



## Medical Policy

# Outpatient Pulmonary Rehabilitation

### Table of Contents

- [Policy: Commercial](#)
- [Policy: Medicare](#)
- [Authorization Information](#)
- [Coding Information](#)
- [Description](#)
- [Policy History](#)
- [Information Pertaining to All Policies](#)
- [References](#)

### Policy Number: 136

BCBSA Reference Number: 8.03.05 (For Plan internal use only)

### Related Policies

- Lung and Lobar Lung Transplant, #[015](#)
- Heart/ Lung Transplant, #[269](#)
- Lung Volume Reduction Surgery for Severe Emphysema, #[364](#)

### Policy

#### **Commercial Members: Managed Care (HMO and POS), PPO, and Indemnity Medicare HMO Blue<sup>SM</sup> and Medicare PPO Blue<sup>SM</sup> Members**

A single course of pulmonary rehabilitation in the outpatient ambulatory care setting may be **MEDICALLY NECESSARY** for treatment of chronic pulmonary disease for individuals with moderate to severe disease who are experiencing disabling symptoms and significantly diminished quality of life despite optimal medical management.

A single course of pulmonary rehabilitation may be **MEDICALLY NECESSARY** in an outpatient ambulatory care setting as a preoperative conditioning component for those considered appropriate candidates for lung volume reduction surgery or for lung transplantation.

Pulmonary rehabilitation programs are considered **MEDICALLY NECESSARY** following lung transplantation.

Pulmonary rehabilitation programs are considered **INVESTIGATIONAL** following other types of lung surgery, included but not limited to lung volume reduction surgery and surgical resection of lung cancer.

Multiple courses of pulmonary rehabilitation are considered **INVESTIGATIONAL**, either as maintenance therapy in individuals who initially respond, or in individuals who fail to respond, or whose response to an initial rehabilitation program has diminished over time.

Home-based pulmonary rehabilitation programs are **INVESTIGATIONAL**.

Pulmonary rehabilitation programs are **INVESTIGATIONAL** in all other situations.

Pulmonary rehabilitation in the outpatient ambulatory setting is **NOT MEDICALLY NECESSARY** for patients with severe psychiatric disturbance (e.g., dementia, organic brain syndrome), and significant or unstable medical conditions (e.g., congestive heart failure, acute cor pulmonale, substance abuse, significant liver dysfunction, metastatic cancer, disabling stroke).

## Prior Authorization Information

### Inpatient

- For services described in this policy, precertification/preauthorization **IS REQUIRED** for all products if the procedure is performed **inpatient**.

### Outpatient

- For services described in this policy, see below for products where prior authorization **might be required** if the procedure is performed **outpatient**.

	Outpatient
Commercial Managed Care (HMO and POS)	Prior authorization is <b>not required</b> .
Commercial PPO and Indemnity	Prior authorization is <b>not required</b> .
Medicare HMO Blue <sup>SM</sup>	Prior authorization is <b>not required</b> .
Medicare PPO Blue <sup>SM</sup>	Prior authorization is <b>not required</b> .

## CPT Codes / HCPCS Codes / ICD Codes

*Inclusion or exclusion of a code does not constitute or imply member coverage or provider reimbursement. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage as it applies to an individual member.*

*Providers should report all services using the most up-to-date industry-standard procedure, revenue, and diagnosis codes, including modifiers where applicable.*

*The following codes are included below for informational purposes only; this is not an all-inclusive list.*

**The above medical necessity criteria MUST be met for the following codes to be covered for Commercial Members: Managed Care (HMO and POS), PPO, Indemnity, Medicare HMO Blue and Medicare PPO Blue:**

### CPT Codes

CPT codes:	Code Description
94625	Physician or other qualified health care professional services for outpatient pulmonary rehabilitation; without continuous oximetry monitoring (per session)
94626	Physician or other qualified health care professional services for outpatient pulmonary rehabilitation; with continuous oximetry monitoring (per session)

### HCPCS Codes

HCPCS codes:	Code Description
G0237	Therapeutic procedures to increase strength or endurance of respiratory muscles, face-to-face, one-on-one, each 15 minutes (includes monitoring)
G0238	Therapeutic procedures to improve respiratory function, other than described by G0237, one-on-one, face-to-face, per 15 minutes (includes monitoring)
G0239	Therapeutic procedures to improve respiratory function or increase strength or endurance of respiratory muscles, two or more individuals (includes monitoring)
G0302	Preoperative pulmonary surgery services for preparation for LVRS, complete course of services, to include a minimum of 16 days of services
G0303	Preoperative pulmonary surgery services for preparation for LVRS, 10 to 15 days of services

