Clinical management of COVID-19

World Health Organization

REHABILITATION FOR PATIENTS WITH LUNG IMPAIRMENT AFTER COVID-19 ILLNESS

COVID-19 Care Pathway: Overview

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Screen for COVID-19
when a person first accesses the health care system.

Ask patient a series of simple questions based on standardize case definition. Keep a distance of at least 1 m between the person asking question and the patient.

Acuity-based triage
in the emergency unit or similar area to sort patients into categories based on need for time-sensitive treatment.

Clinical assessment
for severity of disease, including assessment of risk factors.

arrange for testing as soon as possible

COVID-19 treatment
Treat and isolate in health facility (COVID-19 treatment centre, SARI treatment facility, rehabilitation centre, long-term care facility) or community facility or home according to WHO home care guidance.

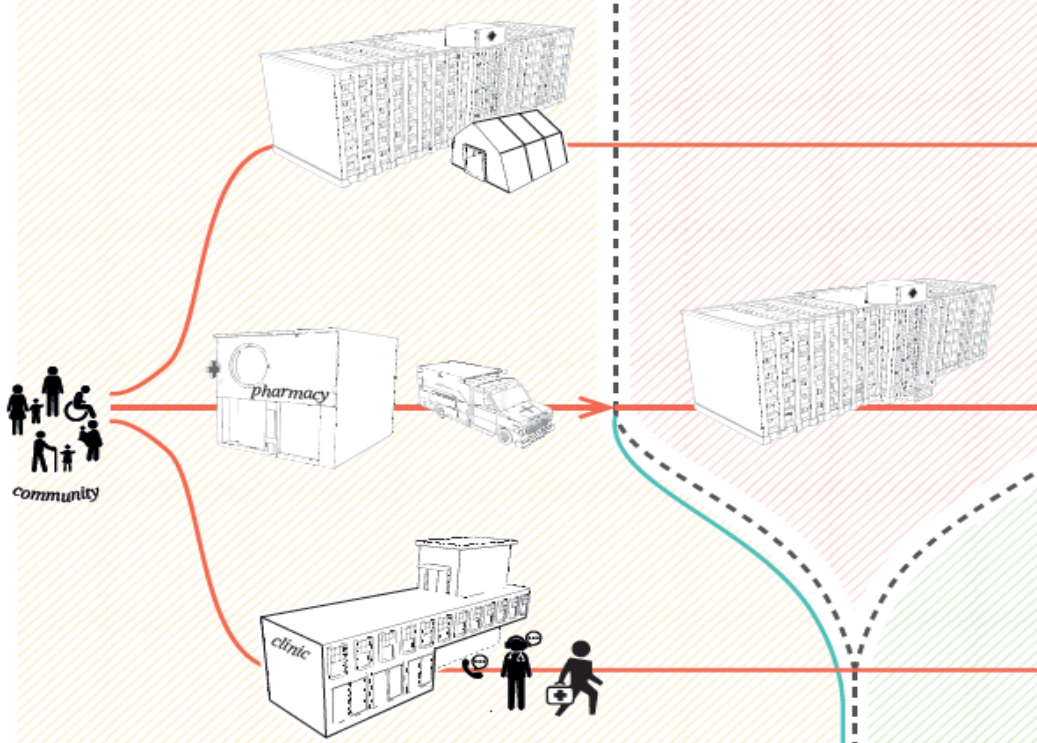
Release from pathway
Discontinue transmission-based precautions, including isolation
For symptomatic patients: 10 days after symptom onset, plus at least 3 days without symptoms (without fever and respiratory symptoms).
For asymptomatic patients: 10 days after test positive.

