not endurance or other outcomes like exercise capacity or health status. As a result, most programs include a variety of training regimens. Increasing the time and intensity of training on a track, treadmill, or cycle ergometer improves lower extremity endurance.

COPD patients may experience discomfort when using their upper extremities for

reaching or personal hygiene, as this diverts the shoulder girdle muscles used for breathing. Upper extremity muscular training, such as unsupported weightlifting and stretching with elastic bands (Ther-a-bands; Hygenic Corp., Akron, OH) or hand cranks (for endurance), can help reduce upper extremity problems. Arm-training programs reduce work effort, dyspnea, and dynamic hyperinflation during arm exercise.

Some programs include exercises to improve respiratory muscle strength, such as inspiratory threshold training (an isometric exercise where a device only allows for inspiratory flow when a negative pressure threshold is reached) and inspiratory resistive training (in which patients inspire through a resistor). The effectiveness of one strategy over the other is unclear, possibly due to difficulties in commitment to inspiratory threshold training. In a meta-analysis, Lotters and colleagues found a nonsignificant trend for improved exercise capacity after inspiratory muscle training (IMT) alone or as an adjunct to general exercise training. Patients with weaker inspiratory muscles at baseline benefited much more than those with normal strength, according to a subgroup study. The study found that IMT is effective for rehabilitating COPD patients with inspiratory muscle weakness, but did not account for the possibility of regression to the mean.

Education and Self-Management

Education and self-management are critical components of pulmonary rehabilitation programs for patients with chronic respiratory diseases. Effective education empowers patients to understand their condition, treatment options, and the importance of adherence to prescribed therapies. According to a study by McCarthy et al. (2015), educational interventions significantly improve patients' knowledge about their disease and enhance their ability to manage symptoms effectively. This knowledge is crucial in fostering a sense of autonomy and encouraging patients to take an active role in their health care (McCarthy et al., n.d.).

Self-management strategies are essential for enabling patients to cope with the daily challenges posed by chronic respiratory diseases. These strategies include recognizing early signs of exacerbation, understanding how to use inhalers correctly, and knowing when to seek medical help. A systematic review by Effing et al. (2016) found that self-management education not only improves clinical outcomes, such as reduced hospital admissions and improved quality of life, but also enhances patients' confidence in managing their condition. This empowerment is particularly important, as it can lead to better adherence to treatment plans and lifestyle modifications (Effing et al., 2007).

Moreover, the integration of self-management techniques into pulmonary rehabilitation programs has been shown to have a lasting impact on patients' health behaviors. A study by Bourbeau et al. (2015) highlighted that patients who participated in structured self-management programs reported significant improvements in their ability to manage symptoms and maintain physical activity levels post-rehabilitation. This suggests that ongoing education and support are vital for sustaining the benefits achieved during formal rehabilitation (Bourbeau et al., 2003).

Nutritional Support

Nutritional support plays a vital role in the effectiveness of pulmonary rehabilitation programs for patients with chronic respiratory diseases. Malnutrition is a common issue among individuals with chronic obstructive pulmonary disease (COPD) and other respiratory conditions, often exacerbated by increased energy expenditure due to labored breathing and reduced dietary intake. According to a study by Schols et al. (2014), malnutrition can lead to muscle wasting, decreased exercise tolerance, and poorer overall health outcomes. Thus, addressing nutritional needs is essential for improving both the physical and functional capacities of patients undergoing pulmonary rehabilitation (Schols et al., 2014).

A well-balanced diet rich in essential nutrients is crucial for maintaining optimal lung function and overall health. Research by Celli et al. (2016) emphasizes the importance of adequate protein intake to support muscle mass and strength, which are critical for respiratory function. Protein-rich foods can help counteract the muscle wasting that often accompanies chronic respiratory diseases. Additionally, ensuring sufficient caloric intake is necessary to meet the increased metabolic demands placed on patients with compromised lung function. Nutritional assessments and personalized dietary plans should be integral components of rehabilitation programs to identify specific deficiencies and tailor interventions accordingly (Celli et al., 2015).

