

Rehabilitations for Chronic Obstructive Pulmonary Disease



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Students at the University of Waterloo created this report while being trained in the systematic review methods of Knowledge Impact Strategies. Authors are listed in alphabetical order.

Rehabilitations for Chronic Obstructive Pulmonary Disease

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Take Home Message

- Any type of rehabilitation program (in-patient, out-patient, home-based) is beneficial in reducing hospitalization rates and healthcare usage. However, there is still debate about how early the rehabilitation should be started for it to be effective.
- Physical training exercises are the most used and most effective. This includes many different types - such as strength training, limb training, and so forth.
- Exercise interventions administered less than once a month are ineffective.
- Exercise interventions commencing in the acute illness phase do not present any health benefits to patients and can even be potentially harmful.
- Even rehabilitations as short as 6 weeks can provide significant health benefits.
- Adherence rates suggest that individualized programs with tangible results, action plans, high enjoyment and regular feedback result in more patient compliance and satisfaction.

Overview

This project was completed during the Spring 2015 term by students in an upper-level Psychology course, *Community-Based Research*, at the University of Waterloo. The students were: Teresa Hart, Emma Markoff, Supreet Sandhu and Judit Szabo. They were assisted by the course instructor Dr. Kathleen Bloom. The community partner organization for this project was Waterloo-Wellington Local Health Integration Network (WWLHIN). Its partnership with the University was coordinated by Zach Weston, Manager of Health System Integration at WWLHIN.

Chronic Obstructive Pulmonary Disease (COPD) is a progressive chronic disease in which the exchange of gases in the lungs is obstructed making it difficult to breathe. COPD affects 14% of all adults. It is the leading cause of hospitalizations and the 3rd largest cause of death in Canada. COPD patients are hospitalized for problems that can effectively be treated in the community. The development of a cost-effective, community-based rehabilitation program could lower the number of COPD hospitalizations and help restore functional independence to patients. A quality based rehabilitation program could also increase patient adherence rates, satisfaction and quality of life.

WWLHIN works to recognize health care needs and to plan, integrate and fund health services to improve the well-being of community members. Zach is responsible for identifying and implementing initiatives to improve the efficacy of the Waterloo Wellington health care system.

The WWLHIN has planned to invest up to \$528,600 for the 2015/16 and 2016/17 years in interventions to help people who have experienced a reversible loss of their functional ability and who are at risk of losing their independence. The organization is looking for one or multiple projects to fund. The project should develop and implement a model for community-based chronic disease prevention and management. This model should serve to decrease rates of hospital readmissions for COPD and result in fewer hospitalizations for conditions that can be effectively treated in the community.

Zach Weston explained his role in the WWLHIN and the topic of interest in a classroom meeting at the start of the course and also offered insights and comments to the students during a presentation of the final results. The purpose of this scoping review was to highlight the most current trends in COPD rehabilitations. The information found in this review can be used to identify a sustainable project with a successful and cost-effective rehabilitation program.

What Was Studied?

The primary goals of the scoping review were to identify the types of Pulmonary Rehabilitation (PR) programs available for people with COPD and to assess their effectiveness according to the weight of evidence across the most current existing research. Additional factors of interest to the Waterloo-Wellington Local Health Integration Network that were also examined included program adherence, re-hospitalization rates as well as program cost-effectiveness. Research on COPD rehabilitation programs reported in peer-reviewed journals published from 2014-2015 were reviewed using systematic methods.

How Was It Studied?

The review was conducted between May and July 2015. A literature search was conducted using the Scopus database which compiles peer-reviewed articles from over 21,000 academic journals. The search strategy was:

(TITLE-ABS-KEY (copd) OR TITLE-ABS-KEY ("Chronic obstructive pulmonary disease") AND TITLE-ABS-KEY (rehab*)) AND PUBYEAR > 2012 AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (LIMIT-TO (LANGUAGE, "English"))

The search was conducted on May 27, 2015 and resulted in the identification of 558 research articles. To ensure the relevance of the articles to the research question, 241 articles that met the following criteria were excluded from the review:

- Articles that did not mention or were not concerned with COPD.
- Articles that did not evaluate or were not concerned with some element of rehabilitation.

- Articles that did not include a cognitive and/or behavioural aspect to rehabilitation (i.e. an exercise and/or education component).

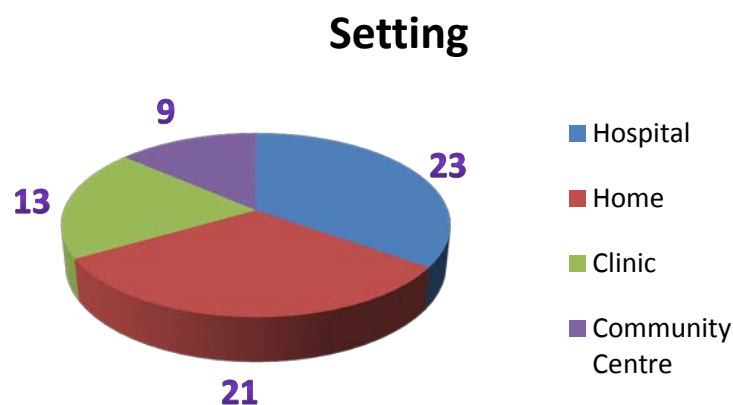
A second set of criteria - listed below - were applied to the remaining 317 articles. 260 articles were subsequently excluded from further analysis because:

- They did not directly concern COPD outcomes (e.g. reduced depression and anxiety).
- The central treatment was primarily pharmacological.
- There was an insufficient description or an unevaluated rehabilitation program.
- The program was centrally concerned with palliative care.
- Programs relied on treatments that heavily incorporate specialized medical machinery or expensive technological gadgetry (e.g. night ventilators, sleep apnea type machines).
- The articles were published before the year 2014.

57 articles remained after the above criteria were applied and all were included in the final review.

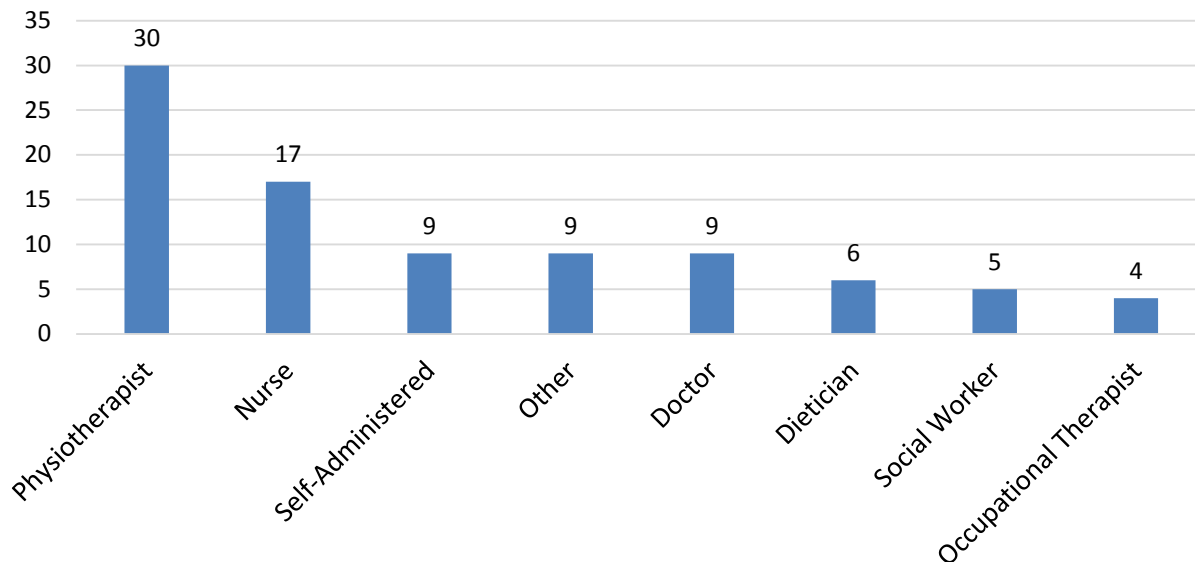
Categories for the extraction of information from the articles were developed. To ensure that the extraction and coding procedure would remain identical between team members, a small number of articles were independently reviewed by each team member and any discrepancies were resolved through group discussion and consensus. The full spreadsheet of information extracted from these articles is attached to the end of this report.

Landscape of Articles



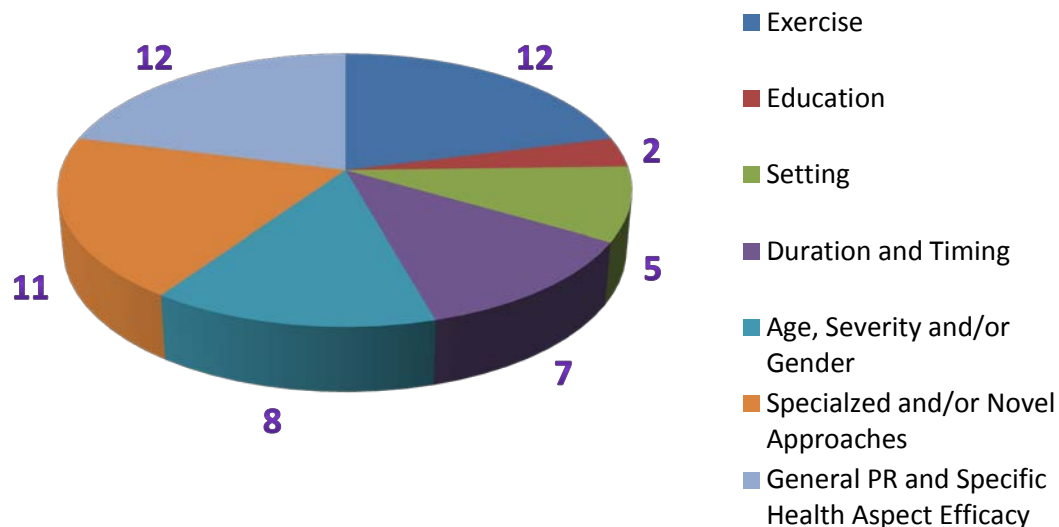
A majority of the PR programs took place in hospitals and at the patients' homes. Clinics and community centers were also used to implement the PR programs.

Staff



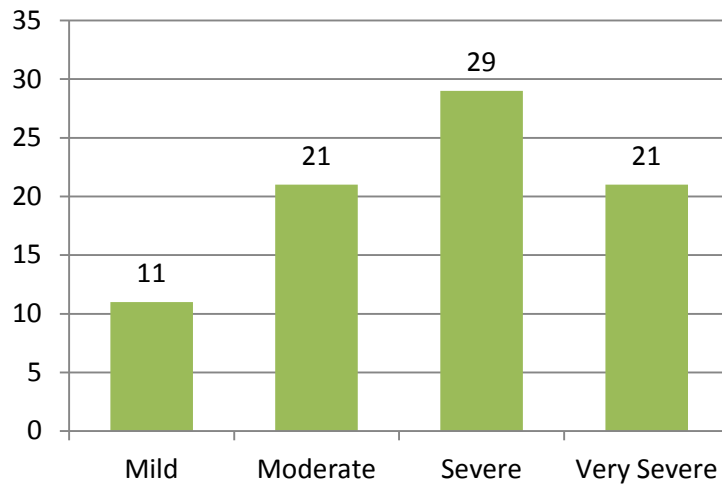
The PR programs were most often supervised by healthcare providers such as physiotherapists and nurses. Several home-based programs also relied on the patient to follow through with the program at home.