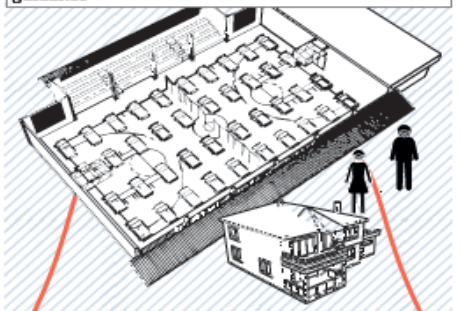
Ad-hoc community screening sites / Community health workers / Clinics / Health posts / Hospitals / Ambulances / Phone-telemedicine / Pharmacies / Long term health care facilities

Appropriate infection prevention control measures, including isolation and personal protective equipment

Mild OR low risk moderate
including asymptomatic persons

Treat and isolate in health facility or community facility or home according to WHO home care guidance

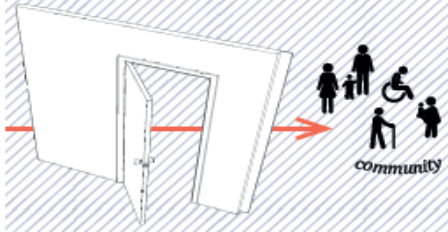




Condition improves

Condition worsens

High risk moderate OR severe OR critical
Treat and isolate in health facility



Non COVID-19 care pathway per local protocol

Not a suspect COVID-19 case

Negative test

WHO: Clinical management of COVID-19. Interim guidance, 27 May 2020.

Learning Objectives

At the end of this lecture, you will be able to:

- Describe the etiology of lung impairment in the context of COVID-19
- Know who and when to assess for lung impairment
- Provide education and advice to patients and their families with lung impairment
- Advise on rehabilitation interventions for patients with lung impairment

Introduction

- What is lung impairment?
- How likely is it that someone will experience changes in lung functioning?
- What are the common rehabilitation needs and care pathway/patient journey for people with COVID-19 and lung functioning difficulties?

This training is focused on patients who are in the sub-acute to long-term phase of care and are medically stable. They may be an inpatient in a hospital or have returned to their home or community setting. It is not for patients in the ICU or a critical care setting.

For information about the respiratory management of COVID-19 patients, including while in ICU please review the **WHO Clinical Management of COVID-19**

Etiology

Patients can develop lung impairment due to:

- The viral respiratory syndrome, potentially complicated with pneumonia
- Pulmonary Fibrosis
- Pulmonary embolisms
- Respiratory muscle weakness following inflammation, prolonged ventilation, use of neuromuscular blocking drugs
- Immobility and atrophy

Presentation and Indicators of Impairment

- Patients may experience breathlessness when in bed, when sitting upright or when moving small amounts, such as during dressing.
- Patients may have reduced tolerance to everyday activities, walking around the hospital ward, home or when undertaking exercise. They may avoid activity.
- A dry cough is common in COVID-19 and may persist beyond recovery.
- Patients may report chest pain and/or tightness, and wheeziness when breathing.
- Breathlessness may contribute to fatigue, which may be reported during recovery.
- New severe breathlessness (an inability to speak full sentences, sweating and blueish lips and face) requires urgent medical attention.

