

COVID-19 CADTH REFERENCE LIST

Virtual Pulmonary Rehabilitation for Respirator Disease or Post-Intensive Care Syndrome: Clinical Effectiveness and Guidelines

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To produce this report, CADTH used a modified approach to the selection, appraisal, and synthesis of the evidence to meet decision-making needs during the COVID-19 pandemic. Care has been taken to ensure the information is accurate and complete, but it should be noted that international scientific evidence about COVID-19 is changing and growing rapidly.

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Questions or requests for information about this report can be directed to requests@cadth.ca.

Research Questions

1. What is the clinical effectiveness of virtual pulmonary rehabilitation for patients with coronavirus disease or post-intensive care syndrome?
2. What is the clinical effectiveness of virtual pulmonary rehabilitation for patients with respiratory disease?
3. What are the evidence-based guidelines regarding the use of virtual pulmonary rehabilitation for patients with respiratory disease or post-intensive care syndrome?

Key Findings

Seven systematic reviews (five with meta-analysis), two randomized controlled trials, and one non-randomized study were identified regarding the clinical effectiveness of virtual pulmonary rehabilitation for patients with respiratory disease. In addition, one evidence-based guideline was identified regarding the use of virtual pulmonary rehabilitation for patients with respiratory disease. No relevant literature was identified regarding the clinical effectiveness of virtual pulmonary rehabilitation for patients with coronavirus disease or post-intensive care syndrome.

Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. To address research question one, the main search concepts were virtual pulmonary rehabilitation and post-intensive care syndrome, or COVID-19 and like respiratory diseases. No search filters were applied to limit retrieval by study type. To address research questions two and three, the main search concepts was virtual pulmonary rehabilitation, with search filters applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, or network meta-analyses, and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010 and June 8, 2020. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Q1,3: Individuals (of all ages) with confirmed or presumptive coronavirus disease (COVID-19), severe acute respiratory syndrome (SARS), or Middle East Respiratory Syndrome Coronavirus (MERS), or individuals with post-intensive care syndrome (PICS) Q2,3: Patients with respiratory or lung disease
Intervention	Q1-3: Virtual pulmonary rehabilitation or Pulmonary rehabilitation via telephone
Comparator	Q1-2: Pulmonary rehabilitation conducted in-person; No pulmonary rehabilitation Q3: Not applicable
Outcomes	Q1,2: Clinical effectiveness (e.g., functional capacity, exercise tolerance, quality of life, return to work) and adverse events Q3: Recommendations regarding the use of virtual pulmonary rehabilitation
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

Results

Seven systematic reviews (five with meta-analyses),¹⁻⁷ two randomized controlled trials,^{8,9} and one non-randomized study¹⁰ were identified regarding the clinical effectiveness of virtual pulmonary rehabilitation for patients with respiratory disease. In addition, one evidence-based guideline¹¹ was identified regarding the use of virtual pulmonary rehabilitation for patients with respiratory disease. No relevant health technology assessments were identified.

References of potential interest that did not meet the inclusion criteria are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

1. Hong Y, Lee SH. Effectiveness of tele-monitoring by patient severity and intervention type in chronic obstructive pulmonary disease patients: A systematic review and meta-analysis. *Int J Nurs Stud.* 2019 Apr;92:1-15.
[PubMed: PM30690162](#)
2. Deng N, Gu T, Zhao Q, Zhang X, Zhao F, He H. Effects of telephone support on exercise capacity and quality of life in patients with chronic obstructive pulmonary disease: a meta-analysis. *Psychol Health Med.* 2018 Sep;23(8):917-933.
[PubMed: PM29320895](#)
3. Hui CY, Walton R, McKinstry B, Jackson T, Parker R, Pinnock H. The use of mobile applications to support self-management for people with asthma: a systematic review of controlled studies to identify features associated with clinical effectiveness and adherence. *J Am Med Inform Assoc.* 2017 May 1;24(3):619-632.
[PubMed: PM27694279](#)

4. McCabe C, MccCann M, Brady AM. Computer and Mobile Technology Interventions for Self-Management in Chronic Obstructive Pulmonary Disease. *Cochrane Database Syst Rev.* 2017 May 23;5(5):CD011425.
[PubMed: PM 28535331](#)
5. Chan C, Yamabayashi C, Syed N, Kirkham A, Camp PG. Exercise Telemonitoring and Telerehabilitation Compared with Traditional Cardiac and Pulmonary rehabilitation: A Systematic Review and Meta-Analysis. *Physiother Can.* 2016;68(3):242-251.
[PubMed: PM27909373](#)
6. Kew KM, Cates CJ. Remote versus face - to - face check - ups for asthma. *Cochrane Database Syst Rev.* 2016 Apr 18;4:CD011715.
[PubMed: PM 27087257](#)
7. Lundell S, Holmner Å, Rehn B, Nyberg A, Wadell K. Telehealthcare in COPD: a systematic review and meta-analysis on physical outcomes and dyspnea. *Respir Med.* 2015 Jan;109(1):11-26.
[PubMed: PM25464906](#)