Primary Interests within the Articles



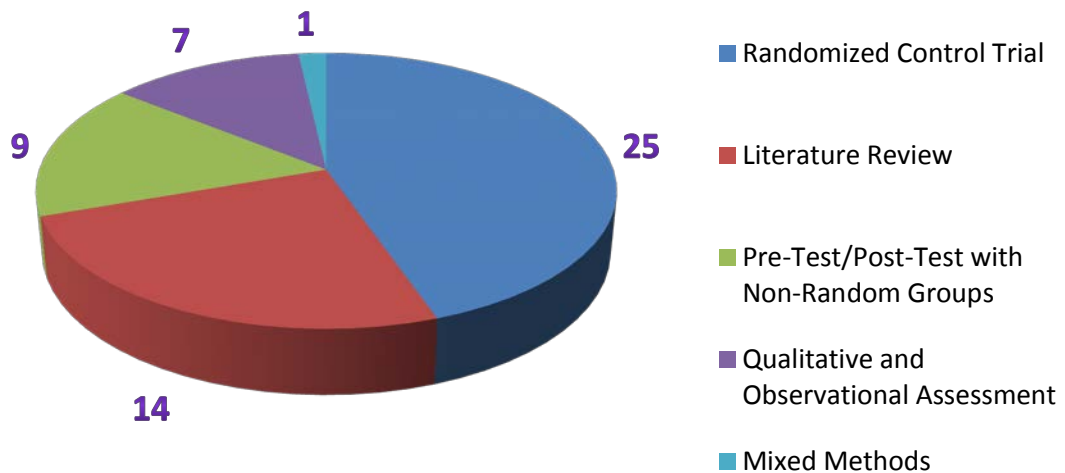
There were many different factors that experimenters studied across the 58 articles. The three factors studied most frequently were the type of exercise, type of educational supports, and the setting in which the PR program was administered. The duration and timing of the programs were studied less frequently, as were age, gender, and severity of the illness.

Observed Severities



Overall, the 58 articles covered all the different severity levels. The severity levels were based on the GOLD staging system.

Research Methods



Mixed methods: study designs used a combination of qualitative and quantitative data, methodologies, and research paradigms.

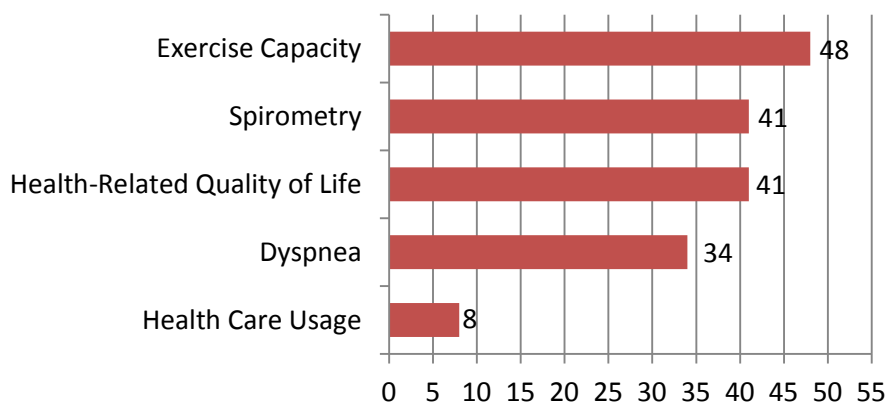
Qualitative and Observational Assessment: study designs used non-numerical, descriptive and approximate measures (e.g. open-ended questionnaires, unstructured interviews).

Pre-Test/Post-Test with Non-Random Groups: study design measured variables before and after intervention and did not randomly assign its participants to control or treatment groups.

Literature Reviews: summarized and evaluated an aggregate of scholarly reports.

Randomized Control Trial: participants were randomly assigned to different PR and then compared on outcome measures.

Outcome Measures

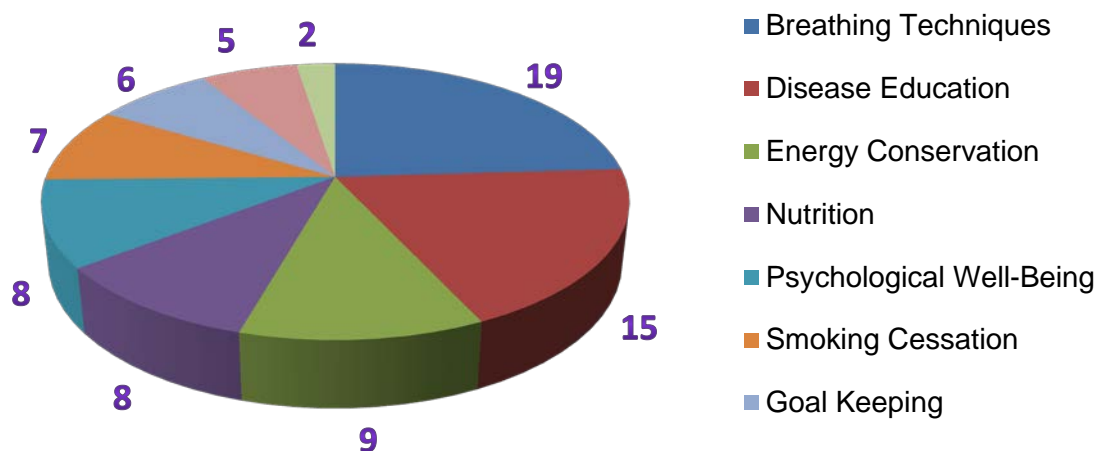


The primary outcome measures used in the 58 articles were exercise capacity, spirometry, health-related quality of life, and dyspnea. Only eight of the articles measured the effects of the PR programs on healthcare usage, which includes hospitalization rates.

Trends in Rehabilitation Duration			
	Ranges	Median	Mode
Length of Session (min)	20-215	60	60
Number of Sessions (per wk)	1-14	3	2
Duration of Program (wks)	1-48	8	12

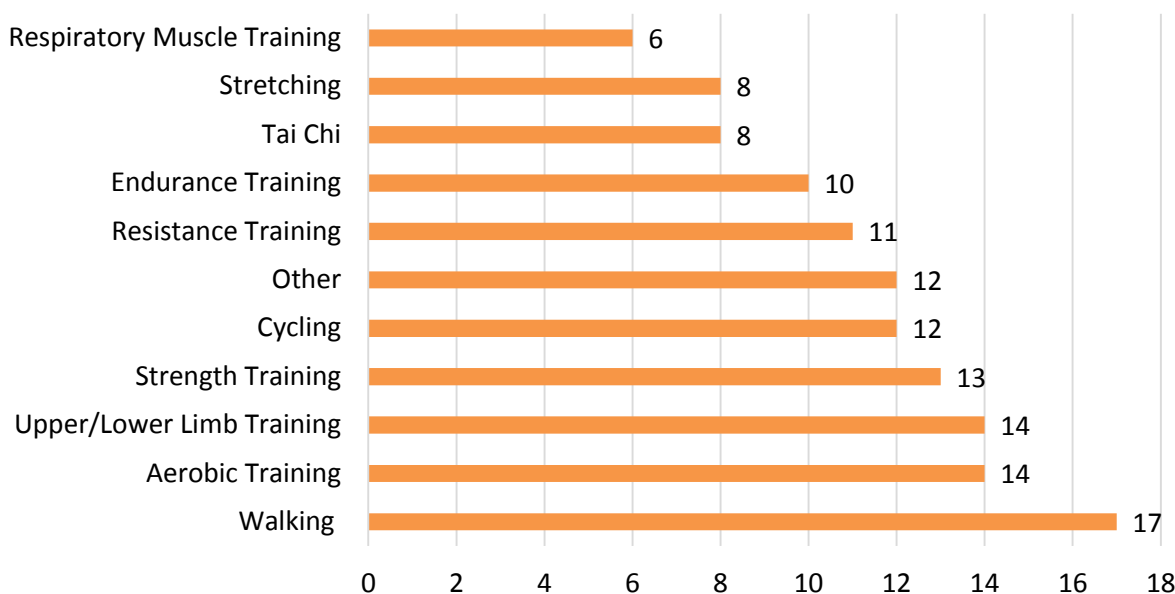
The duration of the PR programs varied from 1-48 weeks in the 58 articles. Also, the number of sessions per week ranged from 1-14, with each session lasting from 20 minutes to 3.5 hours.

Educational and Behavioural Interventions



Many of the studies provided the patient with education about breathing techniques, the disease, energy conservation (ex: how to put on a shirt without using too much energy), and nutrition. The educational component was then usually followed up with behaviour modification techniques such as diary keeping and goal setting.

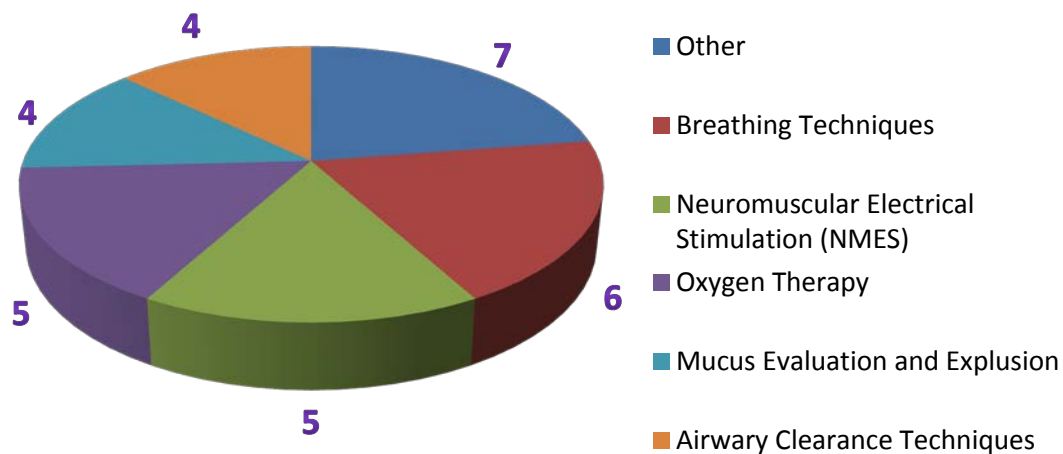
Exercises Used in Rehabilitations



The 58 articles covered a range of exercises that can be used in an effective PR program. Walking (either on a flat surface or on a treadmill), and aerobic training were the most frequently used type of exercise. A common theme among the various exercises is to strengthen the upper

and lower limbs through the different types of training.

Physiotherapies Used in Rehabilitations



Although physiotherapy techniques were not reported often in the 58 articles, they were sometimes used to help patients with breathing techniques including how to manage mucus and clear the airway. NMES was also used as a strength training tool for the patients.

Highlights of Results

Hospitalizations and Healthcare Usage

- Four studies showed that PR, regardless of duration or content, showed improvements in hospital re-admission rates and healthcare usage (Corhay, J. et al., Jacobsen, R. et al., Major, S. et al., van Ranst, D. et al.)
- One study found that home-based PR shows a reduction in hospital re-admissions (Liu, X. et al.)
- Early intervention showed mixed results:
 - A literature review suggested that PR programs that are implemented within four weeks following an acute exacerbation led to reductions in hospital re-admission rates (Maddocks, M. et al.)
 - One study showed that early intervention decreases healthcare utilization (Goldstein, R. et al.)
 - Another study, showed that patients who started the PR within 48 hours following an acute exacerbation showed no improvements in hospital re-admission rates (Greening, N. J., et al.)

Duration, Frequency and Commencement of Intervention

- How early a PR program should be started following an acute exacerbation is not definitive based on the research.
- A monthly exercise intervention frequency is insufficient in supporting significant improvement in exercise capacity and quality of life (Chigira, Y., Takai et al.)
- Several studies indicate that even short term rehabilitation (4-6 weeks) can be effective in improving exercise capacity and cardiac health

Cost Evaluation

- Only one article provided program cost/benefit analysis (see below)
- A Brazilian cost evaluation study found that patients who did not participate in the intervention and experienced exacerbations could incur an estimated 46.33% higher individual cost for the public health system (Farias, C. C., et al.)