Objectives of Rehabilitation

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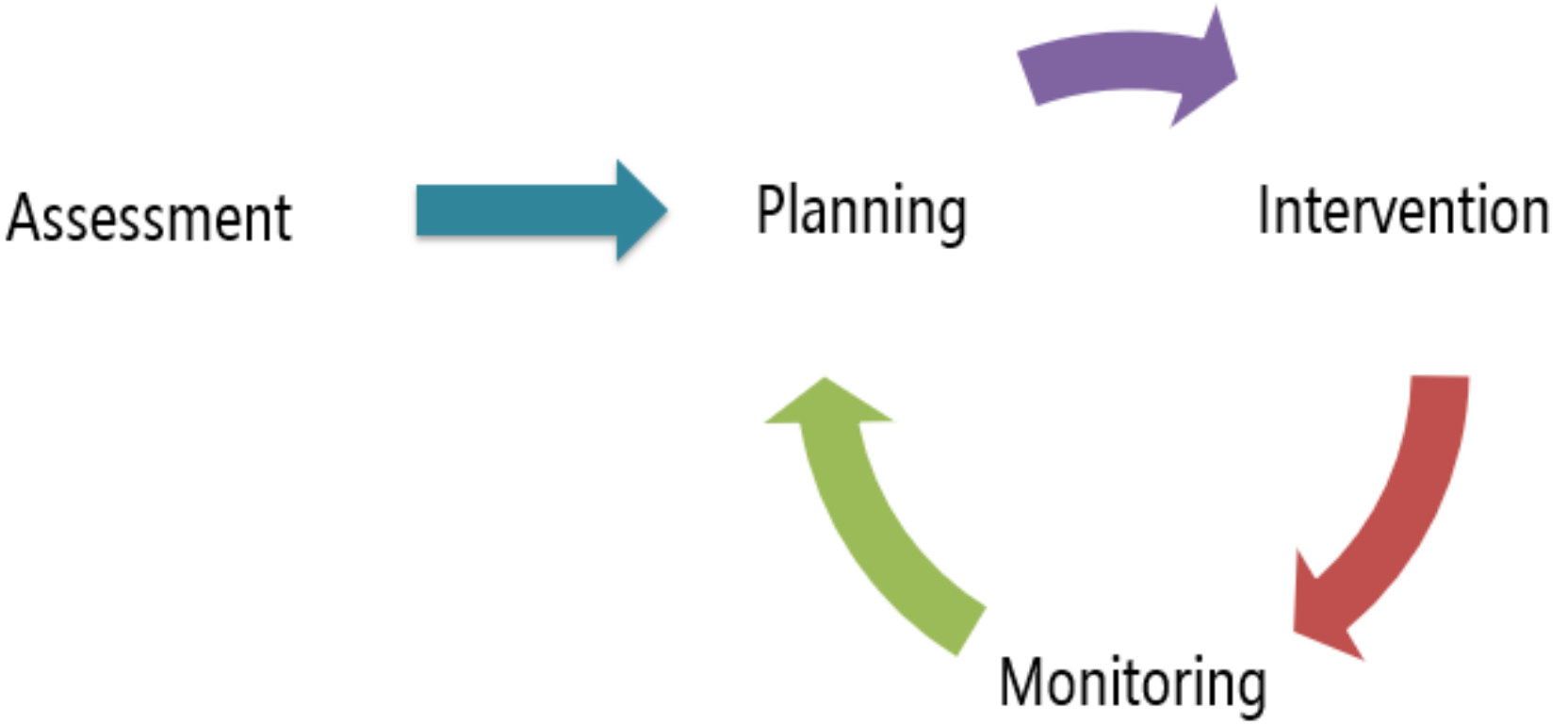
The overarching goal of rehabilitation is to optimize functioning and reduce disability

Rehabilitation should be targeted to the specific goals of the patient, however in general, rehabilitation for lung impairment aims to:

- Empower the patient and their family to understand the impairment and how to manage it in their daily lives;
- Improve lung function; and
- Compensate for deficits in lung functioning.

Rehabilitation Cycle



Assessment: Who should be assessed?

Any patients who have experienced severe COVID-19 are at risk of encountering limitations in lung functioning.

The following patients should be routinely assessed for lung functioning once medically stable:

