

## JAMA Clinical Guidelines Synopsis

## Pulmonary Rehabilitation for Adults With Chronic Respiratory Disease

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**GUIDELINE TITLE** Pulmonary Rehabilitation for Adults With Chronic Respiratory Disease**DEVELOPER AND FUNDING SOURCE** American Thoracic Society**RELEASE DATE** August 15, 2023**TARGET POPULATION** Adult patients with chronic respiratory disease, defined as chronic obstructive pulmonary disease (COPD), interstitial lung disease (ILD), or pulmonary hypertension (PH)**MAJOR RECOMMENDATIONS**

- For adults with COPD, pulmonary rehabilitation is recommended for stable disease (strong recommendation; moderate quality of evidence [QOE]) or after a hospitalization for a COPD exacerbation (strong recommendation; moderate QOE).
- For adults with ILD, pulmonary rehabilitation is recommended (strong recommendation; moderate QOE).
- Pulmonary rehabilitation is suggested for adults with PH (conditional recommendation; low QOE).
- For adults with stable chronic respiratory disease, rehabilitation can be facilitated by telehealth as an alternative to in-person rehabilitation (strong recommendation; moderate QOE).

**Summary of the Clinical Problem**

Chronic respiratory diseases affect more than 545 million people worldwide, reduce health-related quality of life (HRQoL) and functional status, increase health care costs, and are a leading cause of death.<sup>1</sup> Pul-



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monary rehabilitation is a multidisciplinary program of variable duration that is individualized to patients and includes aerobic and resistance exercise training, education (eg, video on inhaler use), and behavior change such as self-management strategies.<sup>1</sup>

Yet pulmonary rehabilitation is both underused and underresourced; less than 5% of people with COPD who may benefit receive it.<sup>1</sup> These guidelines report the value of pulmonary rehabilitation for adults with 3 types of chronic respiratory disease (COPD, ILD, and PH) and highlight telerehabilitation, an alternative model of pulmonary rehabilitation delivery.

**Characteristics of the Guideline Source**

The guidelines were funded by the American Thoracic Society and developed by a panel of physicians, physical therapists, nurses, a respiratory therapist, an exercise physiologist, and a patient. The GRADE approach was used to assess QOE and recommendation strength (eTable in the [Supplement](#)).

**Evidence Base**

The guidelines focus on the effectiveness of pulmonary rehabilitation to improve 6-minute walk distance (6MWD), decrease dyspnea, improve HRQoL, and prolong survival. The 6MWD is a measure of exercise performance and functional capacity, with 30 m suggested as a minimum clinically important difference.<sup>2</sup> Shared decision-making is optimal, particularly for conditional recommendations where evidence is less strong and a substantial number of patients may not prefer the choice.

For COPD, pulmonary rehabilitation was associated with significant benefits in dyspnea and HRQoL, as well as 6MWD, in a meta-analysis of 38 randomized clinical trials (RCTs) with 1879 participants (mean difference [MD], 43.9 m; 95% CI, 32.6-55.2 m).<sup>3</sup> Program duration varied from 4 weeks to 1 year (most lasted 8-12 weeks) and included those with mild to severe lung function impairment (forced expiratory volume in 1 second, 26%-75% predicted).<sup>1</sup> Regular postprogram exercise is encouraged, but the role of continuing formal maintenance pulmonary rehabilitation is unclear.

In a meta-analysis of 12 RCTs with 1309 participants, pulmonary rehabilitation within 3 weeks of a hospitalization for acute COPD exacerbation was associated with reduced readmission (odds ratio [OR], 0.48; 95% CI, 0.30-0.77), improved 6MWD (12 RCTs, 943 patients; MD, 57.5 m; 95% CI, 28.7-86.3 m), and improved dyspnea and HRQoL vs control groups (usual care or initiation of pulmonary rehabilitation >3 weeks after discharge), without increase in adverse events.<sup>1</sup> In a retrospective study of 197 376 Medicare beneficiaries hospitalized for a COPD exacerbation (mean age, 76.9 years; 41% male), initiation of pulmonary rehabilitation within 90 days of discharge was associated with fewer deaths at 1 year (absolute risk difference, -6.7%; 95% CI, -7.9% to -5.6%) vs patients who had delayed or no pulmonary rehabilitation.<sup>4</sup> Based on Medicare data with costs converted to 2020 US dollars, a recent microsimulation model of patients who participated in pulmonary rehabilitation after a COPD hospitalization reported net cost savings of \$5721 per patient (95% prediction interval, \$3307-\$8388) and improved quality-adjusted life expectancy (gain of 0.53 [95% prediction interval, 0.43-0.63] years) using a societal perspective analysis.<sup>5</sup>