Treatment

- The most widespread treatment types included various exercise training methods
- Exercise therapy was used significantly more than physiotherapy
- Functional walk tests were used in the majority of articles as a measurement
- Several articles found that the exercise program should be high-intensity (e.g., 60-80% of the maximum workload) for it to be effective, regardless of the type of training.

Setting and Staff

- Several studies showed positive results for in-patient (hospital) and outpatient (clinic, community center) settings for the administration of the PR programs.
- There were also a few studies that looked specifically at the efficacy of home-based PR programs and showed that home-based PR led to improvements in exercise capacity, dyspnea, respiratory muscle strength, quality of life, and other qualitative measures (Chigira, Y. et al., De Sousa Pinto, J. et al., Do Nascimento, E., et al., Liu, X. et al., Pinto, J. M. S. et al., Wang, C. et al.)
- Physiotherapists were the most widely employed professionals for carrying out the PR programs. However, many studies also suggested the use and benefits of multidisciplinary teams.

Adherence

- Incorporating feedback into a program increases adherence (Cruz, J., et al.)
- Adherence to program improves when exercise rates are reported and reinforced by a telephone call whenever training is missed (Wang, C., et al)
- Compared with hospital PR programs, home-based PR has higher patient compliance (Liu, X., et al)
- Adherence in programs can be improved by building a patient's confidence, promoting tangible results (daily recording of exercise), and by recognizing and responding to issues of readiness and access to the program (Guo, S., et al)
- Self-care adherence was higher in a program which incorporates strategies to complete daily exercise, strategies to cope with dyspnea, identification of barriers, and action plans with goal keeping (Song, H., et al)
- A Tai Chi program reported a high intention to continue among participants, as well as high enjoyment and psychological well-being – which may help adherence rates (Leung, R. W. M., et al)

Notable Studies

- Exercise training using minimal equipment (walking, elastic band resistance training, tai chi, etc.) has been shown to be effective in improving outcomes of exercise capacity and health-related quality of life (Alison, J. A., et al.)
 - **Discussion Point:** Rehabilitation programs that use less equipment are more likely to be cost effective than those which require specialized machines. Therefore, the authors suggest that when creating a PR program, the healthcare practitioners should look for the simplest exercises which do not require much equipment.
- Telehealthcare promoted through regular phone calls, website visits, online chat sessions or mobile phone reporting combined with education and education training does not improve exercise capacity and dyspnea; there is only weak support that it may increase physical activity level (Lundell, S., et al)
 - **Discussion Point:** Based on this study, the authors find that although telehealthcare may make information about rehabilitation more accessible to patients in remote regions, it is insufficiently effective to justify the implementation of costly widespread use
- The use of an interactive video game (IVG), Wii Balance Board, in addition to a supervised Pulmonary Rehabilitation program, did not improve respiratory muscle function or psychological well-being but did improve exercise tolerance (Mazzoleni, S., et al)
 - **Discussion Point:** Based on this study, the authors find the minimal benefits offered by the IVG do not warrant inclusion of a costly video game console which only has single-patient capacity in a community based rehabilitation program. However, the authors consider the use of the IVG potentially beneficial as supplement to PR in a home-setting

Future Research Strategies

The collection and synthesis of such a wide variety of studies in a short review time frame was possible because of the current high demand for research on COPD due to increased prevalence. However, there are still many research areas that remain unexplored. Notably, few studies examined healthcare usage following PR. A small number of studies also highlighted individual differences and encouraged patient feedback which allowed researchers and analysts to pinpoint factors that predict satisfaction, adherence, and program efficacies in the long-term. In-depth examination of individual factors will continue to enlighten program development. An abundance of studies were concerned with intervention frequencies and rehabilitation duration but few that analyzed collaborative influences of these factors. Cross-comparisons of rehabilitation programs with different durations and different frequencies may uncover ideal combinations of these factors (e.g., comparing a program with a duration of twelve weeks with an intervention frequency of twice per week with another of a six weeks duration with a more intensive four times per week intervention frequency). The research field will benefit from

development and analysis of programs which incorporate technological software, such as phone applications to monitor and encourage daily adherence to programs.

Acknowledgements

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Disclaimer

This work was conducted by University of Waterloo undergraduate students with the financial and intellectual support of Knowledge Impact Strategies Consulting Ltd. Every attempt was made to produce a systematic review of the highest quality relative to time and our professional judgment as academics. This work is not necessarily definitive, authoritative, comprehensive, or current. It represents the findings, views, opinions, and conclusions of the research team only, and is provided as is without warranties of any kind. The work is neither the official nor the unofficial policy of the University of Waterloo and the University of Waterloo does not necessarily endorse the findings, views, opinions, and conclusions expressed in the work. Knowledge Impact Strategies Consulting Ltd. including its directors, officers, employees and agents, accept no responsibility for this work.

Citation

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Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Ali, M. S., Talwar, D., & Jain, S. K. (2014). The effect of a short-term pulmonary rehabilitation on exercise capacity and quality of life in patients hospitalised with acute exacerbation of chronic obstructive pulmonary disease. The Indian Journal of Chest Diseases & Allied Sciences, 56(1), 13-19.	Short-term PR for AECOPD patients			X		<ul style="list-style-type: none"> Clinical Evaluation* Spirometry* Exercise Capacity (6MWT, CPET) HRQoL (SF 36) Modified Borg Dyspnoea Score 	30	40 - 70	O, S, V	
Alison, J. A., & McKeough, Z. J. (2014). Pulmonary rehabilitation for COPD: Are programs with minimal exercise equipment effective? Journal of Thoracic Disease, 6(11), 1606-1614.	Exercise training using minimal equipment during PR				X	<ul style="list-style-type: none"> Exercise Capacity (6MWT, ISWT) HRQoL (CRQ, SGRQ) 				
Altenburg, W.A.; Ten Hacken, N.H.T.; Bossenbroek, L.; Kerstjens, H.A.M.; De Greef, M.H.G.; Wempe, J.B. (2015) Short- and long-term effects of a physical activity counselling programme in COPD: A randomized controlled trial. Respir. Med., 109 (1) 112-121	Short and long-term effects of a physical activity (PA) counselling program			X		<ul style="list-style-type: none"> Physical Activity (Pedometer) Exercise Capacity (6MWT) HRQoL (CRQ, CCQ) Spirometry HADS 	155	54-69	M, O, S	

Spreadsheets of Results

Citation	Setting				Timing			Rehabilitations				Staff						Cost?	Guidelines	What Was Found							
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician				OT	Other					
Ali, M. S., Talwar, D., & Jain, S. K. (2014). The effect of a short-term pulmonary rehabilitation on exercise capacity and quality of life in patients hospitalised with acute exacerbation of chronic obstructive pulmonary disease. The Indian Journal of Chest Diseases & Allied Sciences, 56(1), 13-19.			X			20	3	3	X		X																<ul style="list-style-type: none"> After 9 sessions of PR exercises improvement in: <ul style="list-style-type: none"> General Well-Being FEV1 Exercise Capacity (6MWT) CPET values
Alison, J. A., & McKeough, Z. J. (2014). Pulmonary rehabilitation for COPD: Are programs with minimal exercise equipment effective? Journal of Thoracic Disease, 6(11), 1606-1614.					X				X	X																	<ul style="list-style-type: none"> Exercise training using minimal equipment improves: <ul style="list-style-type: none"> Exercise Capacity HRQoL
Altenburg, W.A.; Ten Hacken, N.H.T.; Bossenbroek, L.; Kerstjens, H.A.M.; De Greef, M.H.G.; Wempe, J.B. (2015) Short- and long-term effects of a physical activity counselling programme in COPD: A randomized controlled trial. Respir. Med., 109 (1) 112-121	X	X	X	X		30	<1	12	X	X	X	X									X						<ul style="list-style-type: none"> The PA counselling program improves PA levels after 3 months. Sedentary patients at baseline still benefit after 15 months.

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Amin, S., Abrazado, M., Quinn, M., Storer, T. W., Tseng, C. -, & Cooper, C. B. (2014). A controlled study of community-based exercise training in patients with moderate COPD. <i>BMC Pulmonary Medicine</i> , 14(1)	Community-based exercise (CBE) program for moderate COPD			X		<ul style="list-style-type: none"> • Exercise Capacity (Endurance Test for Treadmill Walking, Muscle Strength) • Clinical Evaluation (Body Composition) • Dyspnea (TDI) • HRQoL (SGRQ) 	19	70	O	
Andrews, L., Barlow, R., & Easton, I. (2015). Differences in patient outcomes between a 6, 7 and 8 week pulmonary rehabilitation programme: A service evaluation. <i>Physiotherapy (United Kingdom)</i> , 101(1), 62-68.	Patient outcomes of a 6, 7, and 8 week PR program	X				<ul style="list-style-type: none"> • HRQoL (SGRQ) • CCQ • HADS • Exercise Capacity (ISWT) 	363			X
Blackstock, F. C., Webster, K. E., McDonald, C. F., & Hill, C. J. (2014). Comparable improvements achieved in chronic obstructive pulmonary disease through pulmonary rehabilitation with and without a structured educational intervention: A randomized controlled trial. <i>Respirology</i> , 19(2), 193-202.	Group education of disease-specific information VERSUS self-management skills within a PR program			X		<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • HRQoL (CRQ, AQoL) • Dyspnea (MRC) • Self-Efficacy (General Self-Efficacy Scale) • Healthcare Usage 	267	72	M	
Borghesi-Silva, A., Mendes, R. G., Trimer, R., Oliveira, C. R., Fregonezi, G. A. F., Resqueti, V. R., . . . Costa, D. (2015). Potential effect of 6 versus 12-weeks of physical training on cardiac autonomic function and exercise capacity in chronic obstructive pulmonary disease. <i>European Journal of Physical and Rehabilitation Medicine</i> , 51(2), 211-221.	Comparison of 6- and 12-week physical training program (PTP)			X		<ul style="list-style-type: none"> • Spirometry (FVC) • Exercise Capacity (6MWT, CPET, CST) • Clinical Evaluation (HR, HRV) 	20	67	O, S, V	
Cameron-Tucker, H. L., Wood-Baker, R., Owen, C., Joseph, L., & Walters, E. H. (2014). Chronic disease self-management and exercise in COPD as pulmonary rehabilitation: A randomized controlled trial. <i>International Journal of COPD</i> , 9, 513-523.	Effects of adding supervised exercise to the Stanford Chronic Disease Self-Management Program (CDSMP)					<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • Self-Efficacy • Self-Reported Exercise • Shortness of Breath • HRQoL (SF-36) 	84			
Chan, R. R., Giardino, N., & Llarson, J. (2015). A pilot study: Mindfulness meditation intervention in COPD. <i>International Journal of COPD</i> , 10, 445-454.	Adaptation of mindfulness meditation intervention for COPD patients			X		<ul style="list-style-type: none"> • Dyspnea (CRQ) • Spirometry (Breathing Timing) • Revised Anxiety Index-3 (AHI-3) • Freiburg Mindfulness Inventory (FMI) 	41		M, O, S, V	

