Novel Strategy for Increasing Access to Pulmonary Rehabilitation in Rural Communities

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This project is 100% supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant # 1 TR1RH45932-01-00. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government."





Objectives/Overview

Learning Objective 1: Identify the most recent evidence suggesting how to improve access to pulmonary rehabilitation.

Learning Objective 2: Describe a strategic model and results of a novel pulmonary rehabilitation program.



Background & Need: COPD And Long-Covid





C Healthwise, Incorporated

COPD – United States and Rural Impact

- Estimated to affect 24 million people in the US and is a leading cause of morbidity and mortality of adults in both the US and across the globe.
- Significantly affects rural residents as compared to individuals who live in urban centers.
 - 2-fold increase in prevalence
- 2018 Johns Hopkins study suggests that rural residence and poverty are independent COPD risk factors.
- Although annual rural death rates for three other leading causes—heart disease, cancer, and stroke—decreased, the rural mortality rate for COPD increased (1999-2014).

Mannino DM, Homa DM, Akinbami LJ, Ford ES, Redd SC. Chronic obstructive pulmonary disease surveillance-- United States, 1971-2000. MMWR Surveill Summ. 2002;51(6):1-16.

National Center for Health Statistics. Health, United States, 2015: With Special Feature on Racial and Ethnic Health Disparities. National Center for Health Statistics; 2016.

Lozano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet.

Raju, Sarath, et al. "Rural residence and poverty are independent risk factors for COPD in the United States." American Journal of Respiratory and Critical Care Medicine. (2019).

Moy, Ernest, et al. "Leading causes of death in nonmetropolitan and metropolitan areas – United States, 19992014." MMWR Surveillance Summaries, 66.SS-1 (2017): 1-8.

Croft JB, Wheaton AG, Liu Y, Xu F, Lu H, Matthews KA, et al. Urban-Rural County and State Differences in Chronic Obstructive Pulmonary Disease - United States, 2015. MMWR Morb Mortal Wkly Rep 2018;67(7):205-211.



^{2012;380 (9859):2095-2128.} Published correction in Lancet. 2013;381(9867):628.

- Significant direct health system costs associated with COPD, namely an estimated \$800 billion during the next 20 years. (From Chest, 2021)
- More than 25% of these costs are attributable to hospitalization for acute exacerbation of COPD, with one-quarter of these patients readmitted within 30 days.
- In one study, hospitalizations due to COPD cost over \$19,000 on average whereas hospitalizations unrelated to COPD had an average cost below \$4,000.

Zafari Z, Li S, Eakin MN, Bellanger M, Reed RM. Projecting long-term health and economic burden of COPD in the United States. *Chest*. 2021;159(4):1400-1410.
Shah T, Press VG, Huisingh-Scheetz M, White SR. COPD readmissions: addressing COPD in the era of value- based health care. *Chest*. 2016;150(4):916-926.
SullivanJ,PravosudV,ManninoDM,SiegelK,ChoateR,SullivanT.NationalandstateestimatesofCOPD morbidity and mortality—United States, 2014-2015. *Chronic Obstr Pulm Dis*. 2018;5(4):324-333.
Menzin, J., L. Boulanger, J. Marton, L. Guadagno, H. Dastani, R. Dirani, A. Phillips, and H. Shah. "The Economic Burden of Chronic Obstructive Pulmonary Disease (COPD) in a U.S. Medicare Population." [In Eng]. Respir Med 102, no. 9 (Sep 2008): 1248-56.



Other Respiratory-related Symptoms: Long-COVID







- Majority of people with Long-COVID report persistent symptoms of <u>shortness of breath</u> <u>and fatigue</u> 6-months after discharge. Another study, (63% SOB up to 12 months).
- These symptoms can lead to physical impairments: 62% of the patients with SOB and fatigue had moderate-to-extreme problems with daily activities at 6-months post discharge.
- Long-COVID has created a growing need for increased access to rehabilitation interventions.



