Pulmonary rehabilitation (PR) is a comprehensive intervention for patients with lung disease who have limited their activities due to dyspnea or fatigue. PR programs are individualized to improve functional status, decrease symptoms of dyspnea and fatigue, improve quality of life, and assist patients in managing their lung condition. PR has been shown to lower health care costs by reversing or stabilizing the systemic effects of chronic lung disease.

PR involves a multidisciplinary group of physicians, nurses, physical therapists, and respiratory therapists. A psychologist, nutritionist, occupational therapist, and others may also be involved.

PR is complementary to the care provided by the patients' primary care provider (PCP). Coordination of care is therefore important. Providers should be familiar with the PR program to which they are referring their patients in order to facilitate communication and maximize benefits to the patient.

Who is a Candidate for Pulmonary Rehabilitation?

While many clinicians think only patients with severe COPD benefit from PR, symptomatic patients with most lung diseases should be considered candidates for PR, including those with only mild-to-moderate COPD (Table 1). In some cases, however, the availability of PR will depend on the skills of the team, third-party reimbursement, and the ability of the program to offer rehabilitation for those with severe lung disease and fragile health.

Poor candidates for PR are those in whom exercise is contraindicated, such as patients with unstable cardiac disease and conditions that interfere with learning, such as cognitive disorders and psychiatric illness (Table 2). Patients who smoke can benefit from PR, but insurers may require evidence that the patient is making an attempt at smoking cessation.

Patients referred for PR are expected to have been maximally evaluated and treated for their underlying lung disease by their PCP. Those with COPD, for example, should have a post-bronchodilator spirometry to establish the presence and degree of airway obstruction. This information guides the PR staff in setting exercise goals.

The PR program coordinator and medical director also assess candidates to assure that patients can exercise safely and that their underlying condition is stable at the time of entry into the program.

TIPS FOR REFERRAL TO PULMONARY REHABILITATION

- Consider a referral to pulmonary rehabilitation for a patient who is symptomatic with dyspnea and/or fatigue from their lung condition, making it difficult to participate in everyday activities.
- Prior to referral, be sure the patient’s lung disease has been fully evaluated and maximally treated, and that the patient is sufficiently stable to undertake a graded exercise program.
- Provide patients with information about pulmonary rehabilitation. Such information is available from the American Thoracic Society and other organizations (see references and resource list).
What Occurs in a Pulmonary Rehabilitation Program?

PR programs can vary in length from 4 to 12 weeks and include both formal and informal exercise along with pulmonary education sessions. Supervised exercise typically takes place 3 to 5 times per week, with each session lasting 2 to 3 hours, with sufficient rest periods. Because skeletal muscle dysfunction is prevalent in patients with COPD and other lung diseases, a combination of strength and endurance training is used to reverse deconditioning. Baseline exercise testing with a walk test such as the six minute walk distance (6MWD) or shuttle walk test (SWT) is used to both evaluate the patient’s ability to exercise as well as to serve as an outcome measure of PR.

The exercise capacity of patients with lung disease is limited by ventilatory capacity, not by heart rate, so target heart rate is not used as a guide to increase exercise as it is in cardiac patients. Rather, the exercise level is increased incrementally based on the patient’s perceived intensity of exertion (Borg or Visual Analog rating scale). The goal is to eventually reach 60 to 80% of peak work rate at baseline.

Exercise consists of upper and lower extremity strength and endurance training (Table 3). Resistance exercises build upper and lower extremity strength. Resistance is gradually increased and strength is built over the course of the program. Thirty minutes of continuous endurance exercise is a goal, though patients who are debilitated may require different goals that include shorter duration with frequent rest breaks, or interval training.

Program staff also modify duration and degree of resistance depending on a patient’s exercise tolerance, oxygen desaturation, or changes in vital signs.

Other Considerations in Pulmonary Rehabilitation

There is evidence that some people benefit from repeating PR. PR has been applied to COVID patients with good success.

Education The educational program includes topics to help patients understand their lung condition and treatment (Table 4).

### Table 3: Upper and Lower Extremity Training Devices

<table>
<thead>
<tr>
<th>Training</th>
<th>Upper Extremity</th>
<th>Lower Extremity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>hand weights</td>
<td>ankle weights</td>
</tr>
<tr>
<td></td>
<td>arm lifts with and without weights</td>
<td>machine weights</td>
</tr>
<tr>
<td></td>
<td>elastic resistance</td>
<td>elastic resistance</td>
</tr>
<tr>
<td>Endurance</td>
<td>arm ergometer</td>
<td>treadmill (motorized)</td>
</tr>
<tr>
<td></td>
<td>dowel lifts</td>
<td>stationary bicycle</td>
</tr>
<tr>
<td></td>
<td>rowing</td>
<td>walking; walking track</td>
</tr>
<tr>
<td></td>
<td></td>
<td>stair climbing</td>
</tr>
</tbody>
</table>

### Table 4: Example of Educational Topics in a Pulmonary Rehabilitation Program

- Normal pulmonary anatomy and physiology
- Pathophysiology of chronic lung disease
- Description of medical tests (lung function tests, oximetry, arterial blood gases)
- Breathing strategies (pursed-lip breathing, secretion clearance, paced breathing techniques, energy conservation)
- Medications (bronchodilators, steroids, oxygen), inhaler technique, spacer/chamber, cleaning equipment, proper use of antibiotics, expectorants and cough suppressants
- Oxygen delivery systems (concentrators, liquid, compressed gas, pulse devices), oxygen-conserving devices
- Exercise and maintaining physical activities, home exercise
- General nutrition guidelines
- Early recognition and treatment of exacerbations (signs and symptoms of a respiratory infection, when to call your health care provider, self-management strategies for increased symptoms, and action plan)
- Prevention (importance of vaccination, avoidance of irritants, secondhand smoke)
- Travel (availability of supplemental oxygen)
- Coping with chronic lung disease (sexuality, depression and anxiety, stress management, relaxation techniques)
- End-of-life planning

References and Resources


American Association for Cardiovascular and Pulmonary Rehabilitation. https://www.aacvpr.org/Program-Directory


Canadian Lung Association: COPD Treatment: https://www.lung.ca/lung-health


Interprofessional care improves the outcomes of older adults with complex health problems.

Editors: Mindy Fain, MD; Jane Mahler, NP-c, MPH, PhD; and Barry D. Weiss, MD

Interprofessional Associate Editors: Tracy Carroll, PT, CHT, MHT; David Coon, PhD; Marilyn Gilbert, MS, CHES;

Jeanie Lee, PharmD, BCPS; Marisa Mendola, PhD; Francisco Moreno, MD; Linea Nagel, PA-C, MPAS; Lisa O’Neill, DBH, MPH; Floribella Redondo; Laura Vitkus, MPH

The University of Arizona, PO Box 245027, Tucson, AZ 85724-5027 | (520) 626-5800 | http://aging.arizona.edu

Supported by: Donald W. Reynolds Foundation, Arizona Geriatrics Workforce Enhancement Program and the University of Arizona Center on Aging

This project was supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number U1QHP28721, Arizona Geriatrics Workforce Enhancement Program. 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.