Randomized Controlled Trials

8. Carr SB, Ronan P, Lorenc A, Mian A, Madge SL, Robinson N. Children and Adults Tai Chi Study (CF-CATS2): a randomised controlled feasibility study comparing internet-delivered with face-to-face Tai Chi lessons in cystic fibrosis. *ERJ open research.* 2018 Oct;4(4).
[PubMed: PM30568967](#)
9. Bourne S, DeVos R, North M, Chauhan A, Green B, Brown T, Cornelius V, Wilkinson T. Online Versus Face-To-Face Pulmonary Rehabilitation for Patients With Chronic Obstructive Pulmonary Disease: Randomised Controlled Trial. *BMJ Open.* 2017 Jul 17;7(7):e014580.
[PubMed: PM28716786](#)

Non-Randomized Studies

10. Knox L, Dunning M, Davies C, Mills-Bennet R, Sion TW, Phipps K, Stevenson V, Hurlin C, Lewis K. Safety, feasibility, and effectiveness of virtual pulmonary rehabilitation in the real world. *Int J Chron Obstruct Pulmon Dis.* 2019; 14: 775–780.
[PubMed: PM 31040656](#)

Guidelines and Recommendations

11. COVID-19 rapid guideline: community-based care of patients with chronic obstructive pulmonary disease (COPD). (*NICE guideline 168*). London (GB): NICE; 2020.
<https://www.nice.org.uk/guidance/ng168/resources/covid19-rapid-guideline-communitybased-care-of-patients-with-chronic-obstructive-pulmonary-disease-copd-pdf-66141907467973> Accessed 2020 Jun 12
See: Pulmonary rehabilitation, 2.12, page 10

Appendix — Further Information

Previous CADTH Reports

12. Pulmonary Rehabilitation for Chronic Obstructive Pulmonary Disease. (*Health Technology Assessment*). Ottawa (ON): CADTH.
<https://cadth.ca/pulmonary-rehabilitation-chronic-obstructive-pulmonary-disease>
 Accessed 2020 Jun 12.

Health Technology Assessments – Intervention Not Specified

13. Franek J. Home telehealth for patients with chronic obstructive pulmonary disease (COPD): an evidence-based analysis. *Ont Health Technol Assess Ser.* 2012;12(11):1-58.
[PubMed: PM23074421](#):

Overviews of Reviews – Unclear Intervention

14. Murphy LA, Harrington P, Taylor SJ, et al. Clinical-effectiveness of self-management interventions in chronic obstructive pulmonary disease: An overview of reviews. *Chron Respir Dis.* 2017 Aug;14(3):276-288.
[PubMed: PM28774200](#)

Systematic Reviews and Meta-Analyses

Alternative Intervention

15. Lu Y, Li P, Li N, et al. Effects of Home-Based Breathing Exercises in Subjects With COPD. *Respir Care.* 2020 Mar;65(3):377-387.
[PubMed: PM31719191](#)
16. Paré G, Moqadem K, Pineau G, St-Hilaire C. Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: a systematic review. *J Med Internet Res.* 2010 Jun 16;12(2):e21.
[PubMed: PM20554500](#)

Unclear Intervention – Virtual Pulmonary Rehabilitation Not Specified

17. Hanlon P, Daines L, Campbell C, McKinstry B, Weller D, Pinnock H. Telehealth Interventions to Support Self-Management of Long-Term Conditions: A Systematic Metareview of Diabetes, Heart Failure, Asthma, Chronic Obstructive Pulmonary disease, and Cancer. *J Med Internet Res.* 2017 May 17;19(5):e172.
[PubMed: PM28526671](#)
18. Liu XL, Tan JY, Wang T, et al. Effectiveness of home-based pulmonary rehabilitation for patients with chronic obstructive pulmonary disease: a meta-analysis of randomized controlled trials. *Rehabil Nurs.* 2014 Jan-Feb;39(1):36-59.
[PubMed: PM23780865](#)

Outcomes Not Specified

19. Rush KL, Hatt L, Janke R, Burton L, Ferrier M, Tetrault M. The efficacy of telehealth delivered educational approaches for patients with chronic diseases: A systematic review. *Patient Educ Couns*. 2018 Aug;101(8):1310-1321.
[PubMed: PM29486994](#)

