ECRONICON OPEN ACCESS

EC PULMONOLOGY AND RESPIRATORY MEDICINE

Review Article

Development of a Nationwide Accessible Pulmonary Rehabilitation Program in India

Raja Dhar[1], Sujeet Rajan[2], Surinder Kumar Jindal[3], Narendra Raval[4], Samir Gami[5], Anand Jaiswal[6], Mahavir Modi[7], Monali Mehta[8], Rushika Shah[8], Meena Lopez[8]* and Jaideep Gogtay[8]

[1]*Department of Pulmonology, CK BIRLA Hospitals, Kolkata, West Bengal, India*

[2]*Department of Pulmonology, Bombay Hospital Institute of Medical Sciences and Bhatia Hospital, Mumbai, Maharashtra, India*

[3]*Department of Pulmonology Jindal Clinics, Sector 20 D, Chandigarh, Punjab/Haryana, India*

[4]*Chest Medicine, Dr Raval Day Care Clinic, Ahmedabad, Gujarat, India*

[5]*Department of Pulmonology, Shivam Chest Clinic Allergy Asthma and Sleep Medicine, Surat, Gujarat, India*

[6]*Respiratory and Sleep Medicine, Medanta Medicity, Gurgaon, Haryana, India*

[7]*Department of Pulmonology, Ruby Hall Clinic, Pune, Maharashtra, India*

[8]*Department of Medical Affairs, Cipla Ltd., Mumbai, Maharashtra, India*

***Corresponding Author:** Meena Lopez, Head Medical Services, Respiratory Business, Cipla Ltd., Mumbai, Maharashtra, India.

Received: September 16, 2025; **Published:** October 13, 2025

Abstract

Pulmonary rehabilitation (PR) has emerged as a valuable nonpharmacological intervention that encompasses exercise training, education, nutritional counseling, and psychosocial support for chronic respiratory diseases (CRDs). Implementing a nationwide accessible PR program is vital for improving health outcomes and promoting healthier lifestyles through preventive measures and comprehensive management strategies for individuals with respiratory conditions. The first structured nationwide PR program in India was initiated in 2022. Details of its evolution and outcomes are presented here. The program involves a team of 113 PR therapists across 84 cities in India. The PR program components include patient assessment, exercise training, education, and psychosocial rehabilitation. Since its inception from April 2022 to July 2024, 27,402 patients have been enrolled. The most common diagnoses were chronic obstructive pulmonary disease (COPD) and asthma (32% each), followed by interstitial lung disease (8%), and others (28%). Learnings from this first nationwide structured PR program will lay the foundation for future initiatives in this realm.

Keywords: *Asthma; Chronic Obstructive Pulmonary Disease; Health Care; India; Pulmonary Rehabilitation*

Abbreviations

ACCP/AACVPR: American Association of Cardiovascular and Pulmonary Rehabilitation; CME: Continuing Medical Education; COPD: Chronic Obstructive Pulmonary Disease; CRD: Chronic Respiratory Disease; DALY: Disability-Adjusted Life Year; GOLD: Global Initiative for Chronic Obstructive Lung Disease; ILD: Interstitial Lung Disease; IPF: Idiopathic Pulmonary Fibrosis; 1-MSTST: 1-Minute Sit-To-Stand Test; QoL: Quality of Life; PR: Pulmonary Rehabilitation; PPF: Progressive Pulmonary Fibrosis; SPO_2: Peripheral Capillary Oxygen Saturation

Introduction

Chronic respiratory diseases (CRDs), which primarily encompass chronic obstructive pulmonary disease (COPD), asthma, and interstitial lung disease (ILD), are associated with a significant burden of morbidity and mortality [1]. In 2019, 454.6 million individuals had CRDs worldwide, leading to approximately 4 million deaths [1,2]. Southeast Asia alone had 35.93 million cases of CRDs in 2019 [1,2]. In India, the contribution of CRDs to the total disability-adjusted life years (DALYs) increased from 4.5% in 1990 to 6.4% in 2016. Notably, India accounted for 32.0% of the global DALYs attributed to CRDs in 2016 [3]. Although the management of lung diseases has witnessed pharmacological advancements, patients with CRDs, especially those with COPD and ILD, experience decline in lung function and have poor quality of life (QoL). In recent times, pulmonary rehabilitation (PR) has emerged as an essential adjunct to pharmacological treatments for patients diagnosed with chronic lung diseases.

