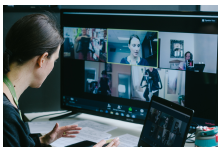
Alternative models of pulmonary rehabilitation delivery



Dr Narelle Cox
Senior Research Fellow
Monash University, Melbourne, Australia

IBAS

MONASH University

PULMONARY REHABILITATION

"... comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to, exercise training, education and behaviour change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviour"

Spruit et al ATS/ERS PR Statement 2013

Why do Pulmonary Rehabilitation?

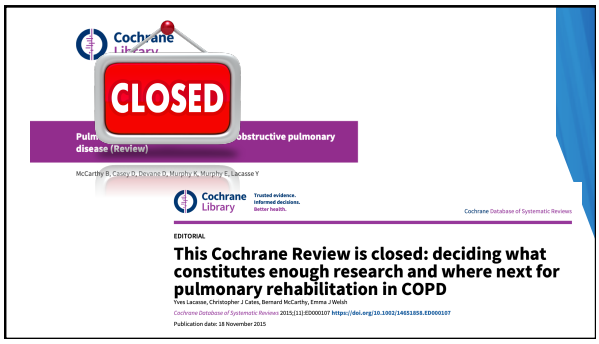
- Improves exercise capacity
- Reduces breathlessness
- Improves quality of life
- Reduces acute exacerbations
- Reduces time spent in hospital
- Cost effective
- Reduces mortality when delivered post exacerbation

Cochrane Library
Cochrane Database of Systematic Reviews

Pulmonary rehabilitation for chronic obstructive pulmonary disease (Review)

McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y

- **ILD:** Dowman et al Cochrane Database Syst Rev 2021 Issue 2. Art. No.: CD006322.
- **PHT:** Morris et al Cochrane Database Syt Rev 2017 Issue 1. Art. No.: CD011285.
- **Bronchiectasis:** Lee et al Arch Phys Med Rehab 2017 98(4): 774-782



Why do we need alternative models of PR?

NOT SUITABLE FOR ALL PATIENT GROUPS	ISSUES OF UPTAKE AND COMPLETION	LIMITED PROGRAM AVAILABILITY AND STAFFING	RESTRICTIONS ASSOCIATED WITH COVID
• Younger patients • Multi-morbidity • Working • Infection control	• Limited referrals • Travel, transport, parking issues • <3% people access program within 12/12 of hospitalisation	• Sufficient programs to meet <2% of global demand • Staffing and resource issues – rural/LMICs	• Shift from centre-based program delivery • Reduced capacity

AMERICAN THORACIC SOCIETY DOCUMENTS

An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation

Carolyn L. Rochester, Ioannis Vogiatzis, Anne E. Holland, Suzanne C. Lareau, Darcy D. Marciniuk, Milo A. Puhan, Martijn A. Spruit, Sarah Masefield, Richard Casaburi, Enrico M. Clini, Rebecca Crouch, Judith Garcia-Aymerich, Chris Garvey, Roger S. Goldstein, Kylie Hill, Michael Morgan, Linda Nici, Fabio Pitta, Andrew L. Ries, Sally J. Singh, Thierry Troosters, Peter J. Wijkstra, Barbara P. Yawn, and Richard L. ZuWallack; on behalf of the ATS/ERS Task Force on Policy in Pulmonary Rehabilitation

Box 5: Increasing Patient Access to PR

Recommendations:

- Patient access to PR should be improved by augmenting program commissioning through increased sustainable payer funding.
- New PR programs should be created in geographic areas where demand exceeds capacity.
- Novel PR program models should be developed and studied that will make evidence-based PR more accessible and acceptable to patients and payers; this may include new approaches within hospital-based programs, community-based programs, comprehensive and well-resourced home-based or telehealth-supported programs, or other novel models of program delivery.
- Selection criteria for PR should reflect current published evidence. The evidence indicates that patients who benefit from PR include not only persons with moderate to severe airflow limitation but also those with mild to moderate airflow limitation with symptom-limited exercise tolerance, those after hospitalization for COPD exacerbation, and those with symptomatic non-COPD respiratory conditions. Increasing patient access for these patient groups will depend on increased referrals, increased payer funding, and patient demand for services.

What are alternative models of PR?