Spreadsheets of Results

Citation	Setting					Timing			Rehabilitations				Staff							Cost?	Guidelines	What Was Found
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT	Other			
Amin, S., Abrazado, M., Quinn, M., Storer, T. W., Tseng, C. -, & Cooper, C. B. (2014). A controlled study of community-based exercise training in patients with moderate COPD. BMC Pulmonary Medicine, 14(1)					X	30	2	12	X		X								X			<ul style="list-style-type: none"> • CBE group showed greater improvements in: <ul style="list-style-type: none"> • Exercise Endurance Time • Muscle Strength • Dyspnea (TDI) • HRQoL (SGRQ)
Andrews, L., Barlow, R., & Easton, I. (2015). Differences in patient outcomes between a 6, 7 and 8 week pulmonary rehabilitation programme: A service evaluation. Physiotherapy (United Kingdom), 101(1), 62-68.		X		X		120	2	6 - 8	X		X		X	X								<ul style="list-style-type: none"> • All programmes showed improvements in ISWT • The 8 week program showed the greatest improvements.
Blackstock, F. C., Webster, K. E., McDonald, C. F., & Hill, C. J. (2014). Comparable improvements achieved in chronic obstructive pulmonary disease through pulmonary rehabilitation with and without a structured educational intervention: A randomized controlled trial. Respirology, 19(2), 193-202.	X			X		45	2	8	X	X	X	X		X		X			X			<ul style="list-style-type: none"> • No difference between the two groups on outcome measures • Equal improvements in: <ul style="list-style-type: none"> • Exercise Capacity • HRQoL
Borghi-Silva, A., Mendes, R. G., Trimer, R., Oliveira, C. R., Fregonezi, G. A. F., Resqueti, V. R., . . . Costa, D. (2015). Potential effect of 6 versus 12-weeks of physical training on cardiac autonomic function and exercise capacity in chronic obstructive pulmonary disease. European Journal of Physical and Rehabilitation Medicine, 51(2), 211-221.						40	3	6 - 12	X					X								<ul style="list-style-type: none"> • After only 6 wks: improvement in HRV Indices • After 12 wks: improvement in SD1 Index
Cameron-Tucker, H. L., Wood-Baker, R., Owen, C., Joseph, L., & Walters, E. H. (2014). Chronic disease self-management and exercise in COPD as pulmonary rehabilitation: A randomized controlled trial. International Journal of COPD, 9, 513-523.				X		210	1	6	X		X			X								<ul style="list-style-type: none"> • Adding supervised exercise to the CDSMP has no additional benefits. • Equal improvements in: <ul style="list-style-type: none"> • Exercise Capacity (6MWT)
Chan, R. R., Giardino, N., & Larson, J. (2015). A pilot study: Mindfulness meditation intervention in COPD. International Journal of COPD, 10, 445-454.						60	1	8				X	X									<ul style="list-style-type: none"> • Mindfulness meditation only improved: <ul style="list-style-type: none"> • Emotional Functional Levels

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Cheng, S. -, Wu, Y. -, Yang, M. -, Huang, C. -, Huang, H. -, Chu, W. -, & Lan, C. -. (2014). Pulmonary rehabilitation improves heart rate variability at peak exercise, exercise capacity and health-related quality of life in chronic obstructive pulmonary disease. <i>Heart and Lung: Journal of Acute and Critical Care</i> , 43(3), 249-255.	Effect of PR on HRV during exercise for COPD patients	X				<ul style="list-style-type: none"> • Exercise Capacity (CPET) • Clinical Evaluation (HRV) • HRQoL (SGRQ) • Spirometry (FEV1, FVC) • Respiratory Muscle Strength (P_{Imax} & P_{emax}) • Dyspnea (Borg's scale) 	64	70.1	O, S	
Chigira, Y., Takai, T., Oda, T., & Dobashi, K. (2014). Difference in the effect of outpatient pulmonary rehabilitation due to variation in the intervention frequency: Intervention centering on home-based exercise. <i>Journal of Physical Therapy Science</i> , 26(7), 1041-1044.	How variations in intervention frequency (once per month vs. once per week) affect outpatient PR			X		<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • QoL (WHO/QoL26) • Spirometry (VC, FEV1, %FEV1) • Clinical Evaluation (quadriceps maximal voluntary contraction force QMVC) 	36	40+	M, O, S, V	
Corhay, J. -, Dang, D. N., Van Cauwenberge, H., & Louis, R. (2014). Pulmonary rehabilitation and copd: Providing patients a good environment for optimizing therapy. <i>International Journal of COPD</i> , 9, 27-39.	Review of impact of PR on COPD patients				X	<ul style="list-style-type: none"> • Exercise Performance* • Dyspnea • Psychosocial Benefits (QoL, HADS) • Cost Effectiveness • Healthcare Usage • Survival 				
Crisafulli, E., Morandi, A., Olivini, A., Malerba, M., & Clini, E. M. (2014). Rehabilitation and supportive therapy in elderly patients with chronic obstructive pulmonary disease. <i>European Journal of Internal Medicine</i> , 25(4), 329-335.	Review of clinical problems, methods of assessment, and useful non-pharmalogical treatments for elderly COPD patients				X	<ul style="list-style-type: none"> • Exercise Capacity [6MWT, SPPB, Balance (14-item Berg Balance Scale), Mobility (Timed Up & Go)] 				X
• Cruz, J., Brooks, D., & Marques, A. (2014). Impact of feedback on physical activity levels of individuals with chronic obstructive pulmonary disease during pulmonary rehabilitation: A feasibility study. <i>Chronic Respiratory Disease</i> , 11(4), 191-198.	Effects of providing feedback on physical activity (PA) levels to COPD patients					<ul style="list-style-type: none"> • Dyspnea (MMRC) • Exercise Capacity (6MWT) • Daily Physical Activity 	16	66	M, O, S, V	
De Sousa Pinto, J. M., MartÃ-n-Nogueras, A. M., Calvo-Arenillas, J. I., & Ramos-GonzÃlez, J. (2014). Clinical benefits of home-based pulmonary rehabilitation in patients with chronic obstructive pulmonary disease. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(5), 355-359.	Effects of home-based PR			X		<ul style="list-style-type: none"> • Spirometry (FEV1, %FEV) • HRQoL (SGRQ) • Dyspnea (LCADL) • Exercise Capacity (6MWT) 	50	70	S, V	

Spreadsheets of Results

Citation	Setting					Timing			Rehabilitations				Staff							Cost?	Guidelines	What Was Found				
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT	Other							
Cheng, S. -, Wu, Y. -, Yang, M. -, Huang, C. -, Huang, H. -, Chu, W. -, & Lan, C. -. (2014). Pulmonary rehabilitation improves heart rate variability at peak exercise, exercise capacity and health-related quality of life in chronic obstructive pulmonary disease. <i>Heart and Lung: Journal of Acute and Critical Care</i> , 43(3), 249-255.			X			50	2	12	X		X															<ul style="list-style-type: none"> After PR, there were improvements in: <ul style="list-style-type: none"> HRV Parameters HRQoL Respiratory Muscle Strength Exercise Capacity Dyspnea Score
Chigira, Y., Takai, T., Oda, T., & Dobashi, K. (2014). Difference in the effect of outpatient pulmonary rehabilitation due to variation in the intervention frequency: Intervention centering on home-based exercise. <i>Journal of Physical Therapy Science</i> , 26(7), 1041-1044.			X				1 OR <1	12	X		X	X		X										X	X	<ul style="list-style-type: none"> The once a week intervention resulted in greater improvements in: <ul style="list-style-type: none"> HRQoL Exercise Capacity Lower-Extremity Muscle Strength PR was cost effective
Corhay, J. -, Dang, D. N., Van Cauwenberge, H., & Louis, R. (2014). Pulmonary rehabilitation and copd: Providing patients a good environment for optimizing therapy. <i>International Journal of COPD</i> , 9, 27-39.	X		X	X					X	X	X	X	X	X		X										<p>A review of the literature suggests that:</p> <ul style="list-style-type: none"> PR is related to improvements in: <ul style="list-style-type: none"> Dyspnea Muscle Strength HRQoL Physical Activity PR also leads to a reduction in hospital readmissions
Crisafulli, E., Morandi, A., Olivini, A., Malerba, M., & Clini, E. M. (2014). Rehabilitation and supportive therapy in elderly patients with chronic obstructive pulmonary disease. <i>European Journal of Internal Medicine</i> , 25(4), 329-335.	X			X					X		X		X	X		X										<ul style="list-style-type: none"> In elderly patients, PR prevents further deterioration PR also shows an improvement in: <ul style="list-style-type: none"> Self-Management Prognosis
Cruz, J., Brooks, D., & Marques, A. (2014). Impact of feedback on physical activity levels of individuals with chronic obstructive pulmonary disease during pulmonary rehabilitation: A feasibility study. <i>Chronic Respiratory Disease</i> , 11(4), 191-198.					X	60 - 90	1 - 3	12	X		X															<ul style="list-style-type: none"> In the short-term, feedback increases: <ul style="list-style-type: none"> Number of Daily Steps Standing Time
De Sousa Pinto, J. M., MartÃ-n-Nogueras, A. M., Calvo-Arenillas, J. I., & Ramos-GonzÃlez, J. (2014). Clinical benefits of home-based pulmonary rehabilitation in patients with chronic obstructive pulmonary disease. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(5), 355-359.	X					30 - 60	1 to <1	12	X		X	X		X												<ul style="list-style-type: none"> Addition of home-based PR to regular care showed greater improvements in: <ul style="list-style-type: none"> Exercise Capacity Breathlessness Dyspnea HRQoL

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Deepak, T. H., Mohapatra, P. R., Janmeja, A. K., Sood, P., & Gupta, M. (2014). Outcome of pulmonary rehabilitation in patients after acute exacerbation of chronic obstructive pulmonary disease. <i>The Indian Journal of Chest Diseases & Allied Sciences</i> , 56(1), 7-12.	Effects of PR on patients with AECOPD			X		<ul style="list-style-type: none"> • Exercise capacity (6MWT) • Spirometry (FEV1, FVC, PEFR) • HRQoL (SGRQ) • Dyspnea (mMRC) 	60	59		
Desveaux, L., Janaudis-Ferreira, T., Goldstein, R., & Brooks, D. (2015). An international comparison of pulmonary rehabilitation: A systematic review. <i>COPD: Journal of Chronic Obstructive Pulmonary Disease</i> , 12(2), 144-153.	Structure, delivery, and availability of PR programs across seven countries				X	<ul style="list-style-type: none"> • Structure of PR Programme • Delivery of PR Programme • Geographical Prevalence of availability of PR 				
Do Nascimento, E. S. P., Sampaio, L. M. M., Peixoto-Souza, F. S., Dias, F. D., Dantas Gomes, E. L. F., Greiffo, F. R., . . . Costa, D. (2015). Home-based pulmonary rehabilitation improves clinical features and systemic inflammation in chronic obstructive pulmonary disease patients. <i>International Journal of COPD</i> , 10, 645-653.	Effects of a home-based PR program	X				<ul style="list-style-type: none"> • Dyspnea (MRC) • HRQoL (SF-36) • Incremental Upper Limb Testing • Spirometry (FVC, FEV1, FEV1/FVC) • Respiratory Muscle Strength • Exercise Capacity (ISWT) • Quantification of Inflammatory Markers • Anthropometric Data 	25	67.8	M, O, S, V	
Farias, C. C., Resqueti, V., Dias, F. A. L., Borghi-Silva, A., Arena, R., & Fregonezi, G. A. F. (2014). Costs and benefits of pulmonary rehabilitation in chronic obstructive pulmonary disease: A randomized controlled trial. <i>Brazilian Journal of Physical Therapy</i> , 18(2), 165-173.	Costs and benefits of an aerobic walking program for COPD patients			X		<ul style="list-style-type: none"> • Body Composition • Anthropometric Assessment • Spirometry • Respiratory Muscle Strength • Exercise Capacity (6MWT) • Peripheral Muscle Strength • Mortality Index (BODE Index) • HRQoL (SGRQ) • Dyspnea (MRC) • ADL • Cost Calculation 	40	40 - 85		
Ferracini Cabral, L., Da Cunha D'Elia, T., De Sousa Marins, D., Araujo Zin, W., & Silva Guimarães, F. (2015). Pursed lip breathing improves exercise tolerance in COPD: A randomized crossover study. <i>European Journal of Physical and Rehabilitation Medicine</i> , 51(1), 79-88.	Effects of pursed lip breathing (PLB) in COPD patients during high-intensity exercise			X		<ul style="list-style-type: none"> • Spirometry (FEV1) • Endurance Test (Inspiratory Capacity, Variations in Breathing Patterns, SpO2) • Dyspnea (Modified Borg Scale) • Dynamic Hyperinflation • Respiratory Inductance Plethysmography (RIP) 	40	40 - 75		