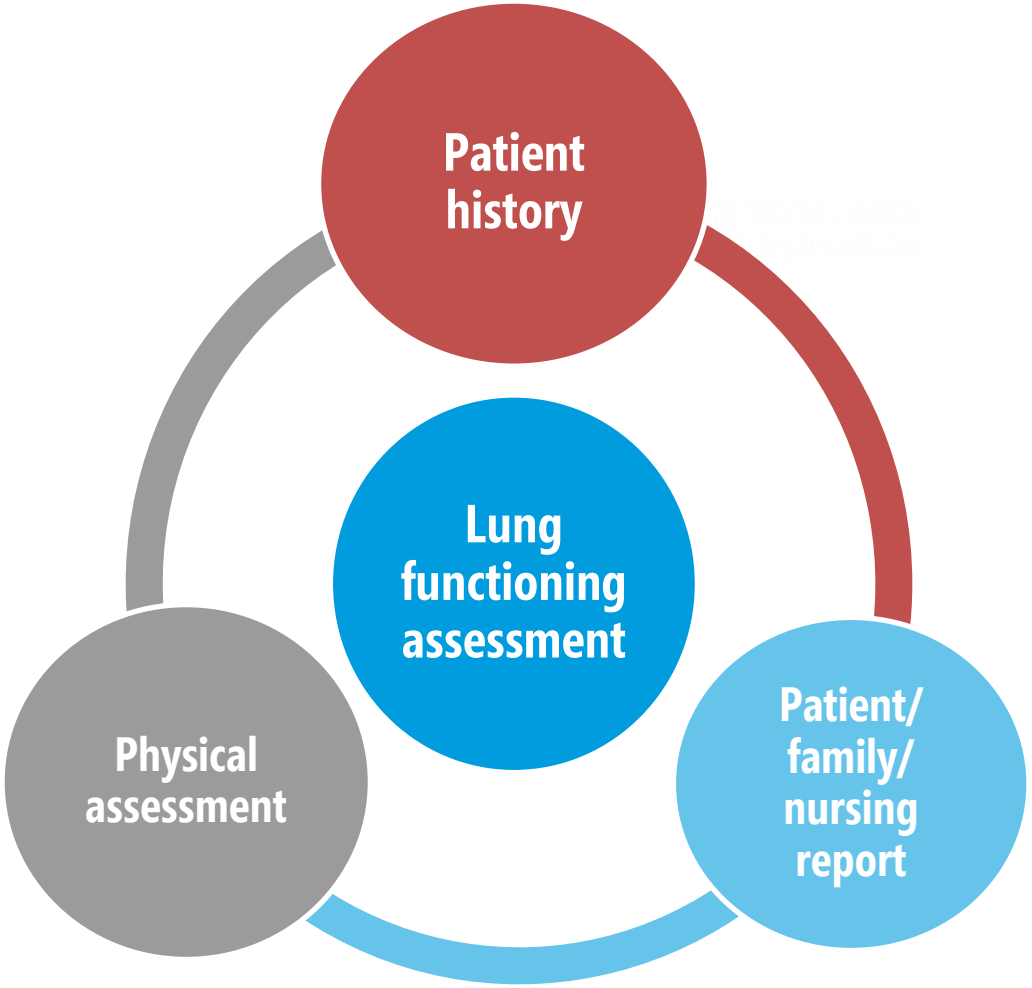
- Patients who have been mechanically ventilated; on prolonged oxygen therapy; older patients; patients with complex clinical situations with co-morbidities; or any patients with a prolonged hospital stay.

- Any patients that exhibit signs of lung functioning difficulties, such as breathlessness with minimal exertion.

