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## Delivering pulmonary rehabilitation during the COVID-19 pandemic: A Canadian Thoracic Society position statement

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#### Disclaimer

This position statement aims to provide guidance for resumption of pulmonary rehabilitation (PR) services during the post-peak phase of the COVID-19 pandemic (ie, period of low community prevalence). These recommendations are based on the consensus of the authors, who are members of the Canadian Thoracic Society (CTS) and on the information available at the time this document was written. Changes in the prevalence of COVID-19 or in our understanding of the disease may affect the recommendations in this statement. Guidance from local public health authorities and from institutional infection prevention and control departments should be considered when assessing information in this document. Readers should consult these resources as they develop plans for PR services.

This document will be updated as new information becomes available; therefore, we recommend checking the CTS website (<https://cts-sct.ca/covid-19/>) for updates.

#### Overview

PR is a comprehensive intervention based on a thorough patient assessment followed by individualized therapies that include, but are not limited to, exercise training, education and promotion of behavior change through the inclusion of self-management interventions. The goal of PR is to improve the physical and psychological health of people with chronic respiratory disease and to help patients to develop the skills and confidence they need to adopt a healthier lifestyle.<sup>1</sup> PR is an important component of care for patients with chronic

obstructive pulmonary disease (COPD) and other chronic airway diseases (asthma, bronchiectasis), interstitial lung diseases and pulmonary hypertension.<sup>1</sup> PR reduces dyspnea, increases exercise capacity, improves quality of life and diminishes healthcare resource utilization in individuals with COPD and has similar positive effects in patients with other chronic respiratory diseases.<sup>1</sup>

National PR quality indicators have been developed to provide guidance on components essential to a quality PR program.<sup>2</sup> Key indicators among these are: a thorough history and physical assessment; objective measures that facilitate safe exercise prescription, aerobic and strength training, and outcome assessment. Readers are encouraged to implement the CTS-endorsed quality indicators, as all programs, whether conducted in-person or virtually, should strive to deliver programs of the highest possible quality.<sup>2</sup>

COPD is associated with an increased risk of severe COVID-19 illness<sup>3,4</sup> and the presence of co-morbidities in those with other chronic respiratory diseases likely increases their risk of severe complications and mortality from COVID-19. The SARS-CoV-2 virus that causes COVID-19 is acquired and disseminated through respiratory droplets spread during coughing, sneezing and talking.<sup>5</sup> The virus can also be transferred by touching the face (mouth, nose, eyes) with hands that have come into contact with the droplets containing the virus on fomites, such as hard surfaces. Therefore, it is important to consider how PR can be delivered safely and effectively during the COVID-19 pandemic. Although virtual PR is proving to be a viable option for many patients, there are challenges related to access and use of technology, optimal assessment and the ability to obtain outcome measures, as well as adequate

supervision. These issues as well as the additional benefits of social interactions support the goal of restarting in-person programs when rates of community transmission are low.

This position statement describes approaches to in-person and virtual PR and offers resources to support PR delivery during the COVID-19 pandemic. It is acknowledged that patients recovering from COVID-19 may need rehabilitation, especially after prolonged illness when there can be profound peripheral muscle weakness and mental health sequelae. However, recommendations for patients recovering from COVID-19 but without respiratory conditions are beyond the scope of this statement.

## Alternatives to in-person PR

There are a number of ways to offer PR remotely to either eliminate or substantially decrease the risk of SARS-CoV-2 infection associated with in-person delivery models. There is growing evidence to support the use of home-based<sup>6–10</sup> and real time, on-line supervised telerehabilitation.<sup>9</sup> A group of Canadian clinicians and researchers have developed a standardized PR program, which has been endorsed by the CTS.<sup>11</sup> This PR program was adapted from the Living Well with COPD program and focuses on disease self-management, and can be delivered in-person or through web-based platforms (including at home).

Resources:

- CTS-Endorsed PR Program: <https://www.livingwellwith-copd.com/174-introduction-.html>
- Guidance on virtual models of PR from the Agency for Clinical Innovation in New South Wales, Australia: [https://www.aci.health.nsw.gov.au/\\_\\_data/assets/pdf\\_file/0004/589801/ACI-COP-Guide-for-Virtual-Models-of-Pulmonary-Rehabilitation.pdf](https://www.aci.health.nsw.gov.au/__data/assets/pdf_file/0004/589801/ACI-COP-Guide-for-Virtual-Models-of-Pulmonary-Rehabilitation.pdf)
- Home-based PR Program from Australia - <https://home-baserehab.net/>

PR can be delivered virtually using various online platforms such as Zoom and Microsoft Teams. Program staff should observe their organization's policies on privacy and security related to the use of such services. These platforms allow PR staff to provide interactive education sessions, real-time or pre-recorded exercise classes, and case management. They offer some ability to assess and monitor the patient's response to exercise but because of inherent limitations associated with the availability of equipment and other aspects of the home environment, modifications are needed in order to deliver virtual PR.