Benefits of PR in chronic lung diseases

The primary goal of PR is to improve symptoms, restore functional capabilities, and enhance overall QoL [4]. Moreover, PR alleviates respiratory symptoms [5], improves overall QoL [6-9], increases activity levels [10], and reduces mortality in patients diagnosed with chronic lung diseases [11].

A systematic review comprising 19 randomized controlled trials (RCTs) (n = 1146) in COPD compared PR groups with usual care (control) groups, which revealed statistically significant improvements in St. George's Respiratory Questionnaire (SGRQ) scores, with a mean difference (MD) of -6.53. Additionally, notable improvements were observed in the QoL components of SGRQ scores, specifically in symptoms, impacts score, and activity score, with MDs of -5.01, -7.23, and -6.08, respectively [10]. Further, another RCT demonstrated that a 3-month PR program integrating transition support and long-term self-management significantly reduced COPD-related hospitalizations and emergency department visits, while also improving health-related QoL at 6 months after discharge [12]. A systematic review of RCTs found a significant reduction in mortality when pulmonary rehabilitation (PR) was initiated either during hospitalization or within four weeks after discharge following an acute exacerbation of COPD, compared to patients who did not receive PR [13].

Accumulating evidence demonstrates the benefits of PR in patients diagnosed with ILD. In a Cochrane review comprising 21 studies that included patients with ILD of varying etiologies, PR was found to be safe and effective. The study showed improvement in functional exercise capacity, peak workload, peak oxygen consumption, and maximum ventilation. Similar improvements were noted in the idiopathic pulmonary fibrosis (IPF) patient subgroup. Additionally, sustained long-term improvements in dyspnea and QoL were reported [14].

Short-term improvements in functional exercise capacity and quality of life have also been reported in a systematic review and meta-analysis in patients with asthma undergoing PR for about 4 - 12 weeks [15].

Guideline recommendations for PR

According to the American College of Chest Physicians and American Association of Cardiovascular and Pulmonary Rehabilitation (ACCP/AACVPR) guidelines, PR is suitable for any patient with stable CRD experiencing disability due to respiratory symptoms [16]. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) Strategy Document 2025 states that a well-defined and structured PR program has a positive impact on shortness of breath, health status, exercise tolerance, exacerbations and mortality in patients with COPD. Importantly, pulmonary rehabilitation is one of the nonpharmacological interventions recommended by GOLD 2025 to reduce COPD mortality. GOLD 2025 also regards PR as one of the most cost-effective treatment strategies in COPD management as it impacts exacerbations, re-hospitalizations, and mortality. It recommends a PR program particularly in patients with symptoms and/or a high risk of exacerbations, i.e. patients belonging to Groups B and E. Optimum benefits can be derived from programs lasting 6-8 weeks. (GOLD for COPD, 2025 report). The 2022 official ATS/ERS/JRS/ALAT clinical practice guideline on IPF and progressive pulmonary fibrosis (PPF),

recommends PR as part of nonpharmacological treatment consideration for IPF patients [17] with a focus on managing breathlessness, fatigue, and cough. The Global Initiative for Asthma (GINA) 2024 recommends PR in asthmatics who have dyspnea due to persistent airflow limitation (post-bronchodilator FEV1 ≤80% of predicted and FEV1/FVC ratio of ≤0.7) [18].

Components of PR program

The traditional PR model involves supervised exercise training, education, self-management strategies, and group support. This comprehensive approach is typically administered at least twice a week for a duration of 8 weeks or longer [19,20]. There are four fundamental types of PR programs: outpatient, inpatient, home-based, and telerehabilitation [4,21]. Community-based PR, home-based supervised PR, PR at community sites delivered via telehealth from a central hospital-based location, and synchronous telehealth PR at home through videoconferencing have demonstrated effectiveness comparable to hospital-based outpatient PR programs [22]. However, despite being a highly effective treatment for individuals with CRDs, PR remains underutilized worldwide [19].