Spreadsheets of Results

Citation	Setting				Timing			Rehabilitations				Staff						Cost?	Guidelines	What Was Found					
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician				OT	Other			
Deepak, T. H., Mohapatra, P. R., Janmeja, A. K., Sood, P., & Gupta, M. (2014). Outcome of pulmonary rehabilitation in patients after acute exacerbation of chronic obstructive pulmonary disease. <i>The Indian Journal of Chest Diseases & Allied Sciences</i> , 56(1), 7-12.				X		120		12	X	X	X	X	X	X											<ul style="list-style-type: none"> • Early PR following an AECOPD showed improvements in: <ul style="list-style-type: none"> • Exercise Capacity • HRQoL
Desveaux, L., Janaudis-Ferreira, T., Goldstein, R., & Brooks, D. (2015). An international comparison of pulmonary rehabilitation: A systematic review. <i>COPD: Journal of Chronic Obstructive Pulmonary Disease</i> , 12(2), 144-153.		X	X			120	~2.8	~8	X		X	X	X	X	X		X	X							<ul style="list-style-type: none"> • Throughout the seven countries: <ul style="list-style-type: none"> • PR components are similar • Patient outcome measures vary • Majority of the PR programs are outpatient based, with a recent increase in the use of community resources.
Do Nascimento, E. S. P., Sampaio, L. M. M., Peixoto-Souza, F. S., Dias, F. D., Dantas Gomes, E. L. F., Greiffo, F. R., . . . Costa, D. (2015). Home-based pulmonary rehabilitation improves clinical features and systemic inflammation in chronic obstructive pulmonary disease patients. <i>International Journal of COPD</i> , 10, 645-653.	X			X		40	3	8	X	X	X	X							NR		X				<ul style="list-style-type: none"> • Home-based PR showed improvements in: <ul style="list-style-type: none"> • Exercise Capacity • HRQoL Components • Systematic Inflammation • Inspiratory Muscle Strength • Cost : ~\$75 per patient
Farias, C. C., Resqueti, V., Dias, F. A. L., Borghi-Silva, A., Arena, R., & Fregonezi, G. A. F. (2014). Costs and benefits of pulmonary rehabilitation in chronic obstructive pulmonary disease: A randomized controlled trial. <i>Brazilian Journal of Physical Therapy</i> , 18(2), 165-173.	X					40 - 60	2	8	X		X			X											<ul style="list-style-type: none"> • Simple aerobic walking showed improvements in: <ul style="list-style-type: none"> • Exercise Capacity • Dyspnea • Respiratory Muscle Strength • BODE Index • HRQoL • ADL Level • This type of intervention is also cost effective
Ferracini Cabral, L., Da Cunha D'Elia, T., De Sousa Marins, D., Araujo Zin, W., & Silva GuimarÃEes, F. (2015). Pursed lip breathing improves exercise tolerance in COPD: A randomized crossover study. <i>European Journal of Physical and Rehabilitation Medicine</i> , 51(1), 79-88.					X				X																<ul style="list-style-type: none"> • In COPD patients with low peak expiratory flow rate, PLB shows improvements in: <ul style="list-style-type: none"> • Dynamic Hyperinflation • Breathing Pattern • Exercise Capacity • Arterial Oxygenation at Submaximal Intensity

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Goldstein, R., & Brooks, D. (2014). Pulmonary rehabilitation at the time of the COPD exacerbation. <i>Clinics in Chest Medicine</i> , 35(2), 391-398.	Effects of PR following an AECOPD				X	<ul style="list-style-type: none"> • Exercise Capacity (ESWT, ISWT, 6MWT) • HRQoL (SGRQ) • Hospital admission • Spirometry (FEV1) 				
Greening, N. J., Williams, J. E. A., Hussain, S. F., Harvey-Dunstan, T. C., Bankart, M. J., Chaplin, E. J., . . . Steiner, M. C. (2014). An early rehabilitation intervention to enhance recovery during hospital admission for an exacerbation of chronic respiratory disease: Randomised controlled trial. <i>BMJ (Online)</i> , 349	Effect of an early PR following an AECOPD			X		<ul style="list-style-type: none"> • Hospital Readmissions • Spirometry • Exercise Capacity (ISWT, ESWT) • Maximal isometric quadriceps strength (Isometric Dynamometer) • HRQoL (SGRQ) 	389	45 - 93		
Greulich, T., Kehr, K., Nell, C., Koepke, J., Haid, D., Koehler, U., . . . Koczulla, A. -. (2014). A randomized clinical trial to assess the influence of a three months training program (gym-based individualized vs. calisthenics-based non-individualized) in COPD-patients. <i>Respiratory Research</i> , 15(1)	Comparison of an individualized training program and a non-individualized training program			X		<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • HRQoL (SGRQ) • CAT • Ultrasound Measurement of M. Rectus Femoris Cross-Sectional Area • Serum Levels Measurements of Myokines and Inflammatory Markers 	61		M, O, S, V	
Guo, S. -. , & Bruce, A. (2014). Improving understanding of and adherence to pulmonary rehabilitation in patients with COPD: A qualitative inquiry of patient and health professional perspectives. <i>Plos One</i> , 9(10)	Experiences of patients, and perceptions of what leads to effective PR		X			<ul style="list-style-type: none"> • Building Confidence • Perceiving Immediate Tangible Results • Readiness and Access 	25	40+		
He, M., Yu, S., Wang, L., Lv, H., & Qiu, Z. (2015). Efficiency and safety of pulmonary rehabilitation in acute exacerbation of chronic obstructive pulmonary disease. <i>Medical Science Monitor</i> , 21, 806-812.	Effectiveness and safety of PR following an AECOPD			X		<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • HRQoL (SGRQ, CRQ-SAS) • ADL-D • Spirometry • Dyspnea (mMRC, Borg Scale) • BODE Index 	94	69.2	S, V	
Hjalmarsen, A., Brenn, T., Jongsma Risberg, M., Meisler Antonsen, K., Kristiansen Benum, E., & Aaseboe, U. (2014). Retrospective survival in elderly COPD patients receiving pulmonary rehabilitation; A study including maintenance rehabilitation. <i>BMC Research Notes</i> , 7(1)	Retrospective survival with three different PR programs: in-patient, out-patient, maintenance			X		<ul style="list-style-type: none"> • Clinical Evaluation • EEG • Chest X-Rays • 6MWT • Blood Tests • Spirometry 	193	69		

Spreadsheets of Results

Citation	Setting					Timing			Rehabilitations				Staff							Cost?	Guidelines	What Was Found			
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT	Other						
Goldstein, R., & Brooks, D. (2014). Pulmonary rehabilitation at the time of the COPD exacerbation. Clinics in Chest Medicine, 35(2), 391-398.	X	X		X					X	X	X														<ul style="list-style-type: none"> PR is associated with improvements in: <ul style="list-style-type: none"> Exercise Capacity HRQoL Psychological Symptoms PR is also associated with a decrease in: <ul style="list-style-type: none"> Healthcare Utilization
Greening, N. J., Williams, J. E. A., Hussain, S. F., Harvey-Dunstan, T. C., Bankart, M. J., Chaplin, E. J., . . . Steiner, M. C. (2014). An early rehabilitation intervention to enhance recovery during hospital admission for an exacerbation of chronic respiratory disease: Randomised controlled trial. BMJ (Online), 349				X			7	6	X	X	X	X		X											<ul style="list-style-type: none"> Early intervention did not improve: <ul style="list-style-type: none"> Hospital Readmission Physical Function Patients that started the early intervention had an increase in: <ul style="list-style-type: none"> Mortality Rate
Greulich, T., Kehr, K., Nell, C., Koepke, J., Haid, D., Koehler, U., . . . Koczulla, A. -. (2014). A randomized clinical trial to assess the influence of a three months training program (gym-based individualized vs. calisthenics-based non-individualized) in COPD-patients. Respiratory Research, 15(1)					X	60	1	4	X	X	X	X													<ul style="list-style-type: none"> Improvements were only seen in the individualized training group, in: <ul style="list-style-type: none"> Exercise Capacity Cross Sectional Area of the M. Rectus Femoris
Guo, S. -, & Bruce, A. (2014). Improving understanding of and adherence to pulmonary rehabilitation in patients with COPD: A qualitative inquiry of patient and health professional perspectives. Plos One, 9(10)		X		X					X		X		X	X			X			X					<ul style="list-style-type: none"> Patient adherence can be improved by: <ul style="list-style-type: none"> Building a patient's confidence Promoting tangible results Recognizing and responding to issues of readiness and access to the program
He, M., Yu, S., Wang, L., Lv, H., & Qiu, Z. (2015). Efficiency and safety of pulmonary rehabilitation in acute exacerbation of chronic obstructive pulmonary disease. Medical Science Monitor, 21, 806-812.				X		30	14	Admission to discharge	X		X	X		X											<ul style="list-style-type: none"> PR showed improvements in: <ul style="list-style-type: none"> Exercise Capacity Dyspnea HRQoL CAT Score ADL BODE Index
Hjalmarsen, A., Brenn, T., Jongsma Risberg, M., Meisler Antonsen, K., Kristiansen Benum, E., & Aaseboe, U. (2014). Retrospective survival in elderly COPD patients receiving pulmonary rehabilitation; A study including maintenance rehabilitation. BMC Research Notes, 7(1)	X			X			2 - 5	4 - 8	X	X	X	X	X	X	X		X	X	X						<ul style="list-style-type: none"> Maintenance group had a higher number of: <ul style="list-style-type: none"> Hospital Stays and Days

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Jacobsen, R., Rusch, E., Andersen, P. K., Adams, J., Jensen, C. R., & Fr�lich, A. (2014). The effect of rehabilitation on health-care utilisation in COPD patients in copenhagen. <i>Clinical Respiratory Journal</i> , 8(3), 321-329.	Impact of rehabilitation on healthcare utilisation			X		<ul style="list-style-type: none"> Hospital Admissions Bed Days Outpatient Visits Emergency Room Visits General Practitioner Visits Special Visits Specific Medication 	354	70	S, V	
Leung, R. W. M., McKeough, Z. J., Peters, M. J., & Alison, J. A. (2015). Experiences and perceptions of STSS (Sun-style Tai Chi) training and perceptions of the short-form sun-style tai chi training in caucasians with COPD. <i>European Journal of Integrative Medicine</i> , 7(2), 131-135.	Experiences and Perceptions of STSS (Sun-style Tai Chi) training		X			<ul style="list-style-type: none"> Participant Experience (VAS) 	23	74		
Liu, X. -, Tan, J. -, Wang, T., Zhang, Q., Zhang, M., Yao, L. -, & Chen, J. -. (2014). Effectiveness of home-based pulmonary rehabilitation for patients with chronic obstructive pulmonary disease: A meta-analysis of randomized controlled trials. <i>Rehabilitation Nursing</i> , 39(1), 36-59.	Home-based PR programs				X	<ul style="list-style-type: none"> HRQoL (CRQ, SGRQ, SF-36) Dyspnea (Borg score, BDI) Exercise Capacity (6MWD, ISWT, Maximal Workload) Spirometry Hospital Admission Cost of Care Mortality 				
Lundell, S., Holmner, �., Rehn, B., Nyberg, A., & Wadell, K. (2015). Telehealthcare in COPD: A systematic review and meta-analysis on physical outcomes and dyspnea. <i>Respiratory Medicine</i> , 109(1), 11-26.	Effects of telehealthcare VERSUS ordinary care				X	<ul style="list-style-type: none"> Physical Activity Level Exercise Capacity (6MWT) Dyspnea (CRQ, MRC, SOBQ, Borg scale) Spirometry 				
Maddocks, M., Kon, S. S. C., Singh, S. J., & Man, W. D. -. (2015). Rehabilitation following hospitalization in patients with COPD: Can it reduce readmissions? <i>Respirology</i> , 20(3), 395-404.	Effectiveness of PR in reducing hospital readmissions				X	<ul style="list-style-type: none"> Physical Activity Level Exercise Capacity (6MWT, ISWT) HRQoL (SGRQ, SF-36) Anxiety Level (HADS) Katz index MLTPAQ 	982	64 - 72	O, S	
Major, S., Moreno, M., Shelton, J., & Panos, R. J. (2014). Veterans with chronic obstructive pulmonary disease achieve clinically relevant improvements in respiratory health after pulmonary rehabilitation. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(6), 420-429.	Respiratory health and health care utilization in PR				X	<ul style="list-style-type: none"> HRQoL (SGRQ) BODE index Exercise Capacity (6MWT) Breathlessness (UCSD-SoBQ) Dyspnea (mMRC) Pulmonary Disease Knowledge Test Hand grip strength Body Fat Percentage Healthcare Utilization 	78		M, O, S	

