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ORIGINAL RESEARCH

Exercise prescription practices in pulmonary rehabilitation programs

Gail Dechman[a], Paul Hernandez[b], and Pat G. Camp[c,d,e]

[a]School of Physiotherapy, Dalhousie University, Halifax, Canada; [b]Division of Respirology, Department of Medicine, Dalhousie University, Halifax, Canada; [c]Centre for Heart Lung Innovation, University of British Columbia, Vancouver, Canada; [d]Department of Physical Therapy, University of British Columbia, Vancouver, Canada; [e]St. Paul's Hospital, Providence Health Care, Vancouver, Canada

ABSTRACT

RATIONALE: Current guidelines recommend using aerobic and strength exercise testing to develop patient specific exercise prescriptions for pulmonary rehabilitation (PR).

OBJECTIVE: The purpose of this investigation was to examine the concordance with guideline recommendations in outpatient PR programs and compare hospital-based and community-based program settings.

METHODS: We conducted a web-based survey of PR programs in Canada. PR programs were identified via web searches, the Canadian Lung Association database, Scott's Medical Directory and the registry of the *Régie de l'Assurance Maladie du Québec*. Participating programs received a link to the survey that contained 175 items, encompassing 16 domains, 3 of which focused on questions related to aerobic and strength exercise testing and training.

MAIN RESULTS: One hundred twelve of 155 (83%) identified programs completed the survey; 64% were hospital-based outpatient programs. The majority of programs provided aerobic exercise prescription (76% hospital-based programs, 78% community-based programs). Most prescriptions were based on exercise testing (73% hospital-based programs, 84% community-based programs). The six minute walk test was the most commonly used test. Dyspnea and oxygen saturation were the most commonly used parameters to determine exercise intensity. More than 90% of programs reported providing strength training but less than 35% used testing to guide training intensity. There were no differences in aerobic or strength testing or training between settings. Inaccurate or incomplete information may have been submitted if consultation among program members did not occur.

CONCLUSIONS: Lack of maximal testing for both aerobic and strength training suggests that current exercise prescription practices in PR programs are unlikely to yield optimal individualized exercise programs. These results suggest more effective knowledge translation is needed to improve exercise interventions in PR.

RÉSUMÉ

CONTEXTE: Les lignes directrices actuelles recommandent d'avoir recours à des tests d'aérobie et de force musculaire à l'effort pour prescrire des exercices individualisés aux patients en réadaptation pulmonaire.

OBJECTIF: Le but de cette enquête était d'examiner la concordance des programmes de réadaptation pulmonaire ambulatoires avec les recommandations des lignes directrices et de comparer les programmes en milieu hospitalier aux programmes communautaires.

MÉTHODES: Nous avons réalisé un sondage en ligne auprès de programmes de réadaptation pulmonaire au Canada. Les programmes de réadaptation pulmonaire ont été recensés à l'aide de recherches sur le Web, de la base de données de l'Association pulmonaire du Canada, des Répertoires médicaux Scott's et du registre de la Régie de l'assurance-maladie du Québec. Les programmes participants ont reçu un lien vers un sondage comprenant 175 énoncés couvrant 16 domaines, dont trois portaient sur des questions liées aux tests d'aérobie et de force musculaire à l'effort et pendant l'entrainement.

PRINCIPAUX RÉSULTATS: Cent douze des 155 programmes recensés (83%) ont répondu au sondage; 64% étaient des programmes ambulatoires en milieu hospitalier. La majorité des programmes prescrivaient des exercices d'aérobie (73% des programmes en milieu hospitalier, 84% des programmes communautaires). Le test de marche de six minutes était le test le plus souvent utilisé. La dyspnée et la saturation de l'oxygène étaient les paramètres les plus communément utilisés afin de déterminer l'intensité de l'exercice. Plus de 90% des programmes ont indiqué offrir un entrainement en musculation mais moins de 35% avaient recours à un test pour guider l'intensité de cet entrainement. Il n'y avait pas de différence entre le milieu hospitalier et le milieu communautaire en ce qui concerne les tests ou les exercices d'aérobie ou de musculation. Il est possible que de l'information inexacte ou incomplète ait été soumise si les membres du programme n'ont pas consultés.

CONCLUSION: L'absence de test maximal tant pour l'entrainement aérobique que pour l'entrainement musculaire suggère que les pratiques actuelles en matière de prescription d'exercice sont peu susceptibles

KEYWORDS
Pulmonary rehabilitation; exercise; exercise prescription; aerobic exercise; resistance exercise

CONTACT Gail Dechman gdechman@dal.ca School of Physiotherapy, Dalhousie University, P.O. Box 15000, Halifax, NS B3H 4R2, Canada.
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de donner lieu à des programmes individualisés optimaux. Ces résultats suggèrent qu'un transfert des connaissances plus efficace est nécessaire pour améliorer les interventions ayant recours à l'exercice en réadaptation pulmonaire.

