Topic Brief: Benefits of Pulmonary Rehabilitation

Date: 10/28/2020
Nomination Number: 0921

Purpose: This document summarizes the information addressing a nomination submitted on July 16, 2020 through the Effective Health Care Website. This information was used to inform the Evidence-based Practice Center (EPC) Program decisions about whether to produce an evidence report on the topic, and if so, what type of evidence report would be most suitable.

Issue: Pulmonary rehabilitation is considered a key management strategy for many chronic lung diseases including chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis, and cystic fibrosis, to name a few. Although pulmonary rehabilitation improves patient's health related quality of life, reduces the number or duration of hospital admissions and readmissions, and improves functional status, its effectiveness is weakened by poor patient uptake and non-completion of pulmonary rehabilitation programs. The U.S. COPD Coalition has submitted this nomination for a potential evidence review to evaluate the existing barriers faced by clinicians and patients regarding greater utilization of referred rehabilitation services and uptake and completion of pulmonary rehabilitation programs. The nominator also expressed interest in evaluating the utility of pulmonary rehabilitation programs in the management of patients recovering from COVID-19 pneumonia.

Program Decision: The key questions (KQs) are adequately addressed by existing and in-progress reviews. This finding is based on a detailed examination of six published and in-progress reviews. Bringing all of this information into one place, and using the target audiences (patients, providers, payers) as the organizing principle, would have value, but may not be optimal for the EPC Program because little if any primary literature synthesis would be involved. Moreover, the impact such a report would have is unclear. A comprehensive report of this kind might highlight evidence-based interventions for overcoming some barriers, but a better approach might be to develop implementation strategies for these interventions rather than summarize them.

Key Findings: We found a total of 29 existing and in-progress evidence reviews[1, 2] including 13 published systematic reviews, two published rapid reviews and 14 protocols for in-progress reviews. Six published[1-6] and in-progress reviews addressed KQ 1, nine published[7-15] and in-progress reviews that addressed KQ 2, five published[7-9, 12, 16] and in-progress reviews that addressed KQ 3, three published[4, 17, 18] reviews that addressed KQ 4 and two published systematic reviews, two rapid reviews and seven systematic review protocols that addressed KQ 5.[19-29]

Background

According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) Guidelines, pulmonary rehabilitation is a multicomponent intervention that may include exercise training, behavior change training, education, and psychological support, and which is often coupled with medication adjustments, and optimization of blood gases.[30, 31] It can improve symptoms, quality of life, pulmonary function, anxiety and depression, and health care utilization in patients with COPD.[30, 31] Pulmonary rehabilitation programs are usually conducted in an outpatient or home settings. Guidelines disagree on whether the optimal program duration is 8 or 12 weeks.[30]

While pulmonary rehabilitation is considered appropriate for most patients with COPD (specifically, GOLD stages B, C, and D), uptake is low. Medicare began covering pulmonary rehabilitation in 2010, but, by 2012, only 2% of patients discharged from a hospital with COPD had received it. Referral rates are low, and many areas of the country are underserved. Pulmonary specialists refer to the three A's—availability, accessibility, and attrition and have made many suggestions for improving implementation.[32] Video (remote) pulmonary rehabilitation, initially proposed because there are no pulmonary rehabilitation programs in many areas, is now of intense interest because of COVID-19.[33, 34]

The GOLD guidelines list other barriers to implementation, including "provider ignorance", patients' lack of awareness of its availability or benefits, access, and attrition due to the difficulty of maintaining physical activity and lifestyle change. Frailty is a predictor of noncompletion of pulmonary rehabilitation and interventions to facilitate participation in this subgroup of COPD patients are needed.[35]

Nomination Summary

This topic was nominated by the US COPD Coalition, which wants to raise awareness of the barriers to wider use of rehabilitation. Key Questions 1-4 related to barriers and to interventions that address them. The nominator later proposed Key Question 5 in the topic development process. The group hopes use the report to develop educational materials for clinicians and patients.

Scope and Key Questions (Table 1)

1. What are the barriers to greater utilization of pulmonary rehabilitation programs by eligible patients with chronic lung diseases who have been referred to pulmonary rehabilitation by the clinician?
2. What is the effectiveness of existing interventions to improve patients' uptake of pulmonary rehabilitation?
3. What is the effectiveness of existing interventions to improve patient's adherence to and completion of pulmonary rehabilitation programs?
4. What are the barriers to healthcare providers referring eligible patients with chronic lung conditions to pulmonary rehabilitation programs?
5. What is the effectiveness of pulmonary rehabilitation programs for patients recovered from COVID-19 pneumonia?