Assessment Approaches

Physical functioning assessment is comprised of

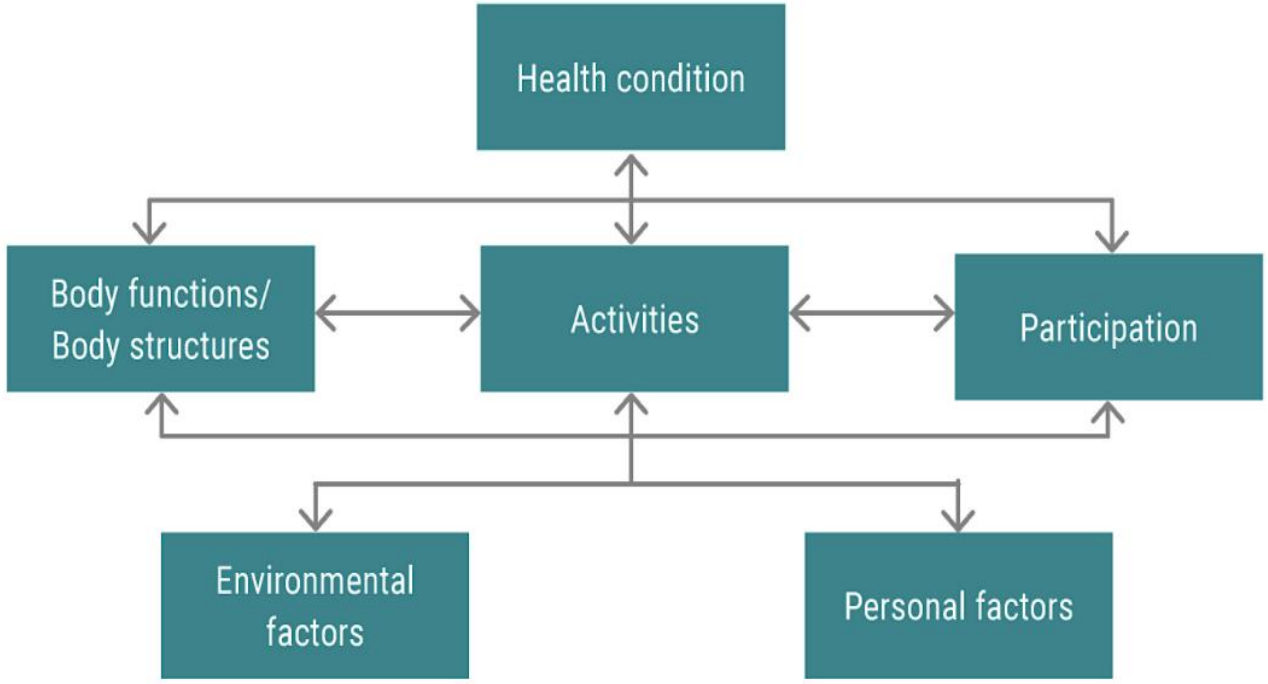
- Gathering the patient's history
- Reports from the patient, their family and the nurses/caregivers
- Conducting a physical assessment of lung function, including through objective/standardized measures that will enable outcome measurement.



Assessment Approaches

The **WHO-ICF** can serve as a model to capture and organize several constructs from subjective and objective assessment.

It is likely that many patients experiencing lung functioning difficulties will also experience physical deconditioning and assessing both may be necessary. See the ***module for physical deconditioning*** *for guidance.*



Before Assessment: Infection Prevention and Control (IPC)

Specific infection control considerations related to rehabilitation for COVID-19 patients are based around the core principles of IPC*:

-Hand hygiene
-Respiratory Hygiene
-Environmental Cleaning
-PPE
-Waste Management

Rehabilitation equipment use should consider the risk of infection and capacity to properly decontaminate:

- Wherever possible, single patient use and disposable equipment is preferred.
- Reusable equipment must be decontaminated before and after patient use;
- Ensure there is a way to flag clean equipment to differentiate from used equipment
- Avoid moving equipment between infectious and non-infectious areas.

Please refer to WHO IPC guidance and training material for more information.

*Refer to the WHO guide "Infection prevention and control during health care when coronavirus disease (COVID-19) is suspected or confirmed"

IPC for Lung Impairment

Aerosol Generating Procedures (AGP) require additional IPC precautions (specially the use of a respirator).