Patients with chronic respiratory diseases are typically either overweight or underweight, and a low BMI correlates with a poor prognosis (34). Few studies have shown that nutritional therapies enhance outcomes, although one recent study found gains in fat-free muscle mass, strength, and quality of life score in patients whose diets included creatine.

Psychosocial Support

Most pulmonary rehabilitation programs include psychosocial and behavioral therapies to address the psychological and emotional stress associated with chronic illness, as well as the prevalence of depression. During educational sessions, psychologists or social workers may teach coping, stress reduction, and relaxation skills. A recent controlled experiment found that teaching controlled breathing and energy conservation techniques during activities like bed making or table setting improved dyspnea and overall functional scores compared to didactic lectures. Sexual dysfunction can be addressed and sexual counselling provided. Patients experiencing severe stress, anxiety, or depression may require individual counselling or referral to a psychiatrist for medicinal therapy.

Effectiveness of Pulmonary Rehabilitation

Several randomized controlled trials have demonstrated the effectiveness of pulmonary rehabilitation for COPD. Ries and associates conducted a comprehensive study on 119 patients who were randomly assigned to receive either education and fitness training or education alone. This study found that both maximum and endurance exercise had significant advantages over a year. Dyspnea and self-efficacy improved, while lung function and well-being remained unchanged. There were trends toward increased survival (67 vs. 56% after up to 6 years of follow-up) and

fewer hospital days per patient per year (2.3 vs. 1.3 d/patient/yr), but these did not achieve statistical significance.

A recent Cochrane meta-analysis concluded that pulmonary rehabilitation is useful for COPD (50). However, the Ries trial was excluded since it incorporated an educational intervention in addition to traditional therapy. A Cochrane review of 23 randomized controlled trials discovered that rehabilitation for COPD patients improves dyspnea and disease-specific quality of life, such as weariness and mastery assessments. The 6-minute walk distance resulted in a significant increase in functional exercise capacity, with an average of 49 metres. This is within the expected minimal clinically meaningful difference of 54 meters.

The largest advantage was seen in patients with severe COPD rather than mild to moderate COPD; the benefit lasted at least 6 months; and supervised programs outperformed unsupervised programs. Although the Cochrane review revealed no overall reduction in the need for hospitalization after rehabilitation, certain individual studies discovered considerable reductions in hospital days per year as well as annual health care use and direct expenses. A recent study also revealed improvements in anxiety and depression in COPD patients after pulmonary rehabilitation when compared to matched control participants. A subsequent meta-analysis focusing solely on patients with mild-moderate COPD concluded that exercise could improve conditioning in these patients, but that studies are insufficient to support the notion that rehabilitation improves dyspnea, quality of life, or disease progression in the mild-moderate subgroup.

Controlled studies have the limitation of not blinding patients or investigators to treatment group, which can lead to bias in outcomes. The Cochrane review found no need for additional studies to compare pulmonary rehabilitation with conventional therapy in COPD patients. More research is needed to determine the essential components of a rehabilitation program, the ideal length, the optimal intensity, frequency, and specific exercises, the value of breathing exercises, and how to maintain benefits.

Several recent research have provided light on some of these topics. Research in the UK indicated that early rehabilitation (within 10 days) after a COPD exacerbation increased exercise capacity and health status at 3 months compared to usual treatment. After 8 weeks of hour-long exercise sessions twice weekly, a Danish study reported no significant change in 6-min walk distance or health-related quality of life. The study suggested that two sessions per week may be insufficient for a training effect. However, there was a substantial dropout rate, and the workout program was not well described. To establish a training impact, there must be a minimal threshold of exercise frequency. While two sessions per week may be near to this threshold, exercise length and intensity must also be considered. Green et al. observed that a 7-week pulmonary rehabilitation program is more effective than 4 weeks. A recent study indicated that patients with severe COPD experienced an increase in 6-min walk distance after 12-24 weeks of pulmonary rehabilitation. The study recommended that supervised programs last at least 24 weeks to maximize effects, but it was uncontrolled. Most programs span 6-12 weeks due to practical

considerations such as insurer reimbursement policies.