## Considerations for delivering PR virtually

### 1. Assessment of exercise capacity

An important factor responsible for the positive outcomes associated with PR is individually prescribed exercise training that is objectively based on a test of exercise capacity. Neither a Six Minute Walk Test (6MWT) nor an Incremental Shuttle Walk Test (ISWT) can be administered according to recognized standards<sup>12</sup> in most home

environments. The one-minute sit-to-stand test has been demonstrated to be a valid representation of aerobic capacity and leg strength<sup>13,14</sup> and is responsive to change<sup>15,16</sup> in people with COPD. However, currently the results cannot be easily used to prescribe a walking or cycling program.

Alternatively, as outpatient services re-open, PR programs may choose to have patients attend in-person exercise assessments using a 6MWT, ISWT or cardiopulmonary exercise tests with appropriate monitoring, the results of which can be used to prescribe personalized in-home or virtual aerobic exercise training. This approach has been used successfully by Holland et al. in their home-based rehabilitation trial.<sup>7</sup>

### 2. Monitoring exercise responses

Assessment of the response to exercise is key to guiding exercise intensity and progression, and to enhancing patient safety.<sup>2</sup> While some patients may have home oximetry, and heart rate and blood pressure monitors that can assist with objectively monitoring exercise responses, many programs will need to rely on the modified Borg Dyspnea (0–10) and Rating of Perceived Exertion (6–20) scales. Patients will need to be proficient in monitoring exercise responses accurately, and program staff should consider whether patient self-monitoring is sufficient or whether real-time virtual monitoring is needed.

### 3. Safety

While adverse events with home or virtual PR are uncommon, safety of the home exercise environment should be assessed. Safety concerns such as electrical cords, clutter, loose rugs, dim lighting, oxygen tubing and availability of a sturdy support surface should be identified and managed. Patients should be encouraged to have a support person present during all exercise sessions to provide assistance or call for help, if needed. The usual precautions regarding the risk of SARS-CoV-2 virus and other virus transmission should also be encouraged and managed especially during exercise sessions. Organizations such as the College of Physiotherapists of Ontario (<https://www.collegept.org/registrants/virtual-practice-in-physiotherapy>) mandate that physiotherapists must have a plan on how to deal with an emergency when doing virtual care. Staff should consult their local professional organization and institutional policies and procedures on this issue.

Caution should be taken when considering home or virtual PR for patients with pulmonary hypertension and those who are pre-lung transplant or have very high O<sub>2</sub> needs, given the limitations of home monitoring and paucity of data on optimal exercise training intensity in unsupervised environments in these patient groups.

Resource:

- Expectations Regarding Tele-rehabilitation (Virtual Practice) Based on Existing College of Physiotherapists of Ontario Standards and Rules <https://www.collegept.org/registrants/virtual-practice-in-physiotherapy>

#### 4. Education and Self-Management Intervention

Education and self-management intervention are vital to facilitate long-term adherence to health-enhancing behaviors.<sup>2</sup> There are many alternatives to offering in-person delivery of these essential components of PR. Holland and colleagues provided motivational interviewing by phone in their home-based PR program.<sup>7</sup> The use of videoconferencing allows presentations, group discussions and activities that may enhance traditional education and counseling techniques. In addition to usual content,<sup>2</sup> programs should include practical education on and reinforce public health advisories regarding avoiding acquisition and spread of the virus that causes Covid-19 illness.

Resources:

- Canadian PR program endorsed by CTS (<http://www.livingwellwithcopd.com/canadian-pulmonary-rehabilitation-program.html>). This enhanced program includes education tools and a slide deck to be used for patient group teaching. The resources are web-based and also include tools for pre-program evaluation, self-management behavior modification interventions, exercise program and prescription, post-program evaluation and long-term follow-up.
- The British Thoracic Society has developed resource documents (<https://www.brit-thoracic.org.uk/about-us/covid-19-information-for-the-respiratory-community/>) for PR healthcare professionals conducting programs remotely during the COVID-19 pandemic. The documents provide information and links to self-management tools and a wide array of assessment resources, all of which are available free of charge.