AGP where rehabilitation professionals may be involved include:

-Intubation/extubation

-Manual ventilation

-Resuscitation

-Non Invasive Ventilation

-Sputum induction induced by using nebulized hypertonic saline

The following may also be AGP, but more data is required:

-High flow oxygen delivery

-Nebulizer treatment

Rehabilitation specific techniques that are not listed as AGP by WHO but which may be classified locally as such include:

-Manual respiratory techniques (chest physiotherapy)

-Use of positive pressure devices, cough assists and high frequency oscillatory devices

Assessment: History and Patient Report

Patient history and report should gather information on the patient's:

- Clinical history, including diagnostic results, esp. from imaging
- Pre-admission physical and respiratory status (to determine extent of change)
- Co-morbidities (to identify factors that may inform clinical decision making and influence recovery)
- Respiratory difficulties reported, including breathlessness, cough, exercise tolerance
- Home and community environment, including ability to exercise safely indoors or outdoors
- Relevant personal and cultural factors

Physical Assessment

An examination of lung function should include:

- Vital signs – respiratory rate, pulse, oxygen saturation and blood pressure
- Observation – general, chest, speech and breathing patterns
- Auscultation – breath sounds, vocal resonance
- Further diagnostic assessment may be required (if not already available), including chest CT and arterial blood gases

Physical Assessment

❗ Testing lung function using spirometers is not recommended in patients in the first 6-8 weeks with COVID-19 because of the infection risks

Later, when patients are non-infectious, spirometry may be helpful to provide objective measures for forced expiratory volume in 1 second, forced vital capacity, and peak expiratory flow rate.

These can then be used for monitoring progress.

Planning

Results from assessment should be used to make decisions with the patient and their family regarding:

- Discharge readiness
- Support requirements
- Rehabilitation intervention required, including if provision of assistive products or medical equipment such as for home oxygen therapy
- Goals
- Mode of ongoing rehabilitation service delivery e.g. inpatient, outpatient, community, virtual, etc.

Rehabilitation Interventions

The following areas should be targeted in a rehabilitation programme that addresses difficulties in lung functioning after COVID-19. Many of these apply known pulmonary rehabilitation concepts and principles.

1. Increasing ventilation
2. Airway clearance, when indicated
3. Education for breathlessness
4. Returning to everyday activities
5. Physical exercise and fitness

1. Increasing Ventilation

Active cycle of breathing techniques (ACBT)

- Exercises that increase breathing control and support deep breathing with thoracic expansion to improve ventilation of the lower lung area.
- Feedback from rehabilitation personnel and through use of a spirometer (that stays with the client) may assist.

Positioning advice and support

- Positions that allow increased thoracic expansion such as sitting up in bed or chair, as well as standing with support can improve ventilation.

2. Airway Clearance

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❗ Airway clearance is only indicated for patients where airway obstruction by sputum is suspected, as these techniques are droplet generating.

- In most patients, ACBTs can be used for airway clearance.
  - These include using deep breathing with thoracic expansion and then exhaling with a huff. Huffing occurs through **forced expiration with an open mouth**. Huffing can help move sputum from small airways to larger airways.
  - A sequence of deep breaths (x3) then 1-2 huffs and a cough can be used to clear sputum.

- Bubble PEP (positive expiratory pressure) can also be used and combined with a huffing and cough sequence to help clear sputum.

3. Education for Breathlessness

Breathlessness education is important so that patients learn to self-manage and do not avoid exercise and become weaker over time.

Key messages:

- **Stay calm**. Breathlessness commonly causes people to feel anxious which can make it worse. Staying calm and using positions and breathing techniques helps manage it.
- **Use positions**. There are several positions that can be adopted that offer support to the body to make breathing easier.
- **Use breathing techniques**. Different breathing techniques may suit in different circumstances.
  - Deep breathing techniques are helpful when wanting to be calm.
  - Paced breathing can be helpful when doing something that takes effort.
  - Pursed lip breathing helps patients empty their lungs and may be helpful to remain calm and when doing a moderate level of activity.

2. Education – Breathlessness

Patients may experience breathlessness with exertion when recovering from COVID-19. This can expend additional energy and cause increased anxiety.