Introduction

Pulmonary rehabilitation (PR) is a comprehensive intervention based on a thorough patient assessment followed by individualized therapies that include, but are not limited to, exercise training, education, and behavior change. It is designed to improve the physical and psychological health of people with chronic respiratory disease and to promote long-term adherence to health-enhancing behaviors.[1] It is a core component of care for people with chronic obstructive pulmonary disease (COPD) and is useful in the management of people with other chronic respiratory diseases.[1–5] Exercise is considered a cornerstone of PR and results in increased exercise capacity and endurance, and decreased activity-related dyspnea as well as other symptoms.[1] Traditionally, PR programs have focused on aerobic exercise interventions; however, in 2013 a statement by the American Thoracic Society (ATS) and the European Respiratory Society (ERS), *Key Concepts and Advancements in Pulmonary Rehabilitation*, specifically recommended the inclusion of strength training in PR.[1]

The American College of Sports Medicine (ACSM) recommends the use of individualized exercise programs based on an exercise prescription[6] that specifies the mode, intensity, duration, and frequency of exercise. The ACSM Guidelines for Exercise Testing and Prescription state that for aerobic exercise, the intensity should be in the range of 60%–80% of the maximum workload achieved on a symptom-limited exercise test and that a session should range from 20–60 minutes in duration. Similarly, strength training prescriptions should include the load, number of repetitions and frequency for each exercise. Intensity of the load is prescribed in terms of the one repetition max (1RM), which is the most weight that can be lifted through full range of motion and in good form, only once. The threshold intensity for strength training is 60%–70% of the 1RM and the ACSM recommends using 1–3 sets of 8–12 repetitions. Thus, maximal exercise testing is implicit in the appropriate prescription of both aerobic and strength training programs. The ACSM also recommends a progression of one or more of the prescription components in order to exceed the threshold intensity as improvement occurs. Many professional respiratory organizations base their recommendations for exercise on the ACSM standards;[1–3] however, it is not known if clinical PR programs follow these recommendations for aerobic or strength exercise testing and prescription.

We recently conducted an extensive survey of PR programs in Canada, which included hospital-based inpatient and outpatient programs and those that operated in community settings (public health units and community recreation centres).[7] Many of the identified programs were located in community-based settings. Programs in these settings may have less access to resources related to exercise testing and training, which may impact how they deliver exercise interventions. This paper examined the concordance with guideline recommendations for the use of exercise testing and prescription practices of Canadian PR programs, and whether these practices differed in programs located in community versus hospital-based settings.

Methods

Program identification and survey development

A detailed explanation of the study methods has been previously published.[7] In brief, we identified PR programs in Canada via web searches, the Canadian Lung Association database, contacting all hospitals in English-speaking Canada listed in the Scott's Medical Directory, and by contacting all hospitals in Quebec via the registry of the *Régie de l'Assurance Maladie du Québec*. Each program was invited to participate via an introductory email that was followed by a consent form and a link to the survey. Our 175+ item survey was based on and extended the scope of the questions from previous surveys[8–10] The complete survey had 16 domains; 3 of which were dedicated to questions related to aerobic and strength exercise testing and training. The survey was pilot-tested by members of the Canadian Thoracic Society COPD Clinical Assembly and by 4 PR programs known to the authors. Revisions, based on their feedback, were made prior to distributing the survey. The survey was then transferred to a web-based format using Fluidsurveys (Fluidsurveys, Canada). The estimated time to complete the entire survey was 1 hour. Ethics approval for this study was granted by the University of British Columbia/Providence Health Care Research Ethics Board (Certificate H12-02380).

Data analysis

This paper provides results related to questions on exercise testing and training (See Table A1 for a list of these questions). A previous publication[7] presented information about: general program characteristics; location and type of program, health care professionals involved; capacity and access to the program; diagnoses of patients; and funding mechanisms. Counts and proportions, means and standard deviations, and median and interquartile ranges were calculated where appropriate. Comparisons between hospital- and community-based programs were conducted using chi-square tests or Fisher exact tests, with a significance level of $\alpha < 0.05$. To enable the comparison between hospital-based and community-based programs, any program that identified itself as "outpatient hospital-based" was designated "hospital" and any program that identified itself as located in a public health unit or community recreation centre was designated "community." For the purposes of this paper, the few programs that identified themselves as being "inpatient," "telehealth," or "home-based" were excluded from this analysis (n = 10).