Mo X, Jian W, Su Z, Chen M, Peng H, Peng P, et al. Abnormal pulmonary function in COVID-19 patients at time of hospital discharge. Eur Respir J 2020;55(6).

Vaes AW, Goertz YMJ, Van Herck M, Machado FVC, Meys R, Delbressine JM, et al. Recovery from COVID-19: a sprint or marathon? 6-month follow-up data from online long COVID-19 support group members. ERJ Open Res 2021;7(2). LM Bek, JC Berentschot, MH Heijenbrok-Kal, et al. Symptoms persisting after hospitalization for COVID-19: 12 months interim results of the COFLOW study. medRxiv. doi: https://doi.org/ 10.1101/2021.12.11.21267652 (preprint: 13 Dec 2021) Polastri M, Nava S, Clini E, Vitacca M, Gosselink R. COVID-19 and pulmonary rehabilitation: preparing for phase three. Eur Respir J 2020;55(6).

Thomas P, Baldwin C, Bissett B, Boden I, Gosselink R, Granger CL, et al. Physiotherapy management for COVID-19 in the acute hospital setting: clinical practice recommendations. J Physiother 2020;66(2):73-82. Vitacca M, Carone M, Clini EM, Paneroni M, Lazzeri M, Lanza A, et al. Joint Statement on the Role of Respiratory Rehabilitation in the COVID-19 Crisis: The Italian Position Paper. Respiration 2020;99(6):493-499.

Evidence-based Guidelines: Pulmonary Rehabilitation as a Strategy for Treating COPD and Long-COVID



The Roots of Pulmonary Rehabilitation



TROMAS L. PETTY, M.B., LOOBE M. NEIT, N.N., MUCHAEL M. FINGERN, M.D., GLEN A. BRINK, B.S., and PHILIP R. CORSELLO, M.D. Denver, Colorado

Source: Richard Casaburi, PhD, MD





- Pulmonary Rehabilitation (PR) has been a successful strategy for improving the lives of people with persistent respiratory diseases, especially chronic obstructive pulmonary disease (COPD).
 - Improves dyspnea, exercise capacity, health-related quality of life (HRQoL), and hospital readmissions.

McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y. Pulmonary rehabilitation for chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2015(2):CD003793.

Puhan MA, Gimeno-Santos E, Cates CJ, Troosters T. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. Cochrane Database Syst Rev 2016;12:CD005305.



AMERICAN THORACIC SOCIETY DOCUMENTS

An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation

Carolyn L. Rochester, Ioannis Vogiatzis, Anne E. Holland, Suzanne C. Lareau, Darcy D. Marciniuk, Milo A. Puhan, Martijn A. Spruit, Sarah Masefield, Richard Casaburi, Enrico M. Clini, Rebecca Crouch, Judith Garcia-Aymerich, Chris Garvey, Roger S. Goldstein, Kylie Hill, Michael Morgan, Linda Nici, Fabio Pitta, Andrew L. Ries, Sally J. Singh, Thierry Troosters, Peter J. Wijkstra, Barbara P. Yawn, and Richard L. ZuWallack; on behalf of the ATS/ERS Task Force on Policy in Pulmonary Rehabilitation

This Official Policy Statement of the American Thoracic Society (ATS) and the European Respiratory Society (ERS) was approved by the ATS Board of Directors, October 2015, and by the ERS Science Council, September 2015

Rationale: Pulmonary rehabilitation (PR) has demonstrated physiological, symptom-reducing, psychosocial, and health economic benefits for patients with chronic respiratory diseases, yet it is underutilized worldwide. Insufficient funding, resources, and reimbursement; lack of healthcare professional, payer, and patient awareness and knowledge; and additional patient-related barriers all contribute to the gap between the knowledge of the science and benefits of PR and the actual delivery of PR services to suitable patients.

Objectives: The objectives of this document are to enhance implementation, use, and delivery of pulmonary rehabilitation to suitable individuals worldwide.