ESSENTIAL COMPONENTS OF PULMONARY REHABILITATION

1. An initial center-based assessment by a health care professional
2. An exercise test at the time of assessment
3. A field exercise test
4. Quality of life measure
5. Dyspnoea assessment
6. Nutritional status evaluation
7. Occupational status evaluation

8. Endurance training
9. Resistance training

10. An exercise program that is individually prescribed
11. An exercise program that is individually progressed
12. Team includes a health care professional with experience in exercise prescription and progression

13. Health care professionals are trained to deliver the components of the model that is deployed

Holland et al Annals ATS 2021

What is the evidence?

Cochrane Library

Cochrane Database of Systematic Reviews

Telerehabilitation for chronic respiratory disease (Review)

Cox NS, Dal Corso S, Hansen H, McDonald CF, Hill CJ, Zanaboni P, Alison JA, O'Halloran P, Macdonald H, Holland AE

Methods

P: Adults with stable chronic respiratory disease

I: Telerehabilitation ***must*** include exercise training
At least 50% of intervention delivered via telerehabilitation

C:
1. Centre-based pulmonary rehabilitation
3. No rehabilitation control

O: Exercise capacity* Dyspnoea Adverse events Quality of life

*primary time point for analysis is change from baseline to end of intervention

S: RCTs and CCTs to November 2020


VIDEOCONFERENCING n= 4

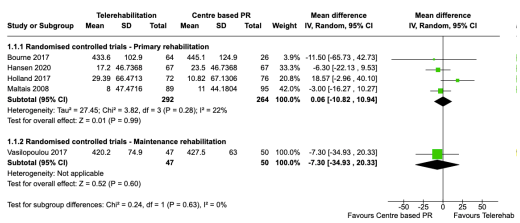

TELEPHONE n= 4


WEBSITE (± PHONE) n= 2 (+2)


MOBILE APP n= 1


SMS n= 1

Telerehabilitation vs Centre-based PR: 6MWD



Cox et al CDSR 2021 1:CD013040

Telerehabilitation vs Centre-based PR: Symptoms & QOL

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with centre-based (out-patient) pulmonary rehabilitation	Risk with telerehabilitation				
Primary rehabilitation						
Breathlessness - CRQ dyspnoea domain Follow-up: end of rehabilitation (range 8 weeks to 11 weeks)	The mean change in CRQ dyspnoea in the control groups was **0.7 points**	The mean change in CRQ dyspnoea was **0.13 points higher** in the telerehabilitation groups (0.1 points lower to 0.4 higher) with higher scores indicating improvement	MD 0.13 (-0.13 to 0.40)	394 (3 RCTs)	⊕⊕◯◯ LOW [2,3]	
Quality of life - SGRQ Follow-up: end of rehabilitation (range 6 weeks to 8 weeks). Lower scores indicating better quality of life	The change in SGRQ in the control groups ranged from **-6.3 to 1.6 points**	The mean change in SGRQ score was **1.3 points lower** in the telerehabilitation groups (4 points lower to 1 point higher)	MD -1.26 (-3.97 to 1.45)	274 (2 RCTs)	⊕⊕◯◯ LOW [1,3]	The MCID for the SGRQ is 4 points

Cox et al CDSR 2021 1:CD013040

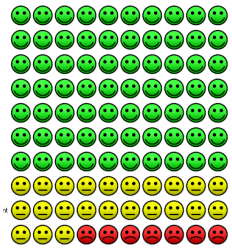
Completion

Figure 6. In the control group 70 people out of 100 completed treatment over 6 to 12 weeks, compared to 93 (95% CI 80 to 96) out of 100 for the active treatment group.

PR completers either program

Additional completers with telerehabilitation

Non-completers



OR 5.36, 95%CI 3.12 to 9.12; 516 participants; 3 studies

Cox et al CDSR 2021 1:CD013040

- Remote assessment
- Real-time supervision aerobic training
- Equivalence of video-supervision models
- Specialist/bespoke equipment versus consumer devices
- Diagnoses other than COPD (e.g. ILD, CF)
- Stable state health versus exacerbation
- Long term follow-up
- Economic analyses: cost-effectiveness, cost-utility, return on investment
- Infrastructure, training and support needs

- Remote assessment
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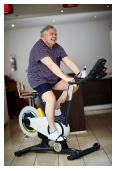
STUDY PROTOCOL Open Access

Telerehabilitation versus traditional centre-based pulmonary rehabilitation for people with chronic respiratory disease: protocol for a randomised controlled trial

Narelle S. Cox[1*], Christine F. McDonald[2], Jennifer A. Alison[3], Ajay Mahal[4], Richard Wootton[5], Catherine J. Hill[6], Janet Bondarenko[7], Heather Macdonald[8], Paul O'Halloran[9], Paolo Zanaboni[10], Ken Clarke[11], Deidre Rennick[8], Kaye Borgeli[11], Angela T. Burge[12], Anoub Lahham[1], Bruna Wagieck[13], Hayley Crute[8], Pawel Czajnyn[11], Amanda Nichols[14] and Anne E. Holland[12]