G0304	Preoperative pulmonary surgery services for preparation for LVRS, 1 to 9 days of services
G0305	Post discharge pulmonary surgery services after LVRS, minimum of 6 days of services
G0424	Pulmonary rehabilitation, including exercise (includes monitoring), one hour, per session, up to two sessions per day
S9473	Pulmonary rehabilitation program, nonphysician provider, per diem

The following ICD Diagnosis Codes are considered medically necessary when submitted with the HCPCS codes above if medical necessity criteria are met:

### ICD-10 Diagnosis Codes

ICD-10-CM Diagnosis codes:	Code Description
D38.1	Neoplasm of uncertain behavior of trachea, bronchus and lung
D84.1	Defects in the complement system
D86.0	Sarcoidosis of lung
D86.2	Sarcoidosis of lung with sarcoidosis of lymph nodes
D86.87	Sarcoid myositis
D86.9	Sarcoidosis, unspecified
E84.0	Cystic fibrosis with pulmonary manifestations
E84.9	Cystic fibrosis, unspecified
I26.01	Septic pulmonary embolism with acute cor pulmonale
I26.02	Saddle embolus of pulmonary artery with acute cor pulmonale
I26.03	Cement embolism of pulmonary artery with acute cor pulmonale
I26.04	Fat embolism of pulmonary artery with acute cor pulmonale
I26.09	Other pulmonary embolism with acute cor pulmonale
I26.90	Septic pulmonary embolism without acute cor pulmonale
I26.92	Saddle embolus of pulmonary artery without acute cor pulmonale
I26.95	Cement embolism of pulmonary artery without acute cor pulmonale
I26.96	Fat embolism of pulmonary artery without acute cor pulmonale
I26.99	Other pulmonary embolism without acute cor pulmonale
I27.0	Primary pulmonary hypertension
J22	Unspecified acute lower respiratory infection
J41.0	Simple chronic bronchitis
J41.1	Mucopurulent chronic bronchitis
J41.8	Mixed simple and mucopurulent chronic bronchitis
J42	Unspecified chronic bronchitis
J43.0	Unilateral pulmonary emphysema [MacLeod's syndrome]
J43.1	Panlobular emphysema
J43.2	Centrilobular emphysema
J43.8	Other emphysema
J43.9	Emphysema, unspecified
J44.0	Chronic obstructive pulmonary disease with acute lower respiratory infection
J44.1	Chronic obstructive pulmonary disease with (acute) exacerbation
J44.9	Chronic obstructive pulmonary disease, unspecified
J47.0	Bronchiectasis with acute lower respiratory infection
J47.1	Bronchiectasis with (acute) exacerbation
J47.9	Bronchiectasis, uncomplicated
J68.4	Chronic respiratory conditions due to chemicals, gases, fumes and vapors
J70.1	Chronic and other pulmonary manifestations due to radiation