Methods: Members of the American Thoracic Society (ATS) Pulmonary Rehabilitation Assembly and the European Respiratory Society (ERS) Rehabilitation and Chronic Care Group established a Task Force and writing committee to develop a policy statement on PR. The document was modified based on feedback from expert peer

reviewers. After cycles of review and revisions, the statement was reviewed and formally approved by the Board of Directors of the ATS and the Science Council and Executive Committee of the ERS.

Main Results: This document articulates policy recommendations for advancing healthcare professional, payer, and patient awareness and knowledge of PR, increasing patient access to PR, and ensuring quality of PR programs. It also recommends areas of future research to establish evidence to support the development of an updated funding and reimbursement policy regarding PR.

Conclusions: The ATS and ERS commit to undertake actions that will improve access to and delivery of PR services for suitable patients. They call on their members and other health professional societies, payers, patients, and patient advocacy groups to join in this commitment.

Keywords: pulmonary rehabilitation; policy; healthcare; chronic respiratory diseases; access

(2015) <u>Improve Mortality</u>



C. L. Rochester, I. Vogiatzis, A. E. Holland, S. C. Lareau, D. D. Marciniuk, M. A. Puhan, et al. Am J Respir Crit Care Med. 2015. Vol. 192, Issue 11. Pages 1373-86

Landmark article from 2020 shows that PR initiated within 90 days of discharge from the hospital for COPD lowers the risk of death by 37% within the first year.

JAMA. 2020;323(18):1813-1823

JAMA | Original Investigation

Association Between Initiation of Pulmonary Rehabilitation After Hospitalization for COPD and 1-Year Survival Among Medicare Beneficiaries

Peter K, Lindenauer, MD, MSc; Mihaela S, Stefan, MD, PhD; Penelope S, Pekov, PhD; Kathleen M, Mazor, EdD; Aruna Phya, MA, MSc; Kerry A, Spitzer, PhD, MPA; Tara C, Lagu, MD, MPH; Quinn R, Pack, MD, MSc; Victor M, Pinto-Plasta, MD; Richard ZuWallack, MD

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Questions page 1842

E CME Quiz at

IMPORTANCE Meta-analyses have suggested that initiating pulmonary rehabilitation after an exacerbation of chronic obstructive pulmonary disease (COPD) was associated with improved survival, although the number of patients studied was small and heterogeneity was high. Current guidelines recommend that patients enroll in pulmonary rehabilitation after hospital discharge.

OBJECTIVE To determine the association between the initiation of pulmonary rehabilitation within 90 days of hospital discharge and 1-year survival.

DESIGN. SETTING, AND PATIENTS This retrospective, inception cohort study used claims data from fee-for-service Medicare beneficiaries hospitalized for COPD in 2014, at 4446 acute care hospitals in the US. The final date of follow-up was December 31, 2015.

EXPOSURES Initiation of pulmonary rehabilitation within 90 days of hospital discharge.

MAIN OUTCOMES AND MEASURES The primary outcome was all-cause mortality at 1 year. Time from discharge to death was modeled using Cox regression with time-varying exposure to pulmonary rehabilitation, adjusting for mortality and for unbalanced characteristics and propensity to initiate pulmonary rehabilitation. Additional analyses evaluated the association between timing of pulmonary rehabilitation and mortality and between number of sessions completed and mortality.

RESULTS Of 197 376 patients (mean age, 76,9 years: 115 690 (58,6%) women), 2721 (1,5%) initiated pulmonary rehabilitation within 90 days of discharge, A total of 38 302 (19,4%) died within 1 year of discharge, including 7.3% of patients who initiated pulmonary rehabilitation after 90 days or not at all. Initiation within 90 days was significantly associated with lower risk of death over 1 year (absolute risk difference (ARD), –6.7% (195% to –5.6%); hazard ratio [HR], 0.63 (195% (1, 0.57 to 0.69); P < .001). Initiation of pulmonary rehabilitation after 90 days or 1 year (absolute risk difference (ARD), –6.7% (195% (1, –7.9% to –5.6%); hazard ratio [HR], 0.63 (195% (1, 0.57 to 0.69); P < .001). Initiation of pulmonary rehabilitation was significantly associated with lower mortality across start dates ranging from 30 days or less (ARD, –4.6% (195% (1, –5.9% to –3.2%); HR, 0.74 (195% (1, 0.67 to 0.82); P < .001) to 6 to 90 days after discharge (ARD, –11.%) (95% (1, –3.2%); LR, 0.74 (195% (1, 0.67 to 0.82); P < .001). Every 3 additional sessions was significantly associated with lower risk of death (HR, 0.91 (195% (1, 0.58 to 0.98); P = .01).