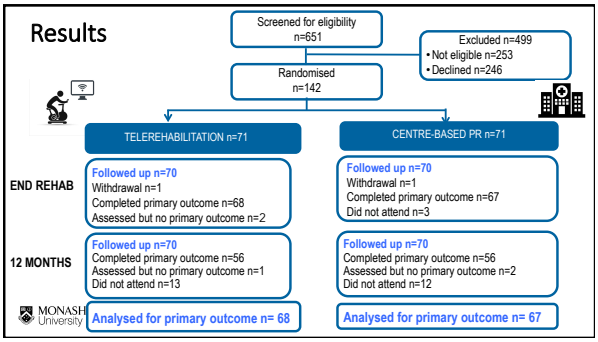
To investigate whether home-based telerehabilitation is equivalent to centre-based pulmonary rehabilitation in people with chronic respiratory disease

Methods

TELEREHABILITATION	CENTRE-BASED PR
• 8 weeks, 2 sessions/week • One home visit – initial training session • Supervised exercise training • Aerobic training – cycle based • Independent strength training • Education • Virtual group 4-6 participants • Home exercise program	• 8 weeks, 2 sessions/week • Supervised exercise training • Aerobic training – walking and cycle • In session strength training • Education • Physical group 8-12 participants • Home exercise program

Equipment

Results



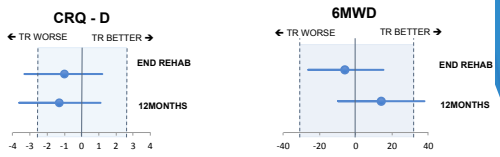
Results – Clinical outcomes ITT analysis

No statistically significant difference between groups for any outcome.

		Between group differences	
		TR – Centre PR (95% CI)	
		End rehab	1 year
Primary outcome	CRQ – Dyspnoea	-1.0 (-3.3, 1.2)	-1.3 (-3.6, 1.1)
Secondary outcomes	CRQ-		
	Emotion	-0.2 (-3.2, 2.7)	0.7 (-2.4, 3.9)
	Fatigue	0.2 (-1.5, 1.8)	-0.2 (-2.0, 1.6)
	Mastery	-0.9 (-2.5, 0.7)	0.1 (-1.6, 1.8)
	6MWD, m	-6 (-26, 15)	14 (-10, 38)
	Endurance cycle test, sec	109 (-77, 284)	-11 (-208, 187)

Cox et al ERJ 2020 56: 4354 [Abstract]

Results – Between group differences



- TR equivalent for 6MWD at TR may not be equivalent for CRQ-D
- Unable to exclude *inferiority* of TR at end rehab and 12 months for CRQ-D

- TR equivalent for 6MWD at end rehab
- Unable to exclude *superiority* of TR for 6MWD at 12 months

Cox et al ERJ 2020 56: 4354 [Abstract]

- Remote assessment
- Real-time supervision aerobic training
- Equivalence of video-supervision models
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- **Diagnoses other than COPD (e.g. ILD, CF)**
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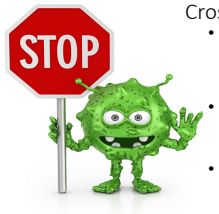
Why traditional PR models don't fit in CF



Cross infection

- Risk initially thought to be no greater than environmental acquisition
  (Hoogkamp et al J Clin Micro 1995)
- Incidence rate of new Ps*A* infection 100% - Danish winter camp
  (Ojeniyi et al Ped Pulm 2000)
- Bacterial transmission occurring in up to 25% of participants – Dutch summer camp
  (Brimicombe et al JCF 2008)

Infection control & group exercise training

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY AUGUST 2014, VOL. 35, NO. 8