J70.2	Acute drug-induced interstitial lung disorders
J70.3	Chronic drug-induced interstitial lung disorders
J70.4	Drug-induced interstitial lung disorders, unspecified
J70.5	Respiratory conditions due to smoke inhalation
J70.8	Respiratory conditions due to other specified external agents
J70.9	Respiratory conditions due to unspecified external agent
J84.10	Pulmonary fibrosis, unspecified
J84.111	Idiopathic interstitial pneumonia, not otherwise specified
J84.112	Idiopathic pulmonary fibrosis
J84.113	Idiopathic non-specific interstitial pneumonitis
J84.114	Acute interstitial pneumonitis
J84.115	Respiratory bronchiolitis interstitial lung disease
J84.116	Cryptogenic organizing pneumonia
J84.117	Desquamative interstitial pneumonia
J84.170	Interstitial lung disease with progressive fibrotic phenotype in diseases classified elsewhere
J84.178	Other interstitial pulmonary diseases with fibrosis in diseases classified elsewhere
J84.2	Lymphoid interstitial pneumonia
J84.89	Other specified interstitial pulmonary diseases
J95.3	Chronic pulmonary insufficiency following surgery
J95.822	Acute and chronic postprocedural respiratory failure
J96.10	Chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.11	Chronic respiratory failure with hypoxia
J96.12	Chronic respiratory failure with hypercapnia
J96.20	Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.21	Acute and chronic respiratory failure with hypoxia
J96.22	Acute and chronic respiratory failure with hypercapnia
J98.2	Interstitial emphysema
J98.3	Compensatory emphysema
J98.4	Other disorders of lung
J98.8	Other specified respiratory disorders
J99	Respiratory disorders in diseases classified elsewhere
M32.13	Lung involvement in systemic lupus erythematosus
M33.01	Juvenile dermatomyositis with respiratory involvement
M33.11	Other dermatomyositis with respiratory involvement
M33.21	Polymyositis with respiratory involvement
M33.91	Dermatomyositis, unspecified with respiratory involvement
M34.0	Progressive systemic sclerosis
M34.1	CR(E)ST syndrome
M34.2	Systemic sclerosis induced by drug and chemical
M34.81	Systemic sclerosis with lung involvement
M34.82	Systemic sclerosis with myopathy
M34.83	Systemic sclerosis with polyneuropathy
M34.89	Other systemic sclerosis
M34.9	Systemic sclerosis, unspecified
M35.02	Sicca syndrome with lung involvement
P27.0	Wilson-Mikity syndrome
P27.1	Bronchopulmonary dysplasia originating in the perinatal period
P27.8	Other chronic respiratory diseases originating in the perinatal period
P27.9	Unspecified chronic respiratory disease originating in the perinatal period
Q21.0	Ventricular septal defect

Q33.4	Congenital bronchiectasis
T82.817A	Embolism due to cardiac prosthetic devices, implants and grafts, initial encounter
T82.818A	Embolism of vascular prosthetic devices, implants and grafts, initial encounter
Z48.24	Encounter For Aftercare Following Lung Transplant
Z94.2	Lung Transplant Status

## Description

### Pulmonary Rehabilitation

In 2013, the American Thoracic Society and the European Respiratory Society defined pulmonary rehabilitation as a “comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to exercise training, education, and behavior change.”<sup>1</sup> Pulmonary rehabilitation programs are intended to improve patient functioning and quality of life. Most research has focused on patients with chronic obstructive pulmonary disease, although there has been some interest in patients with asthma, cystic fibrosis, or bronchiectasis.

## Summary

Pulmonary rehabilitation is a multidisciplinary approach to reducing symptoms and improving quality of life in patients with compromised lung function. Pulmonary rehabilitation programs generally include a patient assessment followed by therapeutic interventions including exercise training, education, and behavior change.

## Summary of Evidence

### Chronic Pulmonary Disease Rehabilitation

For individuals with moderate-to-severe chronic obstructive pulmonary disease (COPD) who receive a single course of outpatient pulmonary rehabilitation, the evidence includes numerous systematic reviews of randomized controlled trials (RCTs). Relevant outcomes are symptoms, functional outcomes, and quality of life. The published studies found improved outcomes (ie, functional ability, quality of life) in patients with moderate-to-severe COPD who underwent a comprehensive pulmonary rehabilitation program in the outpatient setting. Among the many randomized trials, the structure of the pulmonary rehabilitation programs varied, so it is not possible to provide guidance on the optimal components or duration of a pulmonary rehabilitation program. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with idiopathic pulmonary fibrosis who receive a single course of outpatient pulmonary rehabilitation, the evidence includes 3 systematic reviews of RCTs. Relevant outcomes are symptoms, functional outcomes, and quality of life. Significant differences favoring pulmonary rehabilitation over usual care were seen in 6-minute walk distance (6MWD) in the short term. Starting at 3 months post-intervention, outcomes did not differ between groups. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals with bronchiectasis who receive a single course of outpatient pulmonary rehabilitation, the evidence includes a systematic review of RCTs and an RCT published after the systematic review. Relevant outcomes are symptoms, functional outcomes, and quality of life. The systematic review included 4 RCTs on pulmonary rehabilitation for patients with bronchiectasis found that some, but not all, outcomes, improved more with pulmonary rehabilitation than with nonexercise control conditions immediately after the intervention. An RCT published after the systematic review found that 6MWT and quality of life scores increased with pulmonary rehabilitation compared to a non-exercise control group in the short-term. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Although most published evidence on outpatient pulmonary rehabilitation for chronic pulmonary diseases assesses COPD, observational studies have reported on outcomes from pulmonary rehabilitation for other chronic pulmonary diseases. Clinical guidelines from pulmonary organizations have supported the use of outpatient pulmonary rehabilitation for individuals who are experiencing disabling symptoms and

have significantly diminished quality of life despite optimal medical management. Therefore, outpatient pulmonary rehabilitation may be considered medically necessary for this population.