COVID-19 Upcoming Study Protocols

20. Feilong Zhu, Wei Chen, Ming Zhang, Cheng Zeng. The effect of respiratory rehabilitation for patients with Coronavirus Disease 2019 (COVID-19) in the rehabilitation phase: a systematic review and meta-analysis. PROSPERO 2020 CRD42020180214
https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020180214
 Accessed 2020 Jun 12
21. Gutierrez SR, Torres Costoso AI, Pozuelo Carrascosa D, Martínez Vizcaíno V. Effectiveness of respiratory rehabilitation for the treatment of the sequelae produced by interstitial lung diseases similar to Covid-19. A systematic review. PROSPERO 2020 CRD42020178937
https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020178937
 Accessed 2020 Jun 12
22. Renjun Gu, Yihuang Gu, Chunbing Zhang, Zhiguang Sun. Rehabilitation exercise plans for patients after recovery from COVID-19: a systematic review and meta-analysis. PROSPERO 2020 CRD42020176990
https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020176990
 Accessed 2020 Jun 12
23. Renjun Gu, Chunbing Zhang, Zhiguang Sun, Yihuang Gu. The safety and effectiveness of rehabilitation exercises in the treatment of COVID-19: a systematic review and meta-analysis. PROSPERO 2020 CRD42020176972
https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020176972
 Accessed 2020 Jun 12

Randomized Controlled Trials – Rehabilitation Setting Not Specified

24. Liu K, Zhang W, Yang Y, Zhang J, Li Y, Chen Y. Respiratory rehabilitation in elderly patients with COVID-19: A randomized controlled study. *Complement Ther Clin Pract*. 2020 May;39:101166.
[PubMed: PM32379637](#)

Non-Randomized Studies – Rehabilitation Setting Not Specified

25. Hsieh MJ, Lee WC, Cho HY, et al. Recovery of pulmonary functions, exercise capacity, and quality of life after pulmonary rehabilitation in survivors of ARDS due to severe influenza A (H1N1) pneumonitis. *Influenza Other Respir Viruses*. 2018 Sep;12(5):643-648.
[PubMed: PM29676537](#)

Review Articles

26. Lew HL, Oh-Park M, Cifu DX. The War on COVID-19 Pandemic: Role of Rehabilitation Professionals and Hospitals. *Am J Phys Med Rehabil.* 2020 May 4.
[PubMed: PM32371624](#)
27. Simpson R, Robinson L. Rehabilitation After Critical Illness in People With COVID-19 Infection. *Am J Phys Med Rehabil.* 2020 Jun;99(6):470-474.
[PubMed: PM32282359](#)
28. Almojaibel AA. Delivering Pulmonary rehabilitation for Patients with Chronic Obstructive Pulmonary disease at Home Using Telehealth: A Review of the Literature. *Saudi J Med Med Sci.* 2016 Sep-Dec;4(3):164-171.
[PubMed: PM30787723](#)

Additional References

29. Addressing therapeutic questions to help Canadian health care professionals optimize COPS management for their patients during the COVID-19 Pandemic [**in press**]. Ottawa (ON): Canadian Thoracic Society; 2020.
https://cts-sct.ca/wp-content/uploads/2020/04/Final_CTS-COVID-19_COPD-Position-Statement_Apr-8.pdf Accessed 2020 Jun 12
30. Bryant MS, Fedson SE, Sharafkhaneh A. Using Telehealth Cardiopulmonary rehabilitation during the COVID-19 Pandemic. *J Med Syst.* 2020 May 28;44(7):125.
[PubMed: PM32462352](#)
31. Mukaino M, Tatemoto T, Kumazawa N, et al. Staying Active in Isolation: Telerehabilitation for Individuals With the Severe Acute Respiratory Syndrome Coronavirus 2 Infection. *Am J Phys Med Rehabil.* 2020 Jun;99(6):478-479.
[PubMed: PM32282339](#)
32. Tele-Rehab and COVID-19. Toronto (ON): GTA Rehab Network; 2020.
<http://www.gtarehabnetwork.ca/tele-rehab-and-covid-19>
Accessed 2020 Jun 12
See table for individual resources
33. The Evidence Base for Telehealth: Reassurance in the Face of Rapid Expansion During the COVID-19 Pandemic. (White paper). Rockville (MD): Agency for Healthcare Research and Quality; 2020. <https://effectivehealthcare.ahrq.gov/products/telehealth-expansion/white-paper>
Accessed 2020 Jun 12
34. Yang LL, Yang T. Pulmonary rehabilitation for patients with coronavirus disease 2019 (COVID-19). [**article in press**]. *Transitional Med.* 2020
<https://www.sciencedirect.com/science/article/pii/S2095882X20300414>
Accessed 2020 Jun 12