Most data and randomized controlled studies focus on the effectiveness of pulmonary rehabilitation for COPD patients. However, rehabilitation may still assist individuals with non-COPD illnesses. Patients with sufficient reserve can benefit from exercise for training purposes. Educating patients about their ailment can improve coping skills and medication adherence.

Individualized pulmonary rehabilitation programs are necessary for individuals with non-COPD illnesses, as their needs may vary. Asthmatic patients may not have exercise impairment as much as COPD patients, but they require additional education on medication administration and environmental precautions, particularly during crises. After 10 weeks of swim training, asthma patients increased their 12-minute walk distance and experienced fewer exercise-induced bronchospasms.

Comprehensive rehabilitation can improve strength and endurance in patients with neuromuscular illnesses like post-polio syndrome Muscle strengthening and conditioning exercises may not benefit patients with severe neuromuscular illnesses as muscular dystrophies. Patients with contractures may benefit from flexibility exercises or programs to optimize ventilator support regimes. Patients with lung cancer may require specialized instruction and may be recovering from radiation or chemotherapy.

They may also have pain management issues that require special treatment.

Interstitial fibrosis patients may struggle to deliver high-flow oxygen during exercise, while cystic fibrosis patients may require secretion removal coaching or special precautions due to the presence of highly resistant organisms like Burkholderia cepacia. A small, uncontrolled study of cystic fibrosis patients found that exercise programs were beneficial. Exercise training can help patients with bronchiectasis, but IMT does not provide further benefits.

Initiating an exercise program alongside new medicinal medications for pulmonary arterial hypertension may promote functional improvement. Pulmonary rehabilitation has been used before and after surgeries such as lung resection, transplantation, and volume reduction (67). It was also used as standard therapy in both the surgery and control arms of the National Emphysema Therapy Trial, which assessed the effectiveness of lung volume reduction Surgery..

Maintenance of benefit

Some trials have followed patients for up to two years. Ries and colleagues discovered that increases in functional exercise ability last for at least 12 months. Troosters and colleagues found that gains in the 6-minute walk test and quality of life outperformed minor clinically meaningful differences for 18 months. During the rehabilitation part of the program, patients should apply what they learned and adopt a healthy lifestyle with frequent exercise. Unfortunately, most patients do not adhere to this ideal, resulting in programming benefits being lost. Some programs encourage patients to return to the rehabilitation facility twice or three times per week after completing the formal program to maintain the fitness routine. Maintenance programs are not covered by insurance, so they typically charge a nominal fee for

ongoing, less rigorous supervision.

It is unclear if formal maintenance programs following rehabilitation improve or extend the early advantages. Ries and colleagues evaluated a maintenance program involving weekly phone calls and monthly reinforcement sessions. Maintenance improved functional exercise capacity and overall health condition over 12 months compared to usual care, but the benefit faded after 24 months. A study found that once-weekly training sessions following a 3-month rigorous rehabilitation period did not maintain the advantages. However, 2 to 3 hours of exercise per week during the maintenance period avoided some deterioration. Research suggests that listening to music through earbuds during workout sessions can enhance the effectiveness of rehabilitation programs.

Challenges in Implementing Pulmonary Rehabilitation

Implementing pulmonary rehabilitation (PR) programs for patients with chronic respiratory diseases presents several challenges that can hinder their effectiveness and accessibility. These challenges are multifaceted, involving systemic, logistical, and patient-related factors that vary across different healthcare settings. Understanding these barriers is crucial for developing strategies to enhance the delivery and uptake of PR services.