### **Preparation for Lung Surgery**

For individuals with scheduled lung surgery for volume reduction, transplantation, or resection who receive a single course of preoperative outpatient pulmonary rehabilitation, the evidence includes RCTs and observational studies. Relevant outcomes are symptoms, functional outcomes, and quality of life. There is a lack of large RCTs comparing pulmonary rehabilitation with no pulmonary rehabilitation for preoperative candidates undergoing lung volume reduction surgery, lung transplantation, or lung cancer resection. Moreover, the available studies have evaluated exercise programs, but not necessarily comprehensive pulmonary rehabilitation programs. Also, the few small RCTs and observational studies have only reported short-term outcomes and there was inconsistent evidence of benefit on these outcomes. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Findings from the National Emphysema Treatment Trial have suggested that pulmonary rehabilitation is an appropriate component of care for patients with COPD before undergoing lung volume reduction surgery. Also, pulmonary rehabilitation is considered the standard of care in individuals undergoing lung transplantation to maximize preoperative pulmonary status. Thus, pulmonary rehabilitation may be considered medically necessary for individuals considered appropriate candidates for lung volume reduction surgery or lung transplantation.

### **Pulmonary Rehabilitation After Lung Surgery**

For individuals who have had lung volume reduction surgery who receive a single course of outpatient pulmonary rehabilitation, the evidence includes a case series. Relevant outcomes are symptoms, functional outcomes, and quality of life. No published RCTs were identified. The case series evaluated a comprehensive pulmonary rehabilitation program after lung volume reduction surgery in 49 patients who had not received preoperative pulmonary rehabilitation. Health-related quality of life was higher at 3 to 6 months and 12 to 18 months post-surgery. The series did not provide data on patients who underwent lung volume reduction surgery and did not have postoperative pulmonary rehabilitation, or patients who had preoperative pulmonary rehabilitation. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have had lung transplantation who receive a single course of outpatient pulmonary rehabilitation, the evidence includes RCTs, a systematic review, and a case series. Relevant outcomes are symptoms, functional outcomes, and quality of life. Neither of the 2 RCTs identified in a 2010 systematic review reported on functional outcomes, but uncontrolled studies have reported improvements in functional outcomes. An RCT, published after the systematic review, found that patients who had a postsurgical exercise intervention walked more 1-year postdischarge than before and had a significantly greater 6MWD. Findings on other outcomes were mixed. The most recent RCT (2017) did not identify a difference in outcomes with longer duration of pulmonary rehabilitation. Case series data also support improvements in 6MWD after postoperative pulmonary rehabilitation. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have had lung cancer resection who receive a single course of outpatient pulmonary rehabilitation, the evidence includes 2 RCTs. Relevant outcomes are symptoms, functional outcomes, and quality of life. One small RCT evaluated a comprehensive pulmonary rehabilitation program in patients who underwent thoracotomy for lung cancer. The trial was terminated early, had a high dropout rate, and reported mixed findings. An exercise-only intervention in patients who had lung cancer surgery had mixed findings and did not evaluate functional outcomes. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

### **Repeat or Maintenance Pulmonary Rehabilitation**

For individuals who have had an initial course of pulmonary rehabilitation who receive repeat or maintenance outpatient pulmonary rehabilitation, the evidence includes a limited number of RCTs. Relevant outcomes are symptoms, functional outcomes, and quality of life. One small

RCT evaluating repeat pulmonary rehabilitation programs had methodologic limitations and did not report inpatient and outpatient outcomes separately; it also lasted only 3 weeks. In the evaluation of maintenance pulmonary rehabilitation programs, evidence was mixed. Due to the paucity of RCTs, methodologic limitations of available trials, and lack of clinically significant findings, the evidence to determine the effect of maintenance pulmonary rehabilitation programs on health outcomes in patients with COPD is insufficient. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

