

PULMONARY REHABILITATION

Disclaimer: Please consult with your physician to find out if these exercises are right for you before performing them. The general information provided here is not intended to replace your healthcare professional or diagnose any medical condition. If you experience difficulty with these exercises including but not limited to pain, stop and consult with your healthcare provider.

- Pulmonary rehabilitation is set of interventions to help you improve your breathing and exercise capacity.
- It includes physical exercise, airway clearance techniques, breathing exercises, stretching, nutrition, activity guidance and positioning
- The purpose of pulmonary rehabilitation in COVID-19 is to improve symptoms of shortness of breath, relieve anxiety, reduce complications, minimize disability, and improve quality of life.
- These exercises are meant to be done under the supervision of a rehabilitation expert.
- Home-based rehabilitation can be as effective as in-person therapy.

BASIC PRINCIPLES

	INSTRUCTIONS	DOSE	RATIONALE
Nutrition	It is important to engage in healthy eating habits right away. Avoid processed foods and sugars.	Always	Obesity is associated with poorer outcomes in COVID-19 and other viruses.
Hygiene	Cover your nose and mouth with tissue when coughing or sneezing. Immediately dispose of the tissue. Spit expectorant into a closed container. Wash your hands after contact with respiratory secretions and contaminated objects/materials.	Always	COVID-19 is extremely infectious and hygiene is important to prevent aerosolization of sputum. Adequate handling and disposal of contaminated items is important to preventing disease spread.
Mood	Contact psychiatric professionals if you are feeling stressed or depressed. Establish good social support and call and communication with family daily.	Daily	Being ill with COVID-19 can be anxiety provoking. Good social support and the assistance of professionals can help you cope with the anxiety.

Posture	Stand or sit up straight with an erect posture at all times.	Always	Proper posture reduces strain on accessory muscles and helps your lungs more fully with air.
Positioning	Change positions often including side-lying, upright, supine, and prone and guided by imaging findings when possible.	When resting or lying down 2 minutes in each position	The lung receives more oxygen or blood depending on your position. By changing positions often, you can improve filling and blood flow to specific areas of the lung.

BREATHING EXERCISES:

Breathing exercises should be performed 2-3x/day for a total of 10-15 minutes daily. You can combine different breathing exercises. Work towards a goal of 30-60 minutes of total breathing exercises daily.

Frequency: 2-3 times / day, daily

Duration: 10-15 minutes for first 3-4 sessions

Progression: Incrementally increase duration every 2-3 sessions towards a total goal duration of 30-60 minutes

EXERCISE	INSTRUCTIONS	DOSE	VIDEO	RATIONALE
Huff cough	Take a deep breath and forcefully huff out a cough by making a “huff” sound.	Whenever you feel mucus caught in your throat	Link	Huff cough changes the width of the airway and increases the force that air comes out of the lungs to get expectorant and mucus out of the airway.
Diaphragmatic breathing (with nasal inspiration and active abdominal contraction)	Lie or stand. Put one hand on your chest and one hand on your abdomen. Breathe deeply through your nose. Allow your chest and abdomen to expand. Start exhaling by actively	10x	Link	Diaphragmatic breathing engages the diaphragm and minimizes overworking other muscles. Breathing through the nose encourages recruitment of the diaphragm and enhances humidity. Active abdominal contraction increases

	contracting your abdomen. At the end of expiration, continue to actively contract your abdomen			abdominal pressure and puts the diaphragm in a more favorable position.
Glossopharyngeal breathing	Take a short breath in. Hold your breath for half a second. Take another breath in. Hold it in for half a second. Take a 3 rd breath in and hold it for half a second. Exhale completely.	10x	Link	Glossopharyngeal breathing can increase the amount of air in your lungs.
3 second breath hold	Breathe in deeply. Hold your breath for 3 seconds. Exhale.	10x	Link	Allows oxygen to enter into parts of the lung that may be blocked by mucus.
Incentive Spirometer	Inspiratory and expiratory muscle training can be implemented in these patients starting with incentive spirometry and progressing to inspiratory muscle training devices if available. ^{18,19}	10x	Link	
Pursed lip breathing	Breathe in through your nose. Exhale through pursed or puckered lips.	During physical activity when oxygen saturation falls below 90%	Link	Pursed lip breathing slows down the flow of air out of lungs and prevents the airway from collapsing or sticking together if there is mucus in the airways.