One significant challenge in implementing PR is the lack of awareness and knowledge among healthcare professionals regarding the benefits and methodologies of rehabilitation. A study conducted in Malaysia revealed that many healthcare providers were not adequately trained in PR, which deterred them from initiating programs in their institutions. This lack of formal training leads to a scarcity of structured PR services, as many professionals do not feel confident in delivering effective rehabilitation interventions (Chan et al., 2021). This issue is compounded by the absence of standardized guidelines for referrals and care pathways, which further complicates the integration of PR into routine clinical practice (Chan et al., 2021).

Logistical barriers also play a critical role in the implementation of PR programs. Limited resources, including insufficient staffing and inadequate facilities, restrict the ability to offer comprehensive rehabilitation services. According to Chan et al. (2021), many hospitals lack the necessary infrastructure to conduct essential assessments and exercises required for effective PR, such as the six-minute walk test. Additionally, long waiting lists for rehabilitation services can discourage patient participation, as individuals may be unable to commit to a program that is not readily accessible (Bourbeau et al., 2015).

Patient-related factors significantly impact adherence to PR programs. Research indicates that many patients face challenges such as transportation difficulties, lack of caregiver support, and competing responsibilities that make regular attendance difficult (Sohanpal et al., 2012). Furthermore, patients may have misconceptions about the necessity or benefits of PR, leading to low motivation and engagement levels. A qualitative study in Iran highlighted that patient-related barriers, including fear of exacerbating their condition and a lack of understanding about the importance

of rehabilitation, contribute to poor adherence rates (Sohanpal et al., 2012).

Moreover, socioeconomic factors can exacerbate these challenges. Patients from lower socioeconomic backgrounds may struggle with indirect costs associated with attending PR sessions, such as transportation fees or lost wages due to time off work (Labaki & Han, 2020). This financial burden can lead to decreased participation rates and increased dropout rates from rehabilitation programs (Labaki & Han, 2020).

2. Conclusion

pulmonary rehabilitation is a critical, multidisciplinary approach for managing chronic respiratory diseases, offering significant improvements in patients' physical capacity, symptom control, and quality of life. This intervention combines exercise training, education, self-management, nutritional, and psychosocial support, tailored to individual needs. Despite its proven benefits, challenges such as inadequate healthcare provider training, limited resources, logistical barriers, and patient-related factors limit its accessibility and effectiveness. Addressing these challenges through standardized guidelines, enhanced awareness, and support for patient participation can ensure that more patients benefit from this essential rehabilitation service.

Recommendations

- Educate healthcare professionals on the benefits of PR and ensure adequate training in PR techniques, as many providers lack confidence and knowledge to initiate PR programs effectively.
- Establish minimum standards for program duration, frequency, and essential components to promote consistency. This could guide reimbursement processes and set patient expectations regarding outcomes.
- Address logistical barriers by supporting community-based and home-based PR options, which can ease access for patients facing transportation and mobility challenges.
- Consider telemedicine support for remote PR sessions, especially for underserved areas, to increase adherence and accessibility.
- Personalize exercise training based on patient capabilities, focusing on endurance, strength, and respiratory muscle training as needed. Flexibility exercises and inspiratory muscle training could benefit patients with specific physical limitations.
- Provide psychosocial support to help patients manage the emotional stress of chronic illness, including access to behavioral therapies. Nutritional support can be essential for managing malnutrition and supporting overall health and muscle strength.
- Implement structured self-management education to empower patients in symptom recognition, inhaler use, and early intervention strategies for exacerbations, which can reduce hospital admissions and improve adherence to treatment.

- Offer maintenance PR programs, even on a minimal basis, to sustain the gains made during formal rehabilitation. While funding can be a challenge, low-cost options such as periodic phone check-ins or community group sessions may be viable.

- Support research on PR for patients with non-COPD conditions, including asthma and neuromuscular diseases, to optimize PR strategies and validate benefits for a broader range of respiratory diseases.

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