Current status of PR programs in India and recognized challenges

In India, the adoption of PR into COPD care began in the 1990s, although it became more widely practiced at the beginning of the 21st century. However, government health initiatives incorporating PR in management of respiratory diseases are few. In a nation where a significant proportion of the population resides in rural regions, ensuring accessibility to PR therapy for these populations becomes critical [23].

The widespread implementation of PR across India is limited by lack of knowledge of the health benefits of PR, healthcare system barriers, healthcare professional-related challenges, and patient-related challenges (Figure 1) [3]. Consequently, this contributes to heightened morbidity and an increased burden on the healthcare. Addressing these barriers can facilitate healthcare professionals' referrals and enable patients to access and benefit from PR services readily [24].

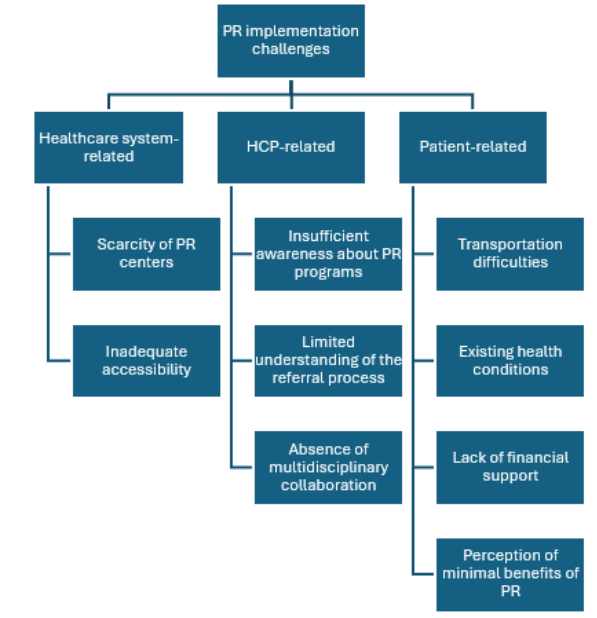

Figure 1: *Challenges to PR implementation in India.*
HCP: Health Care Professionals; PR: Pulmonary Rehabilitation.

To address these challenges and the increased need for PR in post-Covid era, the first structured nationwide protocol-based PR program in India was introduced by Cipla Ltd. in 2022. This article outlines the planned evolutionary phases of this comprehensive and accessible PR program.

Establishment of the nationwide PR program in India

Team composition

Since its inception in April 2022, the program has evolved significantly. It presently comprises 108 PR therapists with either bachelor's or master's degrees in physiotherapy and possessing 1-2 years of clinical experience in managing CRDs. Since its inception in April 2022 through July 2024, the program has enrolled 27,402 patients. The most prevalent diagnosis was COPD and asthma (32% each), followed by ILD (8%), and other conditions (28%).

Patient selection criteria

Patients with an established diagnosis of COPD, asthma, ILD, or other CRD referred by pulmonologists are enrolled in the program, after obtaining a written informed consent. Patients with unstable cardiac conditions, severe pulmonary hypertension, and uncontrolled metabolic disease are excluded.

Evolution of the program

The program embarked on a transformative journey covering 3 distinct evolutionary phases (Figure 2).

Phase I

Due to increased awareness, support, and referrals from practicing pulmonologists in major metropolitan areas, the program was initially launched with a team of six dedicated PR therapists stationed in Mumbai, Delhi, Ahmedabad, and Bengaluru. The PR therapists worked with a group of 15 pulmonologists each, who referred patients for the program if they fulfilled the patient selection criteria. These therapists conducted home visits, performed assessments, and recommended exercises tailored to the patient's evaluation results. However, covering a larger region efficiently with home visits proved challenging, leaving little time to track patient progress.