### Home-Based Pulmonary Rehabilitation

For individuals who have an indication for outpatient pulmonary rehabilitation who receive a single course of home-based pulmonary rehabilitation, the evidence includes RCTs and systematic reviews. Relevant outcomes are symptoms, functional outcomes, and quality of life. Most studies of home-based pulmonary rehabilitation have compared outcomes with standard care. Very few have compared home-based pulmonary rehabilitation with the hospital- or clinic-based pulmonary rehabilitation, and the available studies are mostly of low quality. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

### Policy History

Date	Action
12/2024	Clarified coding information.
10/2024	Clarified coding information.
5/2023	Annual policy review. Minor editorial refinements to policy statements; intent unchanged.
4/2022	Annual policy review. Description, summary, and references updated. Policy statements unchanged.
4/2021	Annual policy review. Policy statements unchanged.
1/2021	Medicare information removed. See MP #132 Medicare Advantage Management for local coverage determination and national coverage determination reference.
10/2020	Clarified coding information
5/2020	Annual policy review. Description, summary and references updated. Policy statements unchanged.
4/2019	Annual policy review. Description, summary and references updated. Policy statements unchanged.
5/2018	Annual policy review. Policy statements reordered to align with the summary. Prior Authorization Information reformatted. Policy statements unchanged.
2/2018	Clarified coding information.
10/2017	Clarified coding information.
4/2016	New references added from Annual policy review.
7/2015	Annual policy review. In summary, "lung resection surgery" corrected to "lung volume reduction surgery."
6/2015	Annual policy review. New medically necessary and investigational indications described. Effective 6/1/2015.
11/2014	Clarified coding information.
6/2014	Annual policy review. New investigational indications described. Effective 6/1/2014.
5/2014	Updated Coding section with ICD10 procedure and diagnosis codes/. Effective 10/2015.
4/2014	Coding information clarified.
2/2013	New references from Annual policy review.
11/2011-4/2012	Medical policy ICD 10 remediation: Formatting, editing and coding updates. No changes to policy statements.
4/2011	Reviewed - Medical Policy Group – Cardiology and Pulmonology. No changes to policy statements.
3/2010	Reviewed - Medical Policy Group - Pulmonology, Allergy/Asthma/Immunology, ENT and Otolaryngology. No changes to policy statements.

11/1/2009	Medical Policy 136 effective 11/1/09 describing covered and non-covered indications.
6/2007	Annual policy review. No changes to policy statement.

## Information Pertaining to All Blue Cross Blue Shield Medical Policies

Click on any of the following terms to access the relevant information:

[Medical Policy Terms of Use](#)

[Managed Care Guidelines](#)

[Indemnity/PPO Guidelines](#)

[Clinical Exception Process](#)

[Medical Technology Assessment Guidelines](#)