Table 1. Questions and PICOS (population, intervention, comparator, outcome, and setting)

Questions	1. What are the barriers to greater utilization of pulmonary rehabilitation programs (PR) by patients with chronic lung diseases?	2. What is the effectiveness of existing interventions to improve patients' uptake of PR?
Population	Adults with chronic lung diseases (COPD, interstitial lung disease, bronchiectasis, cystic fibrosis, asthma etc.)	Adults with chronic lung diseases (COPD, interstitial lung disease, bronchiectasis, cystic fibrosis, asthma etc.)
Interventions	Barriers to patients' utilization of PR programs, including but not limited to: • Geographic proximity of PR programs; • Limited/no access to transportation; • Inconvenient timing; • Disruption to routine activities; • Lack of understanding of PR benefits; • Lack of perceived benefit; • Believing one's condition is not serious enough to merit participation in PR; • Negative past experience with PR or exercise in general; • Chronic lung disease/other health conditions related burdens; • Fearing pressure to quit smoking; • Any other barriers to utilization of PR	Interventions to increase patients' uptake of PR programs, including but not limited to: • Physiotherapist and clinical psychologist assessments prior to start of PR; • Education about benefits of PR; • Positive reinforcement by the referring physician; • Addressing potential barriers to PR uptake, including lack of transportation, inconvenient timing, disruption of daily routine etc.; • Any other interventions to improve patient's uptake of PR
Comparators	None	Usual care
Outcomes	None	• Patient follow-through with PR referrals; • Attendance at start of PR programs;
Setting	Outpatient/Any formal PR programs	Outpatient/Any formal PR programs
Questions	3. What is the effectiveness of existing interventions to improve patients' adherence to and completion of PR?	4. What are the barriers to healthcare providers referring eligible patients with chronic lung conditions to PR programs?
Population	Adults with chronic lung diseases (COPD, interstitial lung disease, bronchiectasis, cystic fibrosis, asthma etc.)	Clinicians (e.g., pulmonologists, primary care providers, nurse practitioners, respiratory therapists) who care for patients with chronic lung conditions
Interventions	Interventions to increase patients' adherence to any formal PR programs, including but not limited to: • Interventions aimed at addressing known barriers to participation in and completion PR (e.g., coping with chronic lung illness/ comorbidities, transportation difficulties, limited social support, lack of understanding of benefits of PR etc.); • Scheduled phone follow-up to encourage patients to attend PR sessions and check-in after missed sessions; • Other interventions to improve patients' participation in and completion of PR	Barriers to patient referrals to PR by clinicians, including but not limited to: • Lack of understanding of evidence-based benefits of PR programs; • Not knowing logistical steps required to refer patients to PR programs; • Lack of understanding of insurance coverage for PR programs; • Other barriers that may preclude providers from referring eligible patients to PR programs
Comparators	Usual care	None
Outcomes	Percentage of patients participating in and completing PR programs	None
Setting	Outpatient/Any formal PR programs	Outpatient/Any formal PR programs

Questions	5. What is the effectiveness of pulmonary rehabilitation therapy in adults recovering from COVID-19 pneumonia?
Population	Adults with and without pre-existing chronic lung diseases experiencing residual pulmonary deficits following recovery from laboratory confirmed COVID-19 pneumonia
Interventions	Pulmonary rehabilitation interventions following viral pneumonia including but not limited to breathing exercises, respiratory muscle training, chest physiotherapy, chest expansion exercises, airway clearance techniques, exercise training etc.
Comparators	Treatment as usual (i.e. no pulmonary rehabilitation)
Outcomes	• 6-min walking distance; • Partial arterial pressure of oxygen/Fraction of inspired oxygen (PaO_2/FiO_2) ratio • Blood oxygen saturation • Pulmonary function tests (e.g., Forced Expiratory Volume in 1 Sec (FEV1), Forced Vital Capacity (FVC)) • Length of hospital stay • Discharge time • Quality-of-Life
Setting	Any

Assessment Methods

See Appendix A.

Summary of Literature Findings

We found four published systematic reviews[1-4] and two systematic review protocols that addressed KQ1. One systematic review[1] explored both patient and provider perspectives on the existing barriers and facilitators of participation in pulmonary rehabilitation programs. 2 systematic reviews[2, 4] evaluated patient, clinician and family caregivers' perspectives on various barriers and facilitators experienced by patients with COPD in their disease self-management. One systematic review[3] focused exclusively on patients' perceptions of beneficial impact of nurse facilitated interventions to support patient self-management (such as motivational interviewing) on patient self-management, including participation in pulmonary rehabilitation. 1 protocol for upcoming systematic review[5] will focus on older patients with COPD and evaluate facilitators and barriers in pulmonary rehabilitation programs that involve resistance training. Another protocol for an upcoming Cochrane systematic review[6] will evaluate patient, healthcare provider and family member perspectives on factors that influence referral to PR by clinicians and uptake and attendance of PR programs by patients.