Spreadsheets of Results

Citation	Setting					Timing			Rehabilitations				Staff							Cost?	Guidelines	What Was Found				
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT	Other							
Jacobsen, R., Rusch, E., Andersen, P. K., Adams, J., Jensen, C. R., & Fr�lich, A. (2014). The effect of rehabilitation on health-care utilisation in COPD patients in copenhagen. <i>Clinical Respiratory Journal</i> , 8(3), 321-329.				X			2	7	X		X	X	X	X			X									<ul style="list-style-type: none"> Patients in PR programs showed a smaller increase in: <ul style="list-style-type: none"> Hospital Admissions Bed Days Outpatient Visits
Leung, R. W. M., McKeough, Z. J., Peters, M. J., & Alison, J. A. (2015). Experiences and perceptions of the short-form sun-style tai chi training in caucasians with COPD. <i>European Journal of Integrative Medicine</i> , 7(2), 131-135.	X	X				60	2 - 5	12	X					X									X			<ul style="list-style-type: none"> Tai Chi improves: <ul style="list-style-type: none"> Breathing Physical Performance Psychological Wellbeing High enjoyment Intention to Continue STSS group had decreased hospital admission and stay length
Liu, X. -, Tan, J. -, Wang, T., Zhang, Q., Zhang, M., Yao, L. -, & Chen, J. -. (2014). Effectiveness of home-based pulmonary rehabilitation for patients with chronic obstructive pulmonary disease: A meta-analysis of randomized controlled trials. <i>Rehabilitation Nursing</i> , 39(1), 36-59.	X					30 - 180	3 - 7	4 - 48	X	X	X	X	X	X		X										<ul style="list-style-type: none"> Home-based PR showed improvements in: <ul style="list-style-type: none"> HRQoL Exercise Capacity Dyspnea Pulmonary Functioning Reduction in: <ul style="list-style-type: none"> Hospital Readmissions
Lundell, S., Holmner, �., Rehn, B., Nyberg, A., & Wadell, K. (2015). Telehealthcare in COPD: A systematic review and meta-analysis on physical outcomes and dyspnea. <i>Respiratory Medicine</i> , 109(1), 11-26.	X	X					1 - 4	8 - 48	X		X	X	X			X								X		<ul style="list-style-type: none"> Telehealthcare showed improvements in: <ul style="list-style-type: none"> Physical Activity Level Both groups showed equal improvement in: <ul style="list-style-type: none"> Exercise Capacity Dyspnea
Maddocks, M., Kon, S. S. C., Singh, S. J., & Man, W. D. -. (2015). Rehabilitation following hospitalization in patients with COPD: Can it reduce readmissions? <i>Respirology</i> , 20(3), 395-404.	X			X		15 - 120	2 - 5	1.5 - 24	X	X	X				X											<ul style="list-style-type: none"> PR programs implemented early after hospitalization (<12 wks) show reductions in: <ul style="list-style-type: none"> Hospital Readmissions
Major, S., Moreno, M., Shelton, J., & Panos, R. J. (2014). Veterans with chronic obstructive pulmonary disease achieve clinically relevant improvements in respiratory health after pulmonary rehabilitation. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(6), 420-429.		X				30 - 60	3	8	X		X															<ul style="list-style-type: none"> PR completion improves: <ul style="list-style-type: none"> Respiratory Health QoL Exercise Capacity BODE Index Dyspnea Decreases: <ul style="list-style-type: none"> Hospitalizations

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Mazzoleni, S., Montagnani, G., Vaghegini, G., Buono, L., Moretti, F., Dario, P., & Ambrosino, N. (2014). Interactive videogame as rehabilitation tool of patients with chronic respiratory diseases: Preliminary results of a feasibility study. <i>Respiratory Medicine</i> , 108(10), 1516-1524.	Effectiveness of an interactive videogame (IV) system in PR			X		<ul style="list-style-type: none"> • Spirometry • HRQoL (SGRQ) • Arterial Blood Gases • Incremental Leg-Cycle Ergonometry • Exercise Capacity (6MWT) • Respiratory Muscle Function • Breathlessness (Borg-scale, MRC) • Dyspnea (BDI, TDI) • Health Status (FIM) • Anxiety (STAI) • Depression (BDEI) 	40	68.9 - 73.5	O, S	
Moriyama, M., Takeshita, Y., Haruta, Y., Hattori, N., & Ezenwaka, C. E. (2015). Effects of a 6-month nurse-led self-management program on comprehensive pulmonary rehabilitation for patients with COPD receiving home oxygen therapy. <i>Rehabilitation Nursing</i> , 40(1), 40-51.	PR education program for very severe COPD patients receiving home oxygen therapy	X				<ul style="list-style-type: none"> • HRQoL (SGRQ) • ADL (NRADL) • Dyspnea (MRC) • Social Activity (Range, Frequency) • Goal Attainment Rate • Spirometry (FEV1, FEV1%, SpO2) • Physiological Data • Exercise Capacity (6MWT) 	30	73	V	
Nemoto, K., Oh-Ishi, S., Itoh, M., Saito, T., & Ichiwata, T. (2014). Urinary 8-hydroxydeoxyguanosine is a potential indicator for estimating pulmonary rehabilitation-induced oxidative stress in COPD patients. <i>Tohoku Journal of Experimental Medicine</i> , 233(3), 197-204.	Effects of PR on oxidative stress in patients with moderate-severe COPD VERSUS very severe COPD					<ul style="list-style-type: none"> • Oxidant/Antioxidant Imbalance • Exercise Capacity (6MWT, SWT) • HRQoL (SGRQ) • Pulmonary Function Tests • Blood Tests 	18	57 - 77	O, S, V	
Neves, L. F., Reis, M. H., Plentz, R. D. M., Matte, D. L., Coronel, C. C., & Sbruzzi, G. (2014). Expiratory and expiratory plus inspiratory muscle training improves respiratory muscle strength in subjects with COPD: Systematic review. <i>Respiratory Care</i> , 59(9), 1381-1388.	Effects of Expiratory Muscle Training (EMT) and EMT + Inspiratory Muscle Training (IMT) VERSUS control on respiratory muscle strength			X		<ul style="list-style-type: none"> • Respiratory Muscle Strength (Piman, Pemax) • Functional Capacity • Exercise Capacity (6MWT) • Dyspnea (Borg Scale) 	111	62 - 66	S, V	
Ng, B. H. P., Tsang, H. W. H., Ng, B. F. L., & So, C. -. (2014). Traditional chinese exercises for pulmonary rehabilitation: Evidence from a systematic review. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(6), 367-377.	Efficacy of Qigong (QG) & Tai Chi (TC) PR programs				X	<ul style="list-style-type: none"> • PEDro • Spirometry (FEV1, FVC) • Exercise Capacity (6MWT) • HRQoL (SGRQ) 	1178	68		
Ng, L., Chiang, L. K., Tang, R., Siu, C., Fung, L., Lee, A., & Tam, W. (2014). Effectiveness of incorporating tai chi in a pulmonary rehabilitation program for chronic obstructive pulmonary disease (COPD) in primary care-A pilot randomized controlled trial. <i>European Journal of Integrative Medicine</i> , 6(3), 248-258.	Efficacy of PR with VERSUS without Tai Chi (TC) elements incorporated			X		<ul style="list-style-type: none"> • Self-Efficacy (COPD-CSES, SEMSOB) • Spirometry (FEV1, FVC) • HRQoL (SGRQ) • Exercise Capacity (6MWT) • Dyspnea (Borg scale) 	192	74	S, V	

Spreadsheets of Results

Citation	Setting				Timing			Rehabilitations				Staff						Cost?	Guidelines	What Was Found	
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician				OT
Mazzoleni, S., Montagnani, G., Vaghegini, G., Buono, L., Moretti, F., Dario, P., & Ambrosino, N. (2014). Interactive videogame as rehabilitation tool of patients with chronic respiratory diseases: Preliminary results of a feasibility study. <i>Respiratory Medicine</i> , 108(10), 1516-1524.				X		30 - 60	7	1 - 3	X	X	X	X	X	X			X		X		<ul style="list-style-type: none"> IV training improves: <ul style="list-style-type: none"> Exercise Capacity Dyspnea (TDI) HRQoL
Moriyama, M., Takeshita, Y., Haruta, Y., Hattori, N., & Ezenwaka, C. E. (2015). Effects of a 6-month nurse-led self-management program on comprehensive pulmonary rehabilitation for patients with COPD receiving home oxygen therapy. <i>Rehabilitation Nursing</i> , 40(1), 40-51.	X			X			7	25	X	X	X	X	X								<ul style="list-style-type: none"> PR education group improves: <ul style="list-style-type: none"> Severity of Dyspnea Social activity Walking distance (ADL) HRQoL Decreases: <ul style="list-style-type: none"> Hospital Admissions
Nemoto, K., Oh-Ishi, S., Itoh, M., Saito, T., & Ichiwata, T. (2014). Urinary 8-hydroxydeoxyguanosine is a potential indicator for estimating pulmonary rehabilitation-induced oxidative stress in COPD patients. <i>Tohoku Journal of Experimental Medicine</i> , 233(3), 197-204.				X		≥20	2 - 4	8	X	X	X										<ul style="list-style-type: none"> In moderate-severe, patients PR improved: <ul style="list-style-type: none"> Exercise Capacity HRQoL In very severe patients, PR increased: <ul style="list-style-type: none"> Oxidative stress
Neves, L. F., Reis, M. H., Plentz, R. D. M., Matte, D. L., Coronel, C. C., & Sbruzzi, G. (2014). Expiratory and expiratory plus inspiratory muscle training improves respiratory muscle strength in subjects with COPD: Systematic review. <i>Respiratory Care</i> , 59(9), 1381-1388.			X			15 - 30		5 - 40	X	X	X		X								<ul style="list-style-type: none"> EMT and EMT + IMT improves <ul style="list-style-type: none"> Respiratory Muscle Strength No difference from control in: <ul style="list-style-type: none"> Exercise Capacity Dyspnea
Ng, B. H. P., Tsang, H. W. H., Ng, B. F. L., & So, C. -. (2014). Traditional chinese exercises for pulmonary rehabilitation: Evidence from a systematic review. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(6), 367-377.				X		30 - 60	1 - 2	12 - 24	X						X						<ul style="list-style-type: none"> QG and TC improves: <ul style="list-style-type: none"> Lung function Exercise capacity HRQoL
Ng, L., Chiang, L. K., Tang, R., Siu, C., Fung, L., Lee, A., & Tam, W. (2014). Effectiveness of incorporating tai chi in a pulmonary rehabilitation program for chronic obstructive pulmonary disease (COPD) in primary care-A pilot randomized controlled trial. <i>European Journal of Integrative Medicine</i> , 6(3), 248-258.	X	X				80	2	6	X			X	X					X			<ul style="list-style-type: none"> TC group showed greater improvement in: <ul style="list-style-type: none"> Exercise Capacity Both groups showed equal improvement in: <ul style="list-style-type: none"> HRQoL Self-Efficacy