CONCLUSIONS AND RELEVANCE Among fee-for-service Medicare beneficiaries hospitalized for COPD, initiation of pulmonary rehabilitation within 3 months of discharge was significantly associated with lower risk of mortality at 1 year. These findings support current guideline recommendations for pulmonary rehabilitation after hospitalization for COPD, although the potential for residual confounding exists and further research is needed.

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JAMA, 2020;323(18):1813-1823, doi:10.1001/jama,2020.4437

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Initiation of pulmonary rehabilitation within 3 months of discharge was significantly associated with lower risk of mortality at 1 year.



COVID-19: interim guidance on rehabilitation in the hospital and post-hospital phase from a European Respiratory Society- and American Thoracic Society-coordinated international task force

Martijn A. Spruit ^{1,2,3,4}, Anne E. Holland^{5,6,7}, Sally J. Singh^{8,9,10}, Thomy Tonia¹¹, Kevin C. Wilson¹² and Thierry Troosters^{13,14}

@ERSpublications

Experts recommend identification of unmet rehabilitation needs in patients with COVID-19 who are discharged from the hospital, and consequent tailored rehabilitative interventions, accompanied by compliance with the highest biosecurity standards https://bit.ly/3geBsPE

Cite this article as: Spruit MA, Holland AE, Singh SJ, *et al.* COVID-19: interim guidance on rehabilitation in the hospital and post-hospital phase from a European Respiratory Society- and American Thoracic Society-coordinated international task force. *Eur Respir J* 2020; 56: 2002197 [https://doi.org/10.1183/13993003.02197-2020].

ABSTRACT

Background: Patients with coronavirus disease 2019 (COVID-19) or post-COVID-19 will probably have a need for rehabilitation during and directly after the hospitalisation. Data on safety and efficacy are lacking. Healthcare professionals cannot wait for published randomised controlled trials before they can start these rehabilitative interventions in daily clinical practice, as the number of post-COVID-19 patients increases rapidly. The Convergence of Opinion on Recommendations and Evidence process was used to make interim recommendations for rehabilitation in the hospital and post-hospital phases in COVID-19 and post-COVID-19 patients, respectively.

Methods: 93 experts were asked to fill out 13 multiple-choice questions. Agreement of directionality was tabulated for each question. \geq 70% agreement on directionality was necessary to make consensus suggestions. **Results:** 76 (82%) experts reached consensus on all questions based upon indirect evidence and clinical experience on the need for early rehabilitation during the hospital admission, the screening for treatable traits with rehabilitation in all patients at discharge and 6–8 weeks after discharge, and around the content of rehabilitation for these patients. It advocates for assessment of oxygen needs at discharge and more comprehensive assessment of rehabilitation needs, including physical as well as mental aspects 6–8 weeks after discharge. Based on the deficits identified, multidisciplinary rehabilitation should be offered with attention on skeletal muscle and functional as well as mental restoration.

Conclusions: This multinational task force recommends early, bedside rehabilitation for patients affected by severe COVID-19. The model of pulmonary rehabilitation may suit as a framework, particularly in a subset of patients with long-term respiratory consequences.



The European Respiratory Society (ERS) and American Thoracic Society (ATS) suggest using the *pulmonary rehabilitation framework for people with Long-COVID* who

have respiratory-related symptoms.