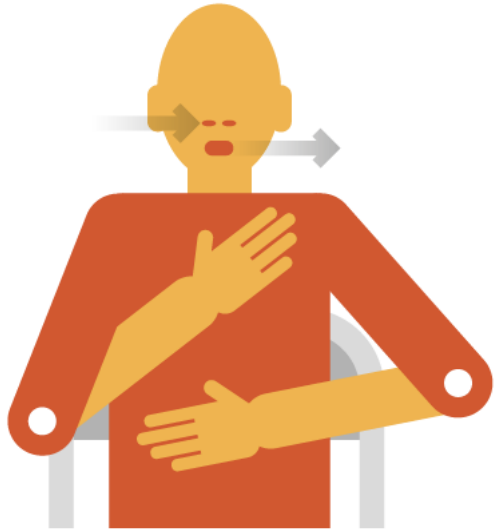
Patient can try relive breathlessness with a number of positions:

2. Education – Breathlessness

4. Forward lean standing

5. Standing with back support

Patients may also find controlled breathing techniques useful.



Inhaling through the nose and exhaling through the mouth

These are two more breathing techniques that may reduce breathlessness.

Pursed lip breathing technique

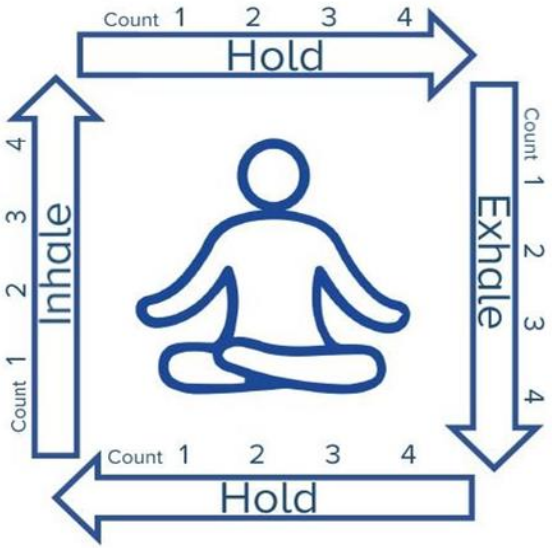
1. Relax your neck and shoulder muscles. ***(figure to right)***
2. Breathe in (inhale) slowly through your nose for two counts, keeping your mouth closed. Don't take a deep breath; a normal breath will do. It may help to count to yourself: inhale, one, two. ***(figure to right)***

3. Pucker or "purse" your lips as if you were going to whistle or gently flicker the flame of a candle. ***(figure to left)***
4. Breathe out (exhale) slowly and gently through your pursed lips while counting to four. It may help to count to yourself: exhale, one, two, three, four. ***(figure to right)***

With regular practice, this technique will seem natural to you.

SQUARE BOX BREATHING

1. **Inhale:** Close your eyes. Breathe in through your nose whilst counting to 4.
2. **Hold:** Keep the air inside and count to 4.
3. **Exhale**: Breathe out slowly for count of 4. Repeat.
4. **Hold:** wait another count of 4 until you breathe in through your nose again.



3. Education for Breathlessness

Advice on staying calm and using positions and breathing techniques is important. Further advice regarding the management of breathlessness is included in the physical deconditioning and ADL modules.

- Education should also include the signs of when to seek further medical assistance
  - Severe shortness of breath that is not relieved by these positions and breathing techniques

- Rehabilitation professionals should also be aware of the risks of cardiac conditions and pulmonary embolisms in COVID-19 patients

4. Returning to Everyday Activities

- Resume everyday activities at an appropriate pace that is safe and manageable for energy levels.
  - During the inpatient period activity levels should remain low
- Monitor oxygen saturation levels closely
  - Ensure patients know to report sweating, light headedness and other signs of low saturation as they increase their activities.
- Some patients may require ongoing supplemental oxygen as they attempt to return to everyday activities.
- Fatigue is common during recovery- ensure patients listen to their bodies and do not overdo it.

5. Exercise and Fitness

- Pulmonary rehabilitation programs should be considered; however sessions may need to be modified to take infection prevention and control measures into account.
  - Utilization of telehealth or other locally appropriate means to deliver some components could be considered
- Encourage a conservative approach rather than an accelerated return to physical activity.
- Exercising at the right intensity can be monitored by using the Borg scale.
- For those with ongoing oxygen needs, at rest or during effort, increased caution should be used if applying principles of graded exercise.