PHYSICAL EXERCISE:

- Physical exercise is a cornerstone of pulmonary rehabilitation and is the most important part of clearing your airway. Early movement and physical exercise work better than breathing exercises.
- Use oxygen if it has been provided to you by your doctor. Oxygen use helps unload the respiratory muscles.
- Use your pulse oximeter when engage in physical exercise. Target SpO2 > 90%.
- Increase your supplemental oxygen by 1L at a time maintain oxygen saturation >90%
- Pause and rest if SpO2 drops below target or Borg scale dyspnea score > 3.
- Use pursed lip breathing during exercise to keep SpO2 > 90%.
- Stop if SpO2 does not recover or if you are unable to maintain Borg scale dyspnea score <4, despite rest or oxygen supplementation, and consult with your healthcare professional.
- Stop if you have chest pain, palpitations, and dizziness, and consult with your healthcare professional.

Exercise frequency: 1-2 times per day, 3-4 times a week

Exercise duration: 10-15 minutes for first 3-4 sessions and incrementally increase. 15-45 min each session

Exercise intensity: Borg dyspnea score ≤ 3

Exercise type: walking, biking

Progression: Incrementally increase work load/effort every 2-3 sessions to target Borg score 4-6 and target total duration to 30-45 minutes

Exercise	Instruction	Dose	Diagram	
Arm lifts Video Link	Sit or stand. Start with your arms at your side. As you breath in, bring your arms up from the side. As you breath out, bring your arms back down to your side.	10x		Arm lifts increase chest wall movement and allow more air to enter the lungs.
Walking Video Link	Walk daily	2-3 times daily		Physical movement helps with blood

				flow, oxygen delivery, and cardiovascular efficiency.
Neck Stretch Video Link	Gently side bend your neck towards your right shoulder. Hold your neck there for 1 minute. Breathe in and out. Gently side bend your neck towards the left shoulder. Hold your neck there for 1 minute. Breathe in and out.	1-2 minutes each side		Stretching increases the amount the chest wall can move and the amount of air that can enter the lung.
Upper Chest Stretch Video Link	Bring both arms up and over the head. Place palms of the hand on the back of the head. Breathe in and out.	1-2 minutes total		Stretching increases the amount the chest wall can move and the amount of air that can enter the lung.
Side Stretch Video Link	Lift your right arm up. Bend the left side your body towards the ground. Hold for 1 minute. Breathe in and out. Lift your left arm up. Bend the right side your	1-2 minutes each side		Stretching increases the amount the chest wall can move and the amount of air that can enter the lung.

	body towards the ground. Hold for 1 minute. Breathe in and out.			
Cat/Cow Video Link	Exhale and slowly round your head and torso forward. Inhale and slowly extend your head and torso backwards.	10 x		Stretching increases the amount the chest wall can move and the amount of air that can enter the lung.

The [Modified Borg Scale \(Borg CR10 Scale\)](#) is a validated and easy to use tool for patients to self-monitor respiratory effort with a close correlation between the magnitude of respiratory effort and the intensity of dyspnea

PM&R and Pulmonary Rehabilitation for COVID-19. (<https://pubmed.ncbi.nlm.nih.gov/32541352>) Wang, Tina J. MD; Chau, Brian MD; Lui, Mickey DO; Lam, Giang-Tuyet MD; Lin, Nancy MD; Humbert, Sarah MD PM&R and Pulmonary Rehabilitation for COVID-19, American Journal of Physical Medicine & Rehabilitation: June 11, 2020 - Volume Publish Ahead of Print - Issue - doi: 10.1097/PHM.0000000000001505