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Osterling, K., Macfadyen, K., Gilbert, R., & Dechman, G. (2014). The effects of high intensity exercise during pulmonary rehabilitation on ventilatory parameters in people with moderate to severe stable COPD: A systematic review. <i>International Journal of COPD</i> , 9, 1069-1079.	Moderate to severe COPD and PR exercise at high intensity					<ul style="list-style-type: none"> Dyspnea (Borg scale, VAS) Spirometry (FEV1, FVC, IC) 	125	40 - 80	O, S	
Paneroni, M., Colombo, F., Papalia, A., Colitta, A., Borghi, G., Saleri, M., . . . Vitacca, M. (2015). Is telerehabilitation a safe and viable option for patients with COPD? A feasibility study. <i>COPD: Journal of Chronic Obstructive Pulmonary Disease</i> , 12(2), 217-225.	Home-based reinforcement telerehabilitation program (TRP) VERSUS standard outpatient PR	X				<ul style="list-style-type: none"> Spirometry (FEV1, FVC) Exercise Capacity (6MWT) Dyspnea (MRC, Borg Scale) HRQoL (SGRQ) Feasibility Adherence Satisfaction 	36	66		
Pinto, J. M. S., MartÃ-n-Nogueras, A., & Nations, M. (2014). Illness experiences of persons with chronic obstructive pulmonary disease: Self-perceived efficacy of home-based pulmonary rehabilitation. [ExperiÃªncia da enfermidade de pessoas com doenÃ§a pulmonar obstrutiva crÃ´nica: EficÃ¡cia autopercebida de um programa de reabilitaÃ§Ã£o pulmonar domiciliary] <i>Cadernos De Saude Publica</i> , 30(6), 1270-1280.	Self-Perceived efficacy of PR		X			<ul style="list-style-type: none"> Self-Perceived Assessment of Efficacy Spirometry (FEV1, FVC) 	23	69	S, V	X
Pothirat, C., Chaiwong, W., & Phetsuk, N. (2015). Efficacy of a simple and inexpensive exercise training program for advanced chronic obstructive pulmonary disease patients in community hospitals. <i>Journal of Thoracic Disease</i> , 7(4), 637-643.	Efficacy of a simplified exercise training program with inexpensive training equipment	X				<ul style="list-style-type: none"> Spirometry (FEV1, FVC, FEV1/FVC) Upper Limb Strength Lower Limb Strength Exercise Capacity (6MWT) HRQoL (SGRQ) Dyspnea (mMRC) 	30	69	O, S, V	
Pothirat, C., Chaiwong, W., Phetsuk, N., Liwsrisakun, C., Bumroongkit, C., Deesomchok, A., . . . Limsukon, A. (2015). Long-term efficacy of intensive cycle ergometer exercise training program for advanced COPD patients. <i>International Journal of COPD</i> , 10, 133-144.	Long-term efficacy of intensive cycle ergometer (ICE) exercise program		X			<ul style="list-style-type: none"> Spirometry (FEV1, FVC, FEV1/FVC) Upper Limb Strength Lower Limb Strength Exercise Capacity (6MWT, ESWT) HRQoL (SGRQ) Dyspnea (mMRC, BDI/TDI) 	41		O, S, V	
Ramos, E. M. C., De Toledo-Arruda, A. C., Fosco, L. C., Bonfim, R., Bertolini, G. N., Guarnier, F. A., . . . Ramos, D. (2014). The effects of elastic tubing-based resistance training compared with conventional resistance training in patients with moderate chronic obstructive pulmonary disease: A randomized clinical trial.	Elastic tubing training VERSUS conventional resistance training			X		<ul style="list-style-type: none"> Spirometry Exercise capacity (6MWT) Peripheral muscle strength HRQoL (CRQ) Fat-free mass Cytokine Profile 	45		O	

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Citation	Setting					Timing			Rehabilitations				Staff							Cost?	Guidelines	What Was Found				
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT	Other							
Osterling, K., Macfadyen, K., Gilbert, R., & Dechman, G. (2014). The effects of high intensity exercise during pulmonary rehabilitation on ventilatory parameters in people with moderate to severe stable COPD: A systematic review. <i>International Journal of COPD</i> , 9, 1069-1079.					X	90 - 180	3 - 5	4 -12	X	X				X												<ul style="list-style-type: none"> High intensity exercise improves: <ul style="list-style-type: none"> Dyspnea Ventilatory Parameters
Paneroni, M., Colombo, F., Papalia, A., Colitta, A., Borghi, G., Saleri, M., . . . Vitacca, M. (2015). Is telerehabilitation a safe and viable option for patients with COPD? A feasibility study. <i>COPD: Journal of Chronic Obstructive Pulmonary Disease</i> , 12(2), 217-225.	X					100	3.5	5.7	X		X			X	X						X					<ul style="list-style-type: none"> TPR showed greater improvement in: <ul style="list-style-type: none"> Physical Activity Both groups showed equal improvement in: <ul style="list-style-type: none"> Exercise Capacity Dyspnea QoL
Pinto, J. M. S., MartÃ-n-Nogueras, A., & Nations, M. (2014). Illness experiences of persons with chronic obstructive pulmonary disease: Self-perceived efficacy of home-based pulmonary rehabilitation. [ExperiÃancia da enfermidade de pessoas com doenÃa pulmonar obstrutiva crÃnica: EficÃcia autopercebida de um programa de reabilitaÃo pulmonar domiciliary] <i>Cadernos De Saude Publica</i> , 30(6), 1270-1280.	X						7	12	X		X					X							X			<ul style="list-style-type: none"> Patients weigh therapeutic efficacy of PR on at least 11 meaningful changes in various criteria including: <ul style="list-style-type: none"> Thorax Anatomical Structure Breathing Patterns Fear of Death by Suffocation Ease of Movement Dependency State Self Esteem Sense of Normalcy
Pothirat, C., Chaiwong, W., & Phetsuk, N. (2015). Efficacy of a simple and inexpensive exercise training program for advanced chronic obstructive pulmonary disease patients in community hospitals. <i>Journal of Thoracic Disease</i> , 7(4), 637-643.				X		35 - 40	2	8	X	X	X															<ul style="list-style-type: none"> Throughout 12 mo. follow-up, improvements in: <ul style="list-style-type: none"> Limb and Chest Wall Muscle Strength Dyspnea Level Exercise Capacity HRQoL
Pothirat, C., Chaiwong, W., Phetsuk, N., Liwsrisakun, C., Bumroongkit, C., Deesomchok, A., . . . Limsukon, A. (2015). Long-term efficacy of intensive cycle ergometer exercise training program for advanced COPD patients. <i>International Journal of COPD</i> , 10, 133-144.	X		X			50 - 60	2	8	X		X	X	X	X							X					<ul style="list-style-type: none"> ICE exercise improves: <ul style="list-style-type: none"> Muscle strength Endurance time Exercise Capacity (6MWD) Dyspnea score HRQoL
Ramos, E. M. C., De Toledo-Arruda, A. C., Fosco, L. C., Bonfim, R., Bertolini, G. N., Garnier, F. A., . . . Ramos, D. (2014). The effects of elastic tubing-based resistance training compared with conventional resistance training in patients with moderate chronic obstructive pulmonary disease: A randomized clinical trial.		X				60	3	8	X	X				X												<ul style="list-style-type: none"> Elastic tubing training showed greater improvements in: <ul style="list-style-type: none"> Functional Exercise Capacity Both groups showed equal improvement in: <ul style="list-style-type: none"> Muscle Strength HRQoL

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Robles, P. G., Brooks, D., Goldstein, R., Salbach, N., & Mathur, S. (2014). Gender-associated differences in pulmonary rehabilitation outcomes in people with chronic obstructive pulmonary disease: A systematic review. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(2), 87-97.	Men VERSUS women in PR outcomes				X	<ul style="list-style-type: none"> Dyspnea (MRC, TDI, CRQdd, SOBQ) HRQoL (CRQ, SGRQ) Exercise Capacity (6MWT, 12MWT, ISWT) Psychological Status Functional Status Coping Strategies 	671	59 - 71		
Rugbjerg, M., Iepsen, U. W., Jrgensen, K. J., & Lange, P. (2015). Effectiveness of pulmonary rehabilitation in COPD with mild symptoms: A systematic review with meta-analyses. <i>International Journal of</i>	PR for mild COPD				X	<ul style="list-style-type: none"> HRQoL (SGRQ) Exercise Capacity (6MWT) Mortality Muscle Strength Dropout Rates 	489	61.3 - 74.1	M	
Sillen, M. J. H., Franssen, F. M. E., Delbressine, J. M. L., Vaes, A. W., Wouters, E. F. M., & Spruit, M. A. (2014). Efficacy of lower-limb muscle training modalities in severely dyspnoeic individuals with COPD and quadriceps muscle weakness: Results from the DICES trial. <i>Thorax</i> , 69(6), 525-531.	Efficacy of high-frequency (75Hz) neuromuscular electrical stimulation (NMES) VERSUS low-frequency (15Hz) NMES VERSUS strength training				X	<ul style="list-style-type: none"> Isokinetic Quadriceps Muscle Function Exercise Capacity (6MWT, CWRT) Dyspnoea (mMRC) HRQoL (SGRQ) Anxiety (HADS) Spirometry Arterial Blood Gasses 	120	64.8	S	
Song, H. -, Yong, S. J., & Hur, H. K. (2014). Effectiveness of a brief self-care support intervention for pulmonary rehabilitation among the elderly patients with chronic obstructive pulmonary disease in Korea. <i>Rehabilitation Nursing</i> , 39(3), 147-156.	Brief self-care support intervention (SCSI)				X	<ul style="list-style-type: none"> Exercise Capacity (6MWT, PEFR) HRQoL (SGRQ) Adherence Exercise Compliance 	40	66.6	O	X
Talwar, A., Sahni, S., John, S., Verma, S., Cardenas-Garcia, J., & Kohn, N. (2014). Effects of pulmonary rehabilitation on fatigue severity scale in patients with lung disease. [Wpyw rehabilitacji oddechowej na nasilenie zmÄ™czenia ocenianego wedug Fatigue Severity Scale u pacjentw z chorob... p,uc] <i>Pneumonologia i Alergologia Polska</i> , 82(6), 534-540.	Effect of PR on fatigue	X				<ul style="list-style-type: none"> Fatigue (FSS) Depression (GDS) Spirometry (FEV1, FVC, FEV1/FVC) 	21	64.5		
Van Dam Van Isselt, E.F.; Spruit, M.; Groenewegen-Sipkema, K.H.; Chavannes, N.H.; Achterberg, W.P. (2014) Geriatric rehabilitation for patients with advanced chronic obstructive pulmonary disease: A naturalistic prospective cohort study on feasibility and course of health status. <i>Chronic Respiratory Disease</i> , 11(2) 111-119.	Efficacy of a COPD Geriatric Rehabilitation Program (GR-COPD)		X			<ul style="list-style-type: none"> Patient Characteristics (BMI, FEMI) Spirometry (FEV1, LTOT) Anxiety (HADS) HRQoL/Health Status (CCQ) Exercise Capacity (6MWT) 	61		S, V	X