## References

1. Spruit MA, Singh SJ, Garvey C, et al. An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med.* Oct 15 2013; 188(8): e13-64. PMID 24127811
2. Puhan MA, Gimeno-Santos E, Cates CJ, et al. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev.* Dec 08 2016; 12(12): CD005305. PMID 27930803
3. McCarthy B, Casey D, Devane D, et al. Pulmonary rehabilitation for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev.* Feb 23 2015; (2): CD003793. PMID 25705944
4. Rugbjerg M, Iepsen UW, Jørgensen KJ, et al. Effectiveness of pulmonary rehabilitation in COPD with mild symptoms: a systematic review with meta-analyses. *Int J Chron Obstruct Pulmon Dis.* 2015; 10: 791-801. PMID 25945044
5. Román M, Larraz C, Gómez A, et al. Efficacy of pulmonary rehabilitation in patients with moderate chronic obstructive pulmonary disease: a randomized controlled trial. *BMC Fam Pract.* Feb 11 2013; 14: 21. PMID 23399113
6. Gottlieb V, Lyngsø AM, Nybo B, et al. Pulmonary rehabilitation for moderate COPD (GOLD 2)--does it have an effect?. *COPD.* Oct 2011; 8(5): 380-6. PMID 21936683
7. Liu X-D, Jin H-Z, Ng B-P, et al. Therapeutic effects of qigong in patients with COPD: a randomized controlled trial. *Hong Kong J Occup Ther.* Aug 9 2012;22(1):38-46. <https://journals.sagepub.com/doi/pdf/10.1016/j.hkjot.2012.06.002>. Accessed February 1, 2023.
8. van Wetering CR, Hoogendoorn M, Mol SJ, et al. Short- and long-term efficacy of a community-based COPD management programme in less advanced COPD: a randomised controlled trial. *Thorax.* Jan 2010; 65(1): 7-13. PMID 19703824
9. Dowman L, Hill CJ, May A, et al. Pulmonary rehabilitation for interstitial lung disease. *Cochrane Database Syst Rev.* Feb 01 2021; 2(2): CD006322. PMID 34559419
10. Yu X, Li X, Wang L, et al. Pulmonary Rehabilitation for Exercise Tolerance and Quality of Life in IPF Patients: A Systematic Review and Meta-Analysis. *Biomed Res Int.* 2019; 2019: 8498603. PMID 31016200
11. Cheng L, Tan B, Yin Y, et al. Short- and long-term effects of pulmonary rehabilitation for idiopathic pulmonary fibrosis: a systematic review and meta-analysis. *Clin Rehabil.* Oct 2018; 32(10): 1299-1307. PMID 29843523
12. Lee AL, Hill CJ, McDonald CF, et al. Pulmonary Rehabilitation in Individuals With Non-Cystic Fibrosis Bronchiectasis: A Systematic Review. *Arch Phys Med Rehabil.* Apr 2017; 98(4): 774-782.e1. PMID 27320420
13. Araújo AS, Figueiredo MR, Lomonaco I, et al. Effects of Pulmonary Rehabilitation on Systemic Inflammation and Exercise Capacity in Bronchiectasis: A Randomized Controlled Trial. *Lung.* Jun 2022; 200(3): 409-417. PMID 35543710
14. Fishman A, Martinez F, Naunheim K, et al. A randomized trial comparing lung-volume-reduction surgery with medical therapy for severe emphysema. *N Engl J Med.* May 22 2003; 348(21): 2059-73. PMID 12759479
15. Hoffman M, Chaves G, Ribeiro-Samora GA, et al. Effects of pulmonary rehabilitation in lung transplant candidates: a systematic review. *BMJ Open.* Feb 03 2017; 7(2): e013445. PMID 28159852