AMERICAN THORACIC SOCIETY DOCUMENTS

Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease

An Official American Thoracic Society Clinical Practice Guideline

Carolyn L. Rochester, Jennifer A. Alison, Brian Carlin, Alex R. Jenkins, Narelle S. Cox, Gerene Bauldoff, Surya P. Bhatt, Jean Bourbeau, Chris Burtin, Pat G. Camp, Thomas M. Cascino, Grace Anne Dorney Koppel, Chris Garvey, Roger Goldstein, Drew Harris, Linzy Houchen-Wolloff, Trina Limberg, Peter K. Lindenauer, Marilyn L. Moy, Christopher J. Ryerson, Sally J. Singh, Michael Steiner, Rachel S. Tappan, Abebaw M. Yohannes, and Anne E. Holland; on behalf of the American Thoracic Society Assembly on Pulmonary Rehabilitation

THIS OFFICIAL CLINICAL PRACTICE GUIDELINE OF THE AMERICAN THORACIC SOCIETY WAS APPROVED MAY 2023

Abstract

Background: Despite the known benefits of pulmonary rehabilitation (PR) for patients with chronic respiratory disease, this treatment is underused. Evidence-based guidelines should lead to greater knowledge of the proven benefits of PR, highlight the role of PR in evidence-based health care, and in turn foster referrals to and more effective delivery of PR for people with chronic respiratory disease.

Methods: The multidisciplinary panel formulated six research questions addressing PR for specific patient groups (chronic obstructive pulmonary disease [COPD], interstitial lung disease, and pulmonary hypertension) and models for PR delivery (telerehabilitation, maintenance PR). Treatment effects were quantified using systematic reviews. The Grading of Recommendations, Assessment, Development and Evaluation approach was used to formulate clinical recommendations. **Recommendations:** The panel made the following judgments: strong recommendations for PR for adults with stable COPD (moderate-quality evidence) and after hospitalization for COPD exacerbation (moderate-quality evidence), strong recommendation for PR for adults with interstitial lung disease (moderate-quality evidence), conditional recommendation for PR for adults with pulmonary hypertension (low-quality evidence), strong recommendation for offering the choice of center-based PR or telerehabilitation for patients with chronic respiratory disease (moderate-quality evidence), and conditional recommendation for offering either supervised maintenance PR or usual care after initial PR for adults with COPD (low-quality evidence).

Conclusions: These guidelines provide the basis for evidencebased delivery of PR for people with chronic respiratory disease.

Keywords: pulmonary rehabilitation; chronic obstructive pulmonary disease; interstitial lung disease; pulmonary hypertension; telerehabilitation

(2023)

Novel PR program models should be developed and studied that will make evidence-based PR more accessible and acceptable to patients and payers; this may include new approaches within hospital-based programs, community-based programs, home-based or telehealth-supported programs, or other novel models of program delivery.

Rochester CL, Alison JA, Carlin B, Jenkins AR, Cox NS, Bauldoff G, et al. Pulmonary Rehabilitation for Adults with Chronic Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. Am J Respir Crit Care Med 2023;208(4):e7-e26.



The Gap: Access to Pulmonary Rehabilitation





The Gap

- Although the COVID-19 pandemic has highlighted the need for more PR programs with specialty trained providers to treat people with Long-COVID.
- <1.2% of people with COPD receive PR, from 6 developed countries.
- Only 4% Medicare beneficiaries with COPD participate in PR in the US.

Table 4. National pulmonary rehabilitation capacity							
	United States Bickford 1995	UK Yohannes 2004	Canada Brooks 2007	Ireland O'Neill 2008	Australia Johnston 2011	New Zealand Levack 2012	Sweden Wadell 2013
Response Rate	NR	90%	61%	NR	83%	91%	99%
Number of Programs Surveyed	283	68	98	23	161	112	46
National PR Capacity per annum	NR	5509	8927	NR	NR	1786	1328
Estimated COPD population ^a	NR	> 600,000	> 750,000	NR	NR	275,480 (95% Cl 213,400–329,800)	> 700,000
% of COPD Population serviced by PR	NR	0.01	1.2	NR	NR	0.7	0.2
^a Estimated COPD population provided by respe	ective studies.						