Four published systematic reviews[7-10] and five protocols for upcoming reviews[11-15] addressed KQ 2. Two systematic reviews evaluated the effectiveness of existing interventions to improve the uptake of and completion of pulmonary rehabilitation programs by patients with COPD.[8, 9] One systematic review[7] conducted a broader evaluation of interventions to increase physical activity in COPD patients. Another realist review[10] assessed how exercise-based interventions might improve outcomes in people living with both COPD and frailty, including their participation in pulmonary rehabilitation. Five protocols for upcoming systematic reviews, including 2 protocols for upcoming Cochrane reviews. 1 upcoming review[12] will assess the effectiveness of the range of interventions to promote referral to pulmonary rehabilitation programs by clinicians and their uptake and adherence to buy patients with COPD. The remaining 4 upcoming reviews[11, 13-15] will focus on specific categories of interventions to improve patients' uptake of pulmonary rehabilitation, including PR programs using minimal

equipment, incorporate the use of active video games, are delivered at home through telehealth technology and enable personalized exercise interventions.[14]

Three published systematic reviews,[7-9] including 1 Cochrane review[7] and 2 protocols for upcoming reviews[12, 16] addressed KQ 3. 2 published systematic reviews[8, 9] evaluated the effectiveness of available interventions to improve the attendance of and completion of pulmonary rehabilitation programs and the Cochrane review more broadly assessed the effectiveness of interventions to promote physical activity in patients with COPD. 2 protocols for upcoming reviews[12, 16] will evaluate interventions to promote adherence to pulmonary rehabilitation programs.

Three published systematic reviews[4, 17, 18] addressed KQ 4. These reviews evaluated the existing barriers to greater referral of COPD patients to pulmonary rehabilitation programs by healthcare providers, including providers lack of knowledge of evidence-based benefits of PR programs, lack of understanding of logistical aspects of the referral process.

Two published systematic reviews,[19, 20] including 1 Cochrane Rehabilitation REH-COVER Action rapid living systematic review, two rapid reviews[21, 22] and seven protocols for upcoming reviews[23-29] addressed KQ 5. The four published reviews[19-22] assessed the existing evidence on pulmonary rehabilitation needs of patients recovered from COVID-19 pneumonia and some recommended particular rehabilitation approaches. The seven upcoming systematic reviews[23-29] will focus more closely on pulmonary rehabilitation, how it affects clinical outcomes in COVID-19 patients and reach pulmonary rehabilitation techniques are most effective.

Table 2. Literature identified for each question

Questions	**Systematic reviews** (10/2017 – 10/2020)
KQ 1. What barriers exist to greater utilization of PR programs by patients with chronic lung conditions?	Total published and in-progress reviews: 6 • Published SRs – 4[1-4] • SR protocols – 2[5, 6]
KQ 2. What is the effectiveness of existing interventions to improve patients' uptake of PR programs?	Total published and in-progress reviews: 9 • Published Cochrane SR – 1[7] • Other published SRs – 3[8-10] • SR protocols – 5[11-15]
KQ 3. What is the effectiveness of existing interventions to improve patients' adherence to and completion of PR programs?	Total completed and in-progress reviews: 5 • Published Cochrane SR – 1[7] • Other published SRs – 2[8, 9] • SR protocols – 2[12, 16]
KQ 4. What barriers exist to healthcare providers referring patients with chronic lung conditions to PR programs?	Total completed and in-progress reviews: 3 • Published SRs – 3[4, 17, 18]
KQ 5. What is the effectiveness of pulmonary rehabilitation therapy for adults recovering from COVID-19 pneumonia?	Total completed and in-progress reviews: 11 • Published Cochrane SR – 1[19] • Other published SR – 1[20] • Rapid reviews – 2[21, 22] • Review protocols – 7[23-29]

See Appendix B for detailed assessments of all EPC selection criteria.

Summary of Selection Criteria Assessment

The topic of this nomination pertains to an important healthcare intervention (pulmonary rehabilitation for chronic respiratory conditions) and is important because chronic respiratory conditions are associated with high morbidity and mortality and significant healthcare costs. We found a total of 29 published and soon to be available high quality systematic reviews which together sufficiently address the KQs of this nomination. Since we identified existing high-quality reviews that sufficiently address this topic, the AHRQ EPC Program will not develop new evidence review. Please see Appendix B for detailed assessments of individual EPC Program selection criteria.

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Conflict of Interest: None of the investigators have any affiliations or financial involvement that conflicts with the material presented in this report.