In a meta-analysis of 13 RCTs with 585 participants, pulmonary rehabilitation for patients with various etiologies of ILD was associated with increased 6MWD (MD, 40.1 m; 95% CI, 32.7-47.4 m), HRQoL, and dyspnea vs controls.<sup>6</sup> Improvements in 6MWD were maintained at 6 to 12 months overall but not in the subgroup with idiopathic pulmonary fibrosis.<sup>6</sup> Although evidence is limited, studies to date have not shown reductions in hospitalization (1 RCT, 32 participants)<sup>6</sup> or death (4 RCTs, 291 participants) for patients with ILD treated with pulmonary rehabilitation.<sup>7</sup>

For PH, in a meta-analysis of 11 RCTs (394 participants, most with New York Heart Association class II/III symptoms and pulmonary arterial hypertension or chronic thromboembolism-associated PH), pulmonary rehabilitation was associated with improved 6MWD (MD, 48.5 m; 95% CI, 33.5-63.6 m) and HRQoL vs usual care.<sup>8</sup> Effects on

dyspnea and the optimal duration of pulmonary rehabilitation in people with PH remain unclear.

Pulmonary rehabilitation participation is often limited by program availability and barriers such as travel, transport, and desire for social distancing. In a meta-analysis of 3 RCTs (516 patients) of 8- to 10-week programs, telerehabilitation was associated with higher program completion, defined as attending at least 60% to 70% of sessions (93% vs 70%; odds ratio, 5.3; 95% CI, 2.1-9.2) and lower likelihood of hospitalization (odds ratio, 0.65; 95% CI, 0.43-0.99) compared with center-based rehabilitation.<sup>1</sup>

No difference was observed in magnitude of 6MWD improvement between telerehabilitation and center-based pulmonary rehabilitation at 6 months (MD, 0.06 m; 95% CI, -1 to 11 m; 4 RCTs, 556 participants) or at 12 months (MD, 1.4 m; 95% CI, -12.6 to 15.4 m; 2 RCTs, 308 participants), and similar improvements occurred in HRQoL and dyspnea.<sup>1</sup> Notably, studies of telerehabilitation almost exclusively included patients with COPD and varied by telehealth modality (telephone, video call), setting (home or local facility), supervision (in person, in real time, none), and format (group, individual). The guidelines conditionally recommend telerehabilitation as an alternative option but not as a replacement for center-based pulmonary rehabilitation.

### Benefits and Harms

Overall, the potential for harm from pulmonary rehabilitation is low. No studies evaluated adverse events as a primary outcome; patients with COPD experienced no deaths or serious cardiovascular events related to pulmonary rehabilitation across 42 RCTs (2150 participants).<sup>9</sup> Surveyed patients with PH have reported experiencing adverse events during exercise training, including chest pain, arrhythmia, or dizziness. However, in a separate analysis of 10 RCTs in 391 patients with PH, there was no difference in adverse events (composite outcome of mortality, disease progression, and symptoms precluding training, including illness, syncope, or presyncope) between pulmonary rehabilitation and controls.<sup>8</sup>

### Discussion

While the 2011 American Thoracic Society clinical practice guideline recommended pulmonary rehabilitation for individuals with COPD and a forced expiratory volume of 50% or less, current evidence shows that pulmonary rehabilitation improves exercise capacity and HRQoL at all levels of pulmonary impairment for patients with COPD, ILD, and, to a lesser extent, PH. These guidelines are the first to address telerehabilitation compared with center-based programs and conclude that telerehabilitation can be a reasonable alternative for some individuals, with comparable expected gains in 6MWD, HRQoL, and dyspnea.

### Areas in Need of Future Study

Pulmonary rehabilitation is not a standardized intervention, highlighting opportunities for further investigation of optimal elements and duration and the role of telerehabilitation, both following a COPD exacerbation requiring hospitalization (NCT05119556) and in non-COPD chronic respiratory disease.

Exercise-induced oxygen desaturation is common in chronic respiratory diseases. While pulmonary rehabilitation experts typically provide supplemental oxygen to maintain adequate saturation during training, its benefit is unclear. In 1 RCT of 738 patients with stable COPD and resting or exercise-induced moderate desaturation, long-term supplemental oxygen did not significantly improve 6MWD or time to hospitalization or death.<sup>10</sup> However, moderate resting hypoxemia is associated with higher mortality in patients with ILD vs COPD, suggesting that supplemental oxygen need may differ by disease; an upcoming multicenter RCT will assess the effect of supplemental oxygen on exercise capacity, HRQoL, and physical activity in patients with ILD (NCT03737409). Important areas for future study include tailoring pulmonary rehabilitation programs to individuals by identifying validated biomarkers associated with a clinically relevant response to pulmonary rehabilitation, whether pulmonary rehabilitation provides benefits in daily activity, and its cost-effectiveness with wider implementation in various types and severities of chronic respiratory disease.

### ARTICLE INFORMATION

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