#### In-person pulmonary rehabilitation

As previously indicated, virtual PR presents significant challenges to exercise prescription and safety. Virtual or home-based PR may be challenging for some patients, especially those uncomfortable with the required technology or those residing in rural communities that lack the high-speed internet service needed to support viable online PR platforms. Other patients may prefer an in-person social environment. As rates of community spread of COVID-19 decrease, some programs are considering restarting in-person PR.

The Public Health Agency of Canada, provincial and local public health or infection units offer guidance on ways to decrease transmission and infection rates of SARS-CoV-2. Facility specific planning that includes all PR staff as well as other relevant stakeholders (respirologist/medical director, infection control representative, occupational health and safety) is crucial during planning and initiation, and throughout program delivery during the pandemic.

The following are some of the issues that must be considered when assessing the safety of providing this type of program.

#### 1. Screening Procedures for In-Person PR

As respiratory patients may be immunosuppressed, the relative risk versus benefits should be considered when referring these patients to in-person PR. Patients and staff should observe their facility's procedures for daily screening for COVID-19. Many patients attending PR will have symptoms that are similar to those of COVID-19 (eg, cough, sore throat, dyspnea, myalgia or fatigue), and therefore patients should be asked specifically about new symptoms and potential exposures. If patients have a positive screen, the local SARS-CoV-2 infection control protocols should be consulted to determine follow-up. In addition, all patients should be assessed for their ability to practice appropriate safety precautions, including physical distancing, hand hygiene, proper mask use and the ability to respond accurately to pre-program screening questions.

Patients who have had COVID-19 will only be able to take part in in-person PR when they are deemed to no longer be contagious based on local infection control practices.

#### 2. Exercise Space and Equipment

Whenever possible, patients should wear a mask during exercise to reduce the risk of virus transmission to other patients or staff. Some patients may be unable to wear a mask during exercise; therefore, physical distancing of exercise equipment is recommended. There is some evidence to suggest that 2 meters between pieces of equipment is insufficient protection as coughing and deep breathing with exercise may increase the spread of droplets from an infected individual.<sup>17</sup> Positioning exercise equipment so patients can avoid being in the direct path of expiratory flow from patients should be considered. Class sizes will likely need to be limited to avoid sharing exercise equipment. Facility policies may allow equipment to be cleaned between participants. Sufficient time should be given between classes to allow for droplets to settle or dissipate, and for cleaning and disinfecting of surfaces.

Patients should sanitize their hands when entering the exercise space and after using each piece of equipment.

#### 3. Waiting Areas

Hand sanitizer should be available in the waiting area. Patients and caregivers should wear masks and observe physical distancing in waiting areas. This may be encouraged by using posters that provide education in the waiting area (Guidance on face mask use can be found on the CTS website.) Single-use medical masks are recommended to ensure cleanliness. Caregivers or family members offering transportation or other support should not remain in the waiting area during the class. Limit personal items worn or brought to class to those used during the session or those that are essential for safety.

All non-essential miscellaneous materials, such as magazines and plants, should be removed from patient areas.

Any furniture in the space should be easy to clean and disinfect between classes (vinyl vs. cloth surfaces) and no pil-lowcases or towels should be used. Use floor marking to indicate appropriate physical distancing and to establish one-way patient flow in and out of the treatment space and waiting area.

#### 4. Education and Self-management intervention

Consider offering education and behavior change classes vir-tually to limit in-person contact time.

#### Key points

1. People with chronic respiratory diseases who have COVID-19 are at high risk of developing severe illness; therefore, it is important to limit any potential exposure to the SARS-CoV-2 virus.
2. PR should offer education on and reinforce public health advisories regarding reducing risk of SARS-CoV-2 infections.
3. Options for remote delivery of PR include home-based, telerehabilitation and computer-based virtual programs. These can be designed to provide education and exer-cise with some programs being capable of remote moni-toring of exercise performance.
4. The ability to individualize and monitor exercise inten-sity may be limited when in-person PR is not possible.
5. In-person PR may be considered when community spread of COVID-19 is low, and when patients have needs that are difficult to address remotely or when patient access to technology is limited.
6. Hybrid models that include in-person assessment and exercise testing, and a combination of in-person and virtual exercise training, education and self-management can be used to optimize exercise safety and training effectiveness while decreasing disease transmission and infection rates.
7. Strict attention to mask use, physical distancing and dis-infection protocols must be observed by staff and patients if in-person PR is offered. Equipment should not be shared among patients unless appropriate disin-fecting and cleaning protocols are utilized.

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