Phase II

Phase II of the PR program transitioned to clinic-based PR to enhance feedback mechanisms and involvement of consulting pulmonologists in the PR sessions. During this phase, a PR therapist was assigned to pulmonologists in private practice which had adequate clinic space for conducting PR sessions. Patients received the added advantage of pulmonologist supervision, while pulmonologists became familiar with patients' progress during PR and gained access to comprehensive data on the ongoing program. Additionally, this shift reduced the time-intensive nature of home visits for PR therapists, allowing them to reach more patients needing PR therapy. This phase of the PR program received a positive response, resulting in a marked increase in the number of pulmonologists participating compared to Phase I. Furthermore, overall patient adherence to PR sessions showed marked improvement, based on the portal entries provided by PR therapists. Group sessions at the clinic enhanced patient engagement for follow-up sessions. However, transitioning to a clinic-based model faced obstacles in finding dedicated space, and dropouts occurred due to transportation issues for follow-up sessions.

Phase III

The third phase of the program focused on greater patient reach. To reach a higher number of individuals with limited access to PR, approximately 100 screening camps for patients needing PR were organized across 22 cities. At these camps, pulmonologists evaluated the need for PR in these patients and accordingly the eligible patients were referred to the program. Afterward, the patients were evaluated by PR therapists to assess their exercise tolerance via the 1-minute sit-to-stand (1-MSTST). A hybrid approach was introduced, with the

initial session conducted in the clinic and subsequent sessions offered through a digital platform. Additionally, transitioning to Phase III with a hybrid mode of PR delivery (combining physical and virtual sessions) increased the accessibility of the patients to the pulmonary rehabilitation program and thereby patients were enabled to continue with the PR sessions. Digital sessions required the presence of a caregiver to ensure that patients understood and performed the exercises within the safety zone; the caregiver also captured the vitals at the start and at the end of each session. Moreover, use of an oximeter with real-time display was made mandatory to ensure both safety and effectiveness.

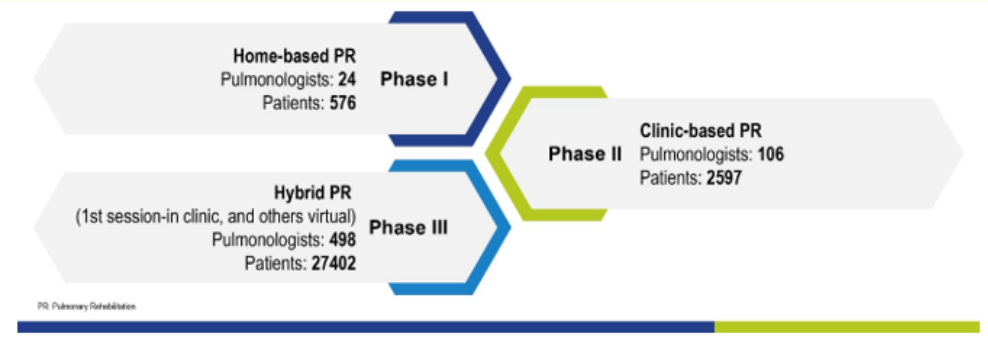

Figure 2: *Phases of the PR program.*

Components of the PR program

The components provided in the current PR program include patient assessment, education, exercise training, and counseling (Figure 3). The PR program follows a systematic process, starting with a pre-program evaluation to establish baseline conditions, followed by customizing exercise sessions for a minimum of 6 weeks.

Figure 3: *Patient journey.*

Initial (pre-program) assessment

It includes the following assessments:

1. Vital signs, including pulse, blood pressure, peripheral capillary oxygen saturation (SpO_2).
2. The Borg scale (assessed as part of routine clinical practice).
3. Abnormal breath sounds (assessed but not documented).
4. 1-minute sit-to-stand test (1-MSTST) (was used in place of 6-minute walk test due to space constraints).

Exercise, education, and behavior modification

Exercise training is the cornerstone of PR programs as it improves muscle function. In designing the exercise prescription, careful consideration is given to patient safety, concurrent medical conditions (such as musculoskeletal, cardiovascular, and neurological disorders), requirements of the individual patient based on the results of initial assessment, as well as the goals of the PR program.