Acknowledgements
Charlotte Armstrong, BA
Emily Gean, PhD
Christine Chang, MD

This report was developed by the Scientific Resource Center under contract to the Agency for Healthcare Research and Quality (AHRQ), Rockville, MD (Contract No. HHSA 290-2017-00003C). The findings and conclusions in this document are those of the author(s) who are responsible for its contents; the findings and conclusions do not necessarily represent the views of AHRQ. No statement in this article should be construed as an official position of the Agency for Healthcare Research and Quality or of the U.S. Department of Health and Human Services.

Appendix A: Methods

We assessed nomination for priority for a systematic review or other AHRQ Effective Health Care report with a hierarchical process using established selection criteria. Assessment of each criteria determined the need to evaluate the next one. See Appendix B for detailed description of the criteria.

Appropriateness and Importance

We assessed the nomination for appropriateness and importance.

Desirability of New Review/Absence of Duplication

We searched for high-quality, completed or in-process evidence reviews published in the last three years on October 28, 2020 on the questions of the nomination from these sources:

- AHRQ: Evidence reports and technology assessments
    - AHRQ Evidence Reports https://www.ahrq.gov/research/findings/evidence-based-reports/index.html
    - EHC Program https://effectivehealthcare.ahrq.gov/
    - US Preventive Services Task Force https://www.uspreventiveservicestaskforce.org/
    - AHRQ Technology Assessment Program https://www.ahrq.gov/research/findings/ta/index.html
- US Department of Veterans Affairs Products publications
    - Evidence Synthesis Program https://www.hsrd.research.va.gov/publications/esp/
    - VA/Department of Defense Evidence-Based Clinical Practice Guideline Program https://www.healthquality.va.gov/
- Cochrane Systematic Reviews https://www.cochranelibrary.com/
- University of York Centre for Reviews and Dissemination database https://www.crd.york.ac.uk/CRDWeb/
- PROSPERO Database (international prospective register of systematic reviews and protocols) http://www.crd.york.ac.uk/prospero/
- PubMed https://www.ncbi.nlm.nih.gov/pubmed/

Impact of a New Evidence Review

The impact of a new evidence review was qualitatively assessed by analyzing the current standard of care, the existence of potential knowledge gaps, and practice variation. We considered whether it was possible for this review to influence the current state of practice through various dissemination pathways (practice recommendation, clinical guidelines, etc.).

Appendix B. Selection Criteria Assessment

Selection Criteria	Assessment
1. Appropriateness	
1a. Does the nomination represent a health care drug, intervention, device, technology, or health care system/setting available (or soon to be available) in the U.S.?	Yes. The nomination is for a potential evidence reviewed to evaluate the existing barriers faced by clinicians and patients regarding greater utilization of referred rehabilitation services and uptake in completion of pulmonary rehabilitation programs. The nominator additionally expressed interest in evaluating the effectiveness of pulmonary rehabilitation in assisting recovery of patients with COVID-19 pneumonia.
1b. Is the nomination a request for an evidence report?	Yes.
1c. Is the focus on effectiveness or comparative effectiveness?	Yes.
1d. Is the nomination focus supported by a logic model or biologic plausibility? Is it consistent or coherent with what is known about the topic?	Yes.
2. Importance	
2a. Represents a significant disease burden; large proportion of the population	Chronic respiratory disease is extremely prevalent. According to the 2017 Global Burden of Disease Study,[36] 544.9 million people worldwide (approximately 7.4% of the world's population) had a chronic respiratory disease, representing an increase of 39.8% from 1990. Chronic respiratory diseases were also the third leading cause of death in 2017, behind only cardiovascular diseases and cancers.
2b. Is of high public interest; affects health care decision making, outcomes, or costs for a large proportion of the US population or for a vulnerable population	Yes.
2c. Incorporates issues around both clinical benefits and potential clinical harms	Yes.
2d. Represents high costs due to common use, high unit costs, or high associated costs to consumers, to patients, to health care systems, or to payers	Yes.
3. Desirability of a New Evidence Review/Absence of Duplication	
3. A recent high-quality systematic review or other evidence review is not available on this topic	No. High-quality systematic reviews are available.
4. Impact of a New Evidence Review	
4a. Is the standard of care unclear (guidelines not available or guidelines inconsistent, indicating an information gap that may be addressed by a new evidence review)?	No. The standard of care is clear and guidelines are available. However, there is a gap between the guidelines and practice due to barriers to implementation.
4b. Is there practice variation (guideline inconsistent with current practice, indicating a potential implementation gap and not best addressed by a new evidence review)?	There is considerable practice variation, specifically, variation in implementing the guidelines.

Abbreviations: AHRQ=Agency for Healthcare Research and Quality;