Results

The survey identified 155 PR programs. Of these, 112 outpatient hospital and community-based programs completed all sections of the survey, including the questions related to exercise testing and training. The majority of the programs (64%; n = 7 2) were located in hospital-based outpatient departments. Twenty seven percent of programs (n = 30) were located in public health units and 9% (n = 10) were located in community recreation centres.

Aerobic exercise testing and prescription

The majority of hospital-based programs (76%; n = 55) responded that they developed an aerobic exercise prescription for participants and forty of those programs (73%) reported that they used an exercise test to develop the prescription. Similarly, 78% of community-based programs developed an aerobic exercise prescription and 84% of those programs used an exercise test to develop the prescription. There was no difference between hospital- and community-based programs in the frequency of exercise testing (p = 0.89) or the use of testing results for exercise prescription (p = 0.33).

The majority of hospital- and community-based programs used the six minute walk test (6MWT) to establish an aerobic exercise prescription (Table 1). Twice as many hospital-based programs, compared to community-based programs, used the results of a symptom-limited cardiopulmonary exercise test (CPET) or an incremental shuttle walk test (ISWT) to prescribe aerobic exercise (35% versus 19%, respectively) but this difference was not statistically significant (p = 0.10).

Respondents who stated they developed an exercise prescription were asked to identify the components of the exercise prescription based on the FITT principle (Frequency, Intensity, Time/Duration per session, Type/mode), regardless of whether the program used exercise testing to develop an exercise prescription. Table 2 shows that 80%–90% of programs included components of the FITT principle in their prescription. Frequently more than one health care professional was responsible for developing exercise prescriptions. Physiotherapists and kinesiologists/exercise physiologists participated equally in developing exercise prescriptions in the hospital-based programs while kinesiologists more commonly did this in community-based programs (Table 2).

All programs monitored exercise intensity using a variety of measures. Table 3 shows that the magnitude of dyspnea and overall exertion using the modified Borg scale were the most commonly used symptom measurement tools. Oxygen saturation (SpO_2) was the most frequently reported objective measure used.

Table 1. Type of exercise test used for exercise prescription.

	HOSP n = 40	COMM n = 26	p
6MWT	24 (60%)	20 (77%)	0.15
CPET	10 (25%)	4 (15%)	0.20*
ISWT	4 (10%)	1 (4%)	0.27*
CPET or ISWT	12	4	0.10

Note. *Fisher's Exact Test
†Table Probability.
6MWT Six minute walk test; CPET cardiopulmonary exercise test; ISWT incremental shuttle walk test; HOSP hospital-based; COMM community-based.

Table 2. Characteristics of exercise prescription practices.

	HOSP n = 55	COMM n = 31	p
Frequency	46 (84%)	28 (90%)	0.51
Intensity	50 (91%)	28 (90%)	0.95
Type	50 (91%)	30 (97%)	0.53
Time	48 (87%)	26 (84%)	0.86
Progression	34 (62%)	18 (58%)	0.82
Who Prescribes?			
PT	38 (69%)	16 (52%)	0.19
EP/Kin	15 (27%)	16 (52%)	0.03
Nurse	5 (10%)	2 (6%)	0.30*
RT	14 (25%)	4 (13%)	0.19
MD	4 (7%)	0 (0%)	0.17*
Other	3 (4%)	4 (13%)	0.15*

Note. *Fisher's Exact Test Table Probability.
Data are presented as the number of programs responding in a category and the percent of the total number of respondents in the setting (hospital-based = HOSP or community-based = COMM).
Frequency = sessions per week; Intensity = how hard the exercise is; Type = exercise modality; Time = length of a session; Progression = how the intensity and/or duration is increased.
PT = physiotherapist; EP/Kin = exercise physiologist/kinesiologist; RT = respiratory therapist.

Strength testing and prescription

Sixty-seven of the 72 (93%) hospital-based programs that provided exercise training offered strength training. Strength training was also common in the community-based programs where 37 of the 40 (93%) programs provided this intervention. All programs that offered strength training reported that they provided upper extremity training and the majority also offered lower extremity and core strength training (Table 4). In contrast to aerobic training, only 33% (n = 22) of hospital-based programs and 27% (n = 10) of community-based programs that offered strength training used an exercise test to develop the training program (Table 5). Only 1 hospital-based program and 2 community-based programs used a 1RM test. The others used indirect measures of the 1RM. Although only a small number of programs reported developing an exercise prescription, 49% of the hospital-based and 68% of the community-based programs stated that they used a training protocol.

Table 3. Criteria used to determine exercise intensity.