Spreadsheets of Results

Citation	Setting				Timing			Rehabilitations				Staff						Cost?	Guidelines	What Was Found						
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician				OT	Other				
Robles, P. G., Brooks, D., Goldstein, R., Salbach, N., & Mathur, S. (2014). Gender-associated differences in pulmonary rehabilitation outcomes in people with chronic obstructive pulmonary disease: A systematic review. <i>Journal of Cardiopulmonary Rehabilitation and Prevention</i> , 34(2), 87-97.					X		2 - 5	3-12 OR 15-24	X		X				X					X						<ul style="list-style-type: none"> • Insufficient evidence to support or refute gender-associated differences
Rugbjerg, M., Iepsen, U. W., Jargensen, K. J., & Lange, P. (2015). Effectiveness of pulmonary rehabilitation in COPD with mild symptoms: A systematic review with meta-analyses. <i>International Journal of</i>					X	30 - 90	2 - 3	7 - 24	X	X	X															<ul style="list-style-type: none"> • PR improves: <ul style="list-style-type: none"> • HRQoL • Exercise Capacity
Sillen, M. J. H., Franssen, F. M. E., Delbressine, J. M. L., Vaes, A. W., Wouters, E. F. M., & Spruit, M. A. (2014). Efficacy of lower-limb muscle training modalities in severely dyspnoeic individuals with COPD and quadriceps muscle weakness: Results from the DICES trial. <i>Thorax</i> , 69(6), 525-531.					X		10	8	X	X				X												<ul style="list-style-type: none"> • All groups showed improvements in: <ul style="list-style-type: none"> • Quadriceps Muscle Endurance • Exercise Performance • Lower-Limb Fat-Free Mass • Dyspnea • Fatigue • HF-NMES and strength training showed improvements in: <ul style="list-style-type: none"> • Quadriceps Muscle Strength
Song, H. -, Yong, S. J., & Hur, H. K. (2014). Effectiveness of a brief self-care support intervention for pulmonary rehabilitation among the elderly patients with chronic obstructive pulmonary disease in Korea. <i>Rehabilitation Nursing</i> , 39(3), 147-156.					X	90	5			X	X	X														<ul style="list-style-type: none"> • The intervention group showed greater improvements in: <ul style="list-style-type: none"> • HRQoL • Self-Care Adherence Scores
Talwar, A., Sahni, S., John, S., Verma, S., Cardenas-Garcia, J., & Kohn, N. (2014). Effects of pulmonary rehabilitation on fatigue severity scale in patients with lung disease. [Wp,yw rehabilitacji oddechowej na nasilenie zmczenia ocenianego wedug Fatigue Severity Scale u pacjentw z chorob... p,uc] <i>Pneumonologia i Alergologia Polska</i> , 82(6), 534-540.					X		3	6	X		X															<ul style="list-style-type: none"> • PR improves: <ul style="list-style-type: none"> • Self-Reported Fatigue Severity
Van Dam Van Isselt, E.F.; Spruit, M.; Groenewegen-Sipkema, K.H.; Chavannes, N.H.; Achterberg, W.P. (2014) Geriatric rehabilitation for patients with advanced chronic obstructive pulmonary disease: A naturalistic prospective cohort study on feasibility and course of health status. <i>Chronic Respiratory Disease</i> , 11(2) 111-119.					X	30 - 40	1 - 6	6	X	X	X	X	X	X	X		X	X	X							<ul style="list-style-type: none"> • GR-COPD improves: <ul style="list-style-type: none"> • Functional Exercise Capacity • HRQoL

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
van Ranst, D., Stoop, W. A., Meijer, J. W., Otten, H. J., & van de Port, I. G. (2014). Reduction of exacerbation frequency in patients with COPD after participation in a comprehensive pulmonary rehabilitation program. <i>International Journal of COPD</i> , 9, 1059-1067.	Effects of PR on self-reported exacerbation and hospitalization frequency		X			<ul style="list-style-type: none"> • Exercise Capacity (6MWT) • BODE index • Dyspnea (MRC) • Number of Hospitalizations • Number of Exacerbations • HRQoL (SGRQ, SF-36 v2) • Spirometry (FEV1, TLC) • Muscle Strength 	537		S, V	
Wang, C. -, Chou, P. -, Joa, W. -, Chen, L. -, Sheng, T. -, Ho, S. -, . . . Kuo, H. -. (2014). Mobile-phone-based home exercise training program decreases systemic inflammation in COPD: A pilot study. <i>BMC Pulmonary Medicine</i> , 14(1)	Efficacy of a home-based exercise training (HBET) program with mobile phone assistance			X		<ul style="list-style-type: none"> • Exercise Capacity (ISWT) • Spirometry (FVC, FEV1, FEV1/FVC, IC) • Muscle Strength • Blood Samples • Dyspnea (Borg Scale) 	30	71		
Wong, E. Y., Jennings, C. A., Rodgers, W. M., Selzler, A. -, Simmonds, L. G., Hamir, R., & Stickland, M. K. (2014). Peer educator vs. respiratory therapist support: Which form of support better maintains health and functional outcomes following pulmonary rehabilitation? <i>Patient Education and Counseling</i> , 95(1), 118-125.	Efficacy of ongoing phone support following PR			X		<ul style="list-style-type: none"> • HRQoL (SGRQ) • Exercise Capacity (6MWT) • Spirometry (FEV1, FVC, FEV1/FVC) • Dyspnea (MRC) • Patient Demographics 	79 - 168	~68		
Wootton, S. L., Cindy Ng, L. W., McKeough, Z. J., Jenkins, S., Hill, K., Eastwood, P. R., . . . Alison, J. A. (2014). Ground-based walking training improves quality of life and exercise capacity in COPD. <i>European Respiratory Journal</i> , 44(4), 895-904.	Effect of ground-based walking training			X		<ul style="list-style-type: none"> • Spirometry (FEV1, FVC) • HRQoL (SGRQ, CRQ) • Exercise Capacity (ESWT, ISWT, 6MWT) 	143	69	O, S, V	
Wu, W., Liu, X., Wang, L., Wang, Z., Hu, J., & Yan, J. (2014). Effects of tai chi on exercise capacity and health-related quality of life in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis. <i>International Journal of COPD</i> , 9, 1253-1263.	Effects of Tai Chi on exercise capacity and HRQoL				X	<ul style="list-style-type: none"> • HRQoL (SGRQ, CRQ) • Exercise Capacity (6MWT) • PEDro Scale 	824		M, O, S	
Zakrisson, A. -. (2014). How life turned out one year after attending a multidisciplinary pulmonary rehabilitation programme in primary health care. <i>Primary Health Care Research & Development</i> , 15(3), 302-311.	Description of the experiences of COPD patients of the lasting usefulness of a multidisciplinary PR program		X			<ul style="list-style-type: none"> • Semi-Structured Interviews (Qualitative Information) 	20	62 - 78	O, S	

Spreadsheets of Results

Citation	Setting					Timing			Rehabilitations				Staff						Cost?	Guidelines	What Was Found				
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician	OT				Other			
van Ranst, D., Stoop, W. A., Meijer, J. W., Otten, H. J., & van de Port, I. G. (2014). Reduction of exacerbation frequency in patients with COPD after participation in a comprehensive pulmonary rehabilitation program. <i>International Journal of COPD</i> , 9, 1059-1067.			X			170 - 215	5	12		X	X	X	X												<ul style="list-style-type: none"> PR reduced: Number of Exacerbations Number of Hospitalizations
Wang, C. -, Chou, P. -, Joa, W. -, Chen, L. -, Sheng, T. -, Ho, S. -, . . . Kuo, H. -. (2014). Mobile-phone-based home exercise training program decreases systemic inflammation in COPD: A pilot study. <i>BMC Pulmonary Medicine</i> , 14(1)	X					4 - 6	4 - 6	24	X			X				X									<ul style="list-style-type: none"> HBET with mobile phone assistance improves: Exercise Capacity Serum CRP Serum IL-8 Limb Muscle Strength
Wong, E. Y., Jennings, C. A., Rodgers, W. M., Selzler, A. -, Simmonds, L. G., Hamir, R., & Stickland, M. K. (2014). Peer educator vs. respiratory therapist support: Which form of support better maintains health and functional outcomes following pulmonary rehabilitation? <i>Patient Education and Counseling</i> , 95(1), 118-125.	X		X			5 - 10	8	24		X		X								X					<ul style="list-style-type: none"> Peer or respiratory therapist support via telephone following PR was not more effective at maintaining exercise capacity and HRQOL than usual care
Wootton, S. L., Cindy Ng, L. W., McKeough, Z. J., Jenkins, S., Hill, K., Eastwood, P. R., . . . Alison, J. A. (2014). Ground-based walking training improves quality of life and exercise capacity in COPD. <i>European Respiratory Journal</i> , 44(4), 995-904				X		30 - 45	2 - 3	8 - 10		X				X											<ul style="list-style-type: none"> Ground-based walking improves: HRQOL Exercise Capacity
Wu, W., Liu, X., Wang, L., Wang, Z., Hu, J., & Yan, J. (2014). Effects of tai chi on exercise capacity and health-related quality of life in patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis. <i>International Journal of COPD</i> , 9, 1253-1263.					X	30 - 60	2 - 5	12 OR 24		X															<ul style="list-style-type: none"> TC improves: Exercise Capacity HRQOL
Zakrisson, A. -. (2014). How life turned out one year after attending a multidisciplinary pulmonary rehabilitation programme in primary health care. <i>Primary Health Care Research & Development</i> , 15(3), 302-311.			X	X						X		X	X	X	X										<ul style="list-style-type: none"> One main theme identified participants' experience of their current situation: <ul style="list-style-type: none"> I live life at my own pace Three sub-themes identified the experience of participation in PR: <ul style="list-style-type: none"> Awareness of limitations in my life Regained control over my life No change in my life

Spreadsheets of Results

Citation	What was studied	Study Design				Measures	Sample			
		Semi-experimental	Correl/Descriptive	Experimental	Literature Review		Size	Age	Severity	Co-morbidities
Zupanic, E., Zivanovic, I., Kalisnik, J. M., Avbelj, V., & Lainscak, M. (2014). The effect of 4-week rehabilitation on heart rate variability and QTc interval in patients with chronic obstructive pulmonary disease. COPD: Journal of Chronic Obstructive Pulmonary Disease, 11(6), 659-669.	Effect of a short term rehabilitation on heart rate variability and QTc interval	X	X			<ul style="list-style-type: none"> • ECG Recordings (HRV, QT) • HRQoL (SGRQ) • Exercise Capacity (6MWT, ISWT) 	121		S, V	

Spreadsheets of Results

Citation	Setting				Timing			Rehabiliations				Staff						Cost?	Guidelines	What Was Found							
	Home	Community Centre	Clinic	Hospital	Not Reported	Session length/min	Sessions per wk	Program Duration/wks	Exercise	Physiotherapy	Educational	Behavioural	Doctor/Nurse	PT	Social Worker	Self-administered	Dietician				OT	Other					
Zupanic, E., Zivanovic, I., Kalisnik, J. M., Avbelj, V., & Lainscak, M. (2014). The effect of 4-week rehabilitation on heart rate variability and QTc interval in patients with chronic obstructive pulmonary disease. COPD: Journal of Chronic Obstructive Pulmonary Disease, 11(6), 659-669.			X			5	4		X	X	X			X													<ul style="list-style-type: none"> • Improvements in: • Exercise Capacity • HRQoL