Advice for Monitoring Exercise Intensity

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Advice on monitoring exercise intensity using the Borg scale can assist patients to exercise at an optimal level.

- Reassure the patient that feeling breathless whilst exercising is normal, and is not harmful or dangerous.
- The Borg scale is often used to help people rate how much effort is required to complete their exercise, and can help patients progress their fitness.
- Start at lower intensities, especially during the first 6 weeks following acute illness.

BORG SCALE

0	Nothing at all
0.5	Very, very slight
1	Very slight
2	Slight
3	Moderate
4	Somewhat severe
5	Severe
6	
7	Very severe
8	
9	Very, very severe
10	Maximal

5. Exercise and Fitness

Increasing exercise and fitness can be aided by Respiratory Muscle Training (RMT). RMT can improve breathing through reducing the effort required by the body as it breathes.

- Inspiratory muscle training (IMT) is facilitated through loading of inspiration, normally by using a breathing device such as a Threshold IMT or Powerbreathe.
- Expiratory muscle training may also be helpful.

Other breathing techniques such as Pursed lip breathing and Bubble PEP (both mentioned earlier) can also help train inspiratory muscles.

5. Exercise and Fitness

Over time patients should aim to do exercise for 20-30minutes, 5 days per week (frequency and intensity will vary by patient).

- Use a pulse oximeter to monitor oxygen saturation. Stop physical activities or exercises when a patient's saturation drops more than 5-10% during exercise.
- Start with less exercise and increase slowly by 30 seconds to 1 minute each time.
- Warm-up and cool-down exercises are recommended.
- Provide patients with physical exercises in the home situation with prescribed training parameters. Encourage keeping an exercise logbook.

Monitoring

- Repeating assessments at set intervals is the typical mechanism for objectively monitoring physical status.
- Observation and patient and family report are important subjective mechanisms of monitoring physical status.
- Monitoring of pre-existing comorbid conditions is warranted to guarantee safety of rehabilitative interventions, and to optimize health.
  - This may require availability of a multidisciplinary team of medical specialists.
- Consider transfer of rehabilitation information to the relevant health professionals, e.g. general practitioner, abiding by patient confidentiality legal frameworks.

Summary

- It is likely that many patients that have been critically unwell with COVID-19 will have some impairment to their lung functioning.
  - These patients are likely to also have other concerns such as physical deconditioning so a comprehensive rehabilitative approach should be utilized.
- Fatigue and breathlessness are commonly reported during recovery. Education, advice and exercise are necessary.
- While improvement in lung functioning will occur for many patients that have had severe COVID-19, for others more significant difficulties may remain over the longer term. More tailored pulmonary rehabilitation programmes may be helpful for this group.
- A range of education, advice, exercise prescription and potentially provision of supplemental oxygen will address rehabilitation needs.
- Provision of rehabilitation should occur along the continuum of inpatient, outpatient and when needed through specialised and community based rehabilitation care. Infection prevention and control measures may influence service delivery but measures can be taken to ensure a continuum.

Useful Links

- WHO Patient leaflet: Support for Self-Management after a COVID-19 Illness https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/technical-guidance/2020/support-for-rehabilitation-self-management-after-covid-19.-related-illness-2020
- WHO Clinical Management of COVID-19

https://www.who.int/publications/i/item/clinical-management-of-covid-19

- PAHO Rehabilitation Considerations During the COVID-19 outbreak

https://www.paho.org/en/documents/rehabilitation-considerations-during-covid-19-outbreak

- WCPT response to COVID-19 – Briefing paper 2.

https://www.wcpt.org/sites/wcpt.org/files/files/wcptnews/COVID19-Briefing-paper-2-Rehab-PT-May2020.pdf

Acknowledgements

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