16. Morano MT, Araújo AS, Nascimento FB, et al. Preoperative pulmonary rehabilitation versus chest physical therapy in patients undergoing lung cancer resection: a pilot randomized controlled trial. *Arch Phys Med Rehabil.* Jan 2013; 94(1): 53-8. PMID 22926460
17. Benzo R, Wigle D, Novotny P, et al. Preoperative pulmonary rehabilitation before lung cancer resection: results from two randomized studies. *Lung Cancer.* Dec 2011; 74(3): 441-5. PMID 21663994
18. Bradley A, Marshall A, Stonehewer L, et al. Pulmonary rehabilitation programme for patients undergoing curative lung cancer surgery. *Eur J Cardiothorac Surg.* Oct 2013; 44(4): e266-71. PMID 23959742
19. Beling J. Improved health-related quality of life after lung volume reduction surgery and pulmonary rehabilitation. *Cardiopulm Phys Ther J.* Sep 2009; 20(3): 16-22. PMID 20467519
20. Wickerson L, Mathur S, Brooks D. Exercise training after lung transplantation: a systematic review. *J Heart Lung Transplant.* May 2010; 29(5): 497-503. PMID 20133160
21. Langer D, Burtin C, Schepers L, et al. Exercise training after lung transplantation improves participation in daily activity: a randomized controlled trial. *Am J Transplant.* Jun 2012; 12(6): 1584-92. PMID 22390625
22. Fuller LM, Button B, Tarrant B, et al. Longer Versus Shorter Duration of Supervised Rehabilitation After Lung Transplantation: A Randomized Trial. *Arch Phys Med Rehabil.* Feb 2017; 98(2): 220-226.e3. PMID 27697429
23. Munro PE, Holland AE, Bailey M, et al. Pulmonary rehabilitation following lung transplantation. *Transplant Proc.* 2009; 41(1): 292-5. PMID 19249538
24. Stigt JA, Uil SM, van Riesen SJ, et al. A randomized controlled trial of postthoracotomy pulmonary rehabilitation in patients with resectable lung cancer. *J Thorac Oncol.* Feb 2013; 8(2): 214-21. PMID 23238118
25. Edvardsen E, Skjønsberg OH, Holme I, et al. High-intensity training following lung cancer surgery: a randomised controlled trial. *Thorax.* Mar 2015; 70(3): 244-50. PMID 25323620
26. Carr SJ, Hill K, Brooks D, et al. Pulmonary rehabilitation after acute exacerbation of chronic obstructive pulmonary disease in patients who previously completed a pulmonary rehabilitation program. *J Cardiopulm Rehabil Prev.* 2009; 29(5): 318-24. PMID 19561523
27. COPD Working Group. Pulmonary rehabilitation for patients with chronic pulmonary disease (COPD): an evidence-based analysis. *Ont Health Technol Assess Ser.* 2012; 12(6): 1-75. PMID 23074434
28. Güell MR, Cejudo P, Ortega F, et al. Benefits of Long-Term Pulmonary Rehabilitation Maintenance Program in Patients with Severe Chronic Obstructive Pulmonary Disease. Three-Year Follow-up. *Am J Respir Crit Care Med.* Mar 01 2017; 195(5): 622-629. PMID 27611807
29. Wilson AM, Browne P, Olive S, et al. The effects of maintenance schedules following pulmonary rehabilitation in patients with chronic obstructive pulmonary disease: a randomised controlled trial. *BMJ Open.* Mar 11 2015; 5(3): e005921. PMID 25762226
30. Liu XL, Tan JY, Wang T, et al. Effectiveness of home-based pulmonary rehabilitation for patients with chronic obstructive pulmonary disease: a meta-analysis of randomized controlled trials. *Rehabil Nurs.* 2014; 39(1): 36-59. PMID 23780865
31. Vieira DS, Maltais F, Bourbeau J. Home-based pulmonary rehabilitation in chronic obstructive pulmonary disease patients. *Curr Opin Pulm Med.* Mar 2010; 16(2): 134-43. PMID 20104176
32. Stafinski T, Nagase FI, Avdagovska M, et al. Effectiveness of home-based pulmonary rehabilitation programs for patients with chronic obstructive pulmonary disease (COPD): systematic review. *BMC Health Serv Res.* Apr 26 2022; 22(1): 557. PMID 35473597
33. Neves LF, Reis MH, Gonçalves TR. Home or community-based pulmonary rehabilitation for individuals with chronic obstructive pulmonary disease: a systematic review and meta-analysis. *Cad Saude Publica.* Jun 20 2016; 32(6). PMID 27333130
34. Maltais F, Bourbeau J, Shapiro S, et al. Effects of home-based pulmonary rehabilitation in patients with chronic obstructive pulmonary disease: a randomized trial. *Ann Intern Med.* Dec 16 2008; 149(12): 869-78. PMID 19075206
35. Qaseem A, Wilt TJ, Weinberger SE, et al. Diagnosis and management of stable chronic obstructive pulmonary disease: a clinical practice guideline update from the American College of Physicians, American College of Chest Physicians, American Thoracic Society, and European Respiratory Society. *Ann Intern Med.* Aug 02 2011; 155(3): 179-91. PMID 21810710

36. Rochester CL, Vogiatzis I, Holland AE, et al. An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation. *Am J Respir Crit Care Med*. Dec 01 2015; 192(11): 1373-86. PMID 26623686
37. Wedzicha JA, Miravittles M, Hurst JR, et al. Management of COPD exacerbations: a European Respiratory Society/American Thoracic Society guideline. *Eur Respir J*. Mar 2017; 49(3). PMID 28298398
38. Holland AE, Cox NS, Houchen-Wolloff L, et al. Defining Modern Pulmonary Rehabilitation. An Official American Thoracic Society Workshop Report. *Ann Am Thorac Soc*. May 2021; 18(5): e12-e29. PMID 33929307
39. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Global Initiative for Chronic Obstructive Lung Disease. 2023. <https://goldcopd.org/2023-gold-report-2/#>. Accessed February 1, 2023.
40. Centers for Medicare & Medicaid Services. National Coverage Determination (NCD) for Pulmonary Rehabilitation Services (240.8). 2008; <https://www.cms.gov/medicare-coverage-database/details/ncd-details.aspx?NCAId=130&NcaName=Smoking+%26+Tobacco+Use+Cessation+Counseling&ExpandComments=n&CommentPeriod=0&NCDId=320&NCSelection=NCA%7CCAL%7CNCD%7CMEDCAC%7CTA%7CMCD&Keyword=Pulmonary+Rehabilitation&KeywordLookUp=Doc&KeywordSearchType=And&kq=true>. Accessed February 1, 2023.