Patients are encouraged to participate in two sessions weekly, lasting 20-40 minutes each, which include warm-up, aerobic exercises (walking/step-ups), cool-down, and resistance exercises. In subsequent follow-up visits, the exercise format is adapted, adjusting intensity, duration, and exercise types based on individual patient's progress in endurance and strength. Throughout the rehabilitation program, PR therapists educate the patients on the disease, behavioral modifications, medications used in treatment, and exercise training. Counseling was provided to patients, helping them to stay motivated and continue with the PR sessions.

Final (post-program) assessment

This includes the parameters originally considered in the initial (pre-program) assessment, i.e. vital signs (HR, BP, SpO_2) and 1-MSTST.

Challenges and learnings

During our efforts to establish a nationwide PR program in India, we faced several challenges, including referral shortages, non-uniform data collection, language barriers, and limited availability of PR therapists. We also encountered logistical issues in home visits, space constraints in clinic-based sessions, patient dropouts, and difficulties in transitioning to digital platforms.

However, we intended to address some of the above challenges before launching Phase III of the PR program, by creating awareness through national conferences, continuing medical education (CMEs), sharing patients' testimonials to emphasize its importance to clinicians, which aided increase in the referrals. A system has been created for periodic training of PRT team to capture the data appropriately. The language barrier is being tackled by asking the PRT to conduct the session in regional language wherever needed. At present apart from Hindi and English, our program also includes Tamil, Telugu, and Malayalam. Exercise charts are being shared with the patients to address challenges faced by those who either have no mobile phones or for whom network connectivity is a challenge.

Future perspectives

The current program has witnessed increasing acceptance among pulmonologists and patients. Further plans include engaging a multidisciplinary healthcare team, including PR therapists, dietitians, clinical psychologists, yoga instructors, physicians, and nurses, to offer comprehensive support. A real-world study to assess the effectiveness of the PR program in chronic lung disease in the Indian setting is warranted.

Conclusion

Chronic respiratory diseases present a global health challenge, demanding a comprehensive approach for effective management. Pulmonary rehabilitation plays a crucial role in the holistic management of patients with CRDs. However, in lower middle-income countries such as India, the availability and accessibility to a PR program is challenging due to multiple factors. The nationwide PR program

launched by Cipla Ltd. in India is a positive move to overcome some of these challenges. The program's comprehensive approach, focusing on patient assessment, exercise training and education, reflects a patient-centric model aimed at enhancing QoL. However, continued efforts to address barriers, improve awareness, and enhance accessibility, will be key to ensure sustained success of this program.

Acknowledgement

The authors would like to express their gratitude to BioQuest Solutions for their editorial assistance. We extend our special thanks to Dr Manisha Ailasinghani and Dr Sayli Rane for their invaluable support in providing the patient data points.

Conflict of Interest

Sujeet Rajan is consultant of Cipla Ltd. Monali Mehta, Rushika Shah, Meena Lopez, Jaideep Gogtay are employees of Cipla Ltd. Rest of the authors do not report any conflicts of interest to disclose.

Funding Support

Financial support for manuscript development and publication was provided by Cipla Ltd.

Author Contributions

All authors have contributed equally to the conception, design, drafting, review and finalization of manuscript.