Lahham A, Holland AE. The Need for Expanding Pulmonary Rehabilitation Services. Life (Basel) 2021;11(11).

Desveaux, L., et al., An international comparison of pulmonary rehabilitation: a systematic review. COPD, 2015. 12(2): p. 144-53.

Nishi SP, Zhang W, Kuo YF, Sharma G. Pulmonary Rehabilitation Utilization in Older Adults With Chronic Obstructive Pulmonary Disease, 2003 to 2012. J Cardiopulm Rehabil Prev 2016;36(5):375-382.



• 73% of rural counties in the United States do not have an outpatient PR program.



Moscovice, I.S., M.M. Casey, and Z. Wu, *Disparities in Geographic Access to Hospital Outpatient Pulmonary Rehabilitation Programs in the United States*. Chest, 2019. **156**(2): p. 308-315.



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Feasibility of a Digitally Enhanced Pulmonary Rehabilitation Program

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Components

- Education
- Psychological support
- Exercise
- Nutritional advice
- Breathing techniques
- Outcome assessment

Standard of Care

Benefits

- Optimizes exercise capacity
- Improves dyspnea
- Enhances quality of life
- Reduced hospital admissions
- Reduced length of stay
- Lower risk of death











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- Allows for combination of TeleRehab and in-person rehabilitation
- Decreases barriers to PR
- Feasible and effective in rural areas?













Study Aims





Aim 1: Assess the feasibility of a novel digital therapeutics app (myCOPD) for delivering PR for people with COPD.

Aim 2: Determine changes in patientreported and clinical outcomes for people with COPD using myCOPD.



Study Design

- Pilot and feasibility
- Longitudinal
- Target enrollment: 30 participants









Inclusion/Exclusion Criteria

- Inclusion
 - Diagnosis of COPD
 - 50+ years of age
 - English speaking
 - Physician referral
 - Ability to access and use internet-enabled device
- Exclusion
 - Upper/lower respiratory infection or COVID-19 within 30 days of enrollment



Recruitment

- Conducted through McPherson Center for Health
- Study FAQ sheets for providers





Study Flow





Intervention



myCOPD

- 3 pillars of PR
- Guided exercise videos with level progression
- Medication diary
- Educational videos
- Provider portal
- Air Quality
- COPD360





Outcome Measures



Clinical Outcomes

6MWT

COPD Assessment Test (CAT)

Exacerbations and healthcare utilization

St. George's Respiratory Questionnaire (SGRQ)



Feasibility

Recruitment and retention

myCOPD usage



Objectives





Ensure the intervention is translatable to real life clinical settings

Long term goal: expand the program to provide PR programs to multiple facilities



The Future of Pulmonary Rehab –

McPherson Hospital

Kerra Abdullayev, BS, RRT Director of Respiratory Care McPherson Hospital kerraa@mcphersonhospital.org



IT IS THE FUTURE

- •We were one of the 73% of rural counties
- without a PR program.
- •Hybrid and digital Pulmonary Rehab
 - •Apps on phones and tablets
 - •12 weeks
 - •Only 1 in-person session a week vs three
 - •Small class sizes
 - •Won't use the 72 sessions up as quickly





WORKING WITH PROVIDERS









How did we get the ReferralsWe went to their offices, were available for questions

Continue to put the idea in front of them -Was a PFT ordered? May be a good candidate for PR





BUILDING THE PROGRAM AGENDA







What did they want to go over?

Make education the focus

Breathing techniques

Nutrition

Coping with chronic lung disease





- •What can we do to help them
- •Be available for questions
- •Small Class sizes (4-5)
- •Talk to them
- •What do they want from this program?





https://www.linkedin.com/company/ mcpherson-hospitalinc./posts/?feedView=all





McPherson CENTER FOR HEALTH