CYSTIC FIBROSIS FOUNDATION GUIDELINE

Infection Prevention and Control Guideline for Cystic Fibrosis: 2013 Update

Lisa Saiman, MD, MPH;[1a] Jane D. Siegel, MD;[2a] John J. LiPuma, MD;[3a] Rebekah F. Brown, MD;[2] Elizabeth A. Bryson, RN, MSN, PPCN-BC, CS;[2] Mary Jo Chambers, LCSW, MSW;[2] Veronica S. Downer, RN;[2] Jill Fliege, APRN;[2] Leslie A. Hazle, MS, RN, CPN, CPHQ;[2] Manu Jain, MD, MSc;[4] Bruce C. Marshall, MD, MMM;[5] Catherine O'Malley, RRT-NPS, AS;[2] Suzanne R. Puttee, JD;[2] Gail Potter-Bynoe, BS;[1a] Siobhan Reid,[1] Karen A. Robinson, PhD;[1a] Kathryn A. Subadosa, MPH;[1] H. Joel Schmidt, MD;[3] Elizabeth Tullis, MD, FRCPC;[6a] Jennifer Webber;[2] David J. Weber, MD, MPH[7,8a]

All persons with CF should:

- "Be separated by ≥ 6 feet (2 metres) to decrease risk droplet transmission"
- "Avoid activities associated with transmission of CF pathogens, including fitness classes with another person with CF"

Saiman et al Infect Cont Hosp Epidemiol 2014

Why traditional PR models may not fit in CF

- Age
- Pattern of activity
  - Prescribed training vs play
- Access
  - –Scheduled time of class
  - –Transport
  - –Parental schedule
  - –Work schedule

Novel exercise rehabilitation studies in CF

Hindawi
International Journal of Telemedicine and Applications
Volume 2021, Article ID 6613575, 7 pages
https://doi.org/10.1155/2021/6613575

Research Article

Telerehabilitation Using Fitness Application in Patients with Severe Cystic Fibrosis Awaiting Lung Transplant: A Pilot Study

Aimee M. Layton,[1] Andrew M. Irwin,[2] Erin C. Mihalik,[3] Emily Fleisch,[3] Claire L. Keating,[3] Emily A. DiMango,[3] Lori Shah,[3,4] and Selim M. Arcasoy[3,4]

frontiers in Public Health

BRIEF RESEARCH REPORT
published: 19 September 2016
doi: 10.3389/fpubh.2016.00200

Tele-Exercise as a Promising Tool to Promote Exercise in Children With Cystic Fibrosis

Jan Jan Chen[1*], Dan M. Cooper[1], Faulo Hacklai[2], Anna Sladkey[2], Eliezer Nussbaum[2] and Shlomit Radom-Aizik[1]

Journal of Clinical Medicine

MDPI

Article

High-Intensity Interval Training Is Effective at Increasing Exercise Endurance Capacity and Is Well Tolerated by Adults with Cystic Fibrosis

Abbey Sawyer [1,2,3], Vinicius Cavalheri [1,3,4], Sue Jenkins [1,2,3], Jamie Wood [1,2,3], Nola Cecins [2], Natasha Bear [5], Bhajan Singh [6,7,8], Daniel Gucciardi [9] and Kylie Hill [1,3,*]

RESEARCH/Original Article

The feasibility of online video calling to engage patients with cystic fibrosis in exercise training

Owen W Tomlinson[1,2], James Shelley[1,3,4], Jayne Trott[1,4], Ben Bowhay[1,4], Rohan Chauhan[1] and Christopher D Sheldon[1]

Journal of Telemedicine and Telecare
2021, Vol. 27(2) 116–124
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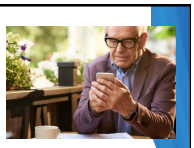
Summary

- Alternative PR models likely ongoing component of therapy delivery in chronic respiratory disease
- Are all program created (delivered) equally? Evidence of real-world effectiveness still required
- Knowledge gaps remain – long-term outcomes? Best model for which patient? Cost-effectiveness?
- Sustainable funding models needed; adequate infrastructure and training



MONASH University

Monash University & Alfred Health, VIC
Prof Anne Holland
Dr Bev Eldridge
Sarah Rawlings
Christie Mellerick
Julianna Dreger
Joanna Lee
A/Prof Brenda Button

Royal Children's Hospital, VIC
Jen Corda
Esta Tannenbaum

Monash Health, VIC
Amanda Nichols
Shelley Bowen
Sarah Rawlings

Royal Hobart Hospital, TAS
Jenny Hauser

Royal Adelaide Hospital, SA
Dr Nathan Ward

Royal Prince Alfred Hospital, NSW
Dr Tiffany Dwyer
Dr Ruth Dentice

Westmead Hospital, NSW
Jenny Bishop
Raynuka Lazarus

Sydney Children's Hospital - Westmead, NSW
Dr Anna Middleton

La Trobe University, VIC
Dr Paul O'Halloran

UK
Dr Kelly Mackintosh
Dr Melita McNarry
Prof Craig Williams

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Questions?