Bibliography

1. Chen X., *et al*. "Global, regional, and national burden of chronic respiratory diseases and associated risk factors, 1990-2019: Results from the Global Burden of Disease Study 2019". *Frontiers in Medicine* 10 (2023): 1066804.
2. GBD 2019 Chronic Respiratory Diseases Collaborators. "Global burden of chronic respiratory diseases and risk factors, 1990-2019: An update from the Global Burden of Disease Study 2019". *EClinicalMedicine* 59 (2023): 101936.
3. Priya N., *et al.* "Effect of homebased pulmonary rehabilitation on healthrelated quality of life, lung function, exercise tolerance, and dyspnea in chronic obstructive pulmonary disorder patients in a tertiary care center in South India". *Lung India* 38.3 (2021): 211-215.
4. Sharma BB and Singh V. "Pulmonary rehabilitation: An overview". *Lung India* 28.4 (2011): 276-284.
5. Sebio Sebio-García R. "Pulmonary rehabilitation: time for an upgrade". *Journal of Clinical Medicine* 9.9 (2020): 2742.
6. Borbeau J and Bhatt SP. *American Journal of Respiratory and Critical Care Medicine* 207 (2023): 7.
7. McCarthy B., *et al.* "Pulmonary rehabilitation for chronic obstructive pulmonary disease". *Cochrane Database of Systematic Reviews* 2 (2015): CD003793.
8. Vivek K., *et al.* "Pulmonary rehabilitation in patients with interstitial lung diseases in an outpatient setting: A randomised controlled trial". *The Indian Journal of Chest Diseases and Allied Sciences* 59 (2017): 75-80.
9. Bairapareddy KC., *et al*. "Telerehabilitation for chronic obstructive pulmonary disease Patients: An underrecognized management in tertiary care". *Indian Journal of Palliative Care* 24.4 (2018): 529-533.
10. Dong J., *et al*. "Efficacy of pulmonary rehabilitation in improving the quality of life for patients with chronic obstructive pulmonary disease: evidence based on nineteen randomized controlled trials". *International Journal of Surgery* 73 (2020): 78-86.

11. Ryrsø CK., *et al.* "Lower mortality after early supervised pulmonary rehabilitation following COPD-exacerbations: a systematic review and meta-analysis". *BMC Pulmonary Medicine* 18.1 (2018): 154.

12. Aboumatar H., *et al.* "Effect of a program combining transitional care and long-term self-management support on outcomes of hospitalized patients with chronic obstructive pulmonary disease: a randomized clinical trial". *Journal of the American Medical Association* 320.22 (2018): 2335-2343.

13. Ryrsø CK., *et al*. "Lower mortality after early supervised pulmonary rehabilitation following COPD-exacerbations: a systematic review and meta-analysis". *BMC Pulmonary Medicine* 18.1 (2018)**:** 154.

14. Downman., *et al*. "Pulmonary rehabilitation for interstitial lung disease". *Cochrane Database of Systematic Reviews* 2 (2021): CD006322.

15. Osadnik Gleeson C., *et al*. "Pulmonary rehabilitation versus usual care for adults with asthma". *Cochrane Database of Systematic Reviews* 8.8 (2022): CD013485.

16. Shenoy MA and Paul V. "Pulmonary Rehabilitation". In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing (2023).

17. Raghu G., *et al.* "Idiopathic pulmonary fibrosis (an update) and progressive pulmonary fibrosis in adults: an official ATS/ERS/JRS/ALAT clinical practice guideline". *American Journal of Respiratory and Critical Care Medicine* 205.9 (2022): e18-e47.

18. Global initiative for Asthma management, 2024.

19. Holland AE., *et al*. "Defining modern pulmonary rehabilitation. An official American Thoracic Society workshop report". *Annals of the American Thoracic Society* 18.5 (2021): e12-e29.

20. Rochester CL., *et al*. "Pulmonary rehabilitation for adults with chronic respiratory disease: An Official American Thoracic Society Clinical Practice Guideline". *American Journal of Respiratory and Critical Care Medicine* 208.4 (2023): e7-e26.

21. Newman ANL., *et al*. "The effects of pulmonary rehabilitation on inflammatory biomarkers in patients with chronic obstructive pulmonary disease: Protocol for a systematic review and meta-analysis". *PLoS One* 18.6 (2023): e0287549.

22. Bourbeau J and Bhatt SP. "Constructing modern pulmonary rehabilitation: another brick from the wall". *American Journal of Respiratory and Critical Care Medicine* 207.7 (2023): 804-805.

23. Bhadra R., *et al*. "Pulmonary rehabilitation in the management of chronic obstructive pulmonary disease among Asian Indians-current status and moving forward, COPD". *Journal of Chronic Obstructive Pulmonary Disease* 18.4 (2021): 476-481.

24. Augustine A., *et al*. "Barriers to pulmonary rehabilitation - A narrative review and perspectives from a few stakeholders". *Lung India* 38.1 (2021): 59-63.

Volume 14 Issue 10 October 2025