	HOSP n = 72	COMM n = 40
BORG	57 (79%)	27 (68%)
SpO_2	49 (68%)	30 (75%)
RPE	30 (42%)	26 (65%)
% MAX PRED HR	25 (35%)	14 (35%)
% MAX ACTUAL HR	12 (17%)	8 (20%)
% MAX WORK RATE	7 (10%)	3 (8%)
% HRR	7 (10%)	3 (8%)
% VO_2 MAX	6 (8%)	1 (3%)
METS	5 (7%)	3 (8%)
% AT	1 (1%)	0 (0%)
OTHER	12 (17%)	7 (18%)

Note. SpO_2 = oxygen saturation by pulse-oximetry; RPE = rating of perceived exertion; MAX PRED HR = maximum predicted heart rate; MAX ACTUAL HR = maximum actual heart rate; MAX WORK RATE = maximum work rate; HRR = heart rate reserve; VO_2 MAX = maximum oxygen uptake; METS = metabolic units;
AT = anaerobic threshold; HOSP = hospital-based; COMM = community-based.

Table 4. Type of strength testing used in the PR programs.

	HOSP n = 67	COMM n = 37
Lower extremity	65 (97%)	36 (97%)
Upper extremity	67 (100%)	37 (100%)
Core	41 (61%)	30 (81%)

Note. HOSP = hospital-based; COMM = community-based.

Typically, these protocols included the number of repetitions and the number of sets to be completed in a training session.

Discussion

The purpose of this study was to report the use of exercise testing and prescription practices of PR programs, examine concordance with guideline recommendations and to determine whether these practices differed in community-based versus hospital-based settings. In general, we found that exercise testing and training did not differ by program setting; however, current guideline recommendations for assessment and prescription of exercise were not being implemented in the majority of centers.

Exercise training is a cornerstone of PR. It is associated with improvements in functional exercise capacity and symptoms. A number of professional organizations have published statements and guidelines to assist PR staff in developing effective exercise programs.[1–3] Each organization recommends that exercise be individually prescribed. Furthermore, they state that exercise should be above the training threshold, which is the minimum intensity required to induce a training effect, and provide specific guidance on determining exercise intensity for aerobic and strength training.[1–4] The ATS/ERS and the American Association of Cardiovascular and Pulmonary Rehabilitation (AACVPR) have adopted the ACSM Guidelines for Exercise Testing and Prescription, which state that aerobic exercise intensity should be 60%–80% of the peak work rate for people with moderate to severe COPD.[11]

Only 20% of respondents used a CPET to identify maximum aerobic exercise capacity. Instead, we found that two-thirds of PR programs based the aerobic exercise prescription on the results of the 6MWT. This test is popular because it is easy to administer; however, oxygen uptake during the 6MWT initially increases in a linear manner and then plateaus from the middle to the end of the test.[12] Also, participants may stop and rest during the test. Thus, the test does not mimic the conditions of, or response to, a graded exercise test and does not provide WRpeak. Although several prediction equations to estimate VO_2 from 6MWD have been developed, these do not provide a valid estimation of VO_2 in the clinical setting.[13] Another weakness of the clinically implemented 6MWT is that does not allow the determination of the VO_2/heart rate relationship; therefore it is impossible to create an exercise prescription based on the VO_2 reserve, which is the ACSM gold standard. Thus, it is unlikely that the exercise prescription in most PR programs surveyed was based on peak work rate, peak heart rate, or VO_2max. Admittedly, access to a CPET is limited. Thus, field tests such as the ISWT that can be used to reliably estimate VO_2peak,[14] an objective standard for exercise prescription, should be promoted as an alternative to the 6MWT when a CPET is unavailable.

Table 5. Type of strength testing protocol.

	HOSP n = 22	COMM n = 10
Protocol		
1 RM w/protocol	1	2
3 RM w/protocol	4	2
10RM w/protocol	3	2
Patient's ability to lift 10X	11	3
Other	8	3

Note. RM = repetition maximum; HOSP = hospital-based; COMM = community-based.
w/protocol indicates a standardized protocol was used to make the determination.

Almost all programs determined the aerobic exercise intensity using the level of oxygen saturation and the participant's subjective rating of dyspnea. These results are similar to those from a recent US survey of PR programs published by Garvey et al.[9] They reported that although 97% of their respondents developed an exercise prescription and 85% included intensity in the prescription, 91.4% used 6MWT results, dyspnea and RPE ratings to determine exercise training intensity. Oxygen saturation can be used to judge the safety of the exercise intensity; however, it is not linearly related to VO_2, a desired reference for prescribing intensity. Using dyspnea, not anchored to heart rate or work rate during a maximal exercise test, to prescribe intensity could result in some patients being comfortable exercising at dangerously low blood oxygen levels while others could be dyspneic and not encouraged to achieve an intensity at or above the training threshold. Confusion on the use of dyspnea intensity is compounded as the ACSM suggests Borg scale 3–5/10 as an appropriate target and the ATS/ERS recommends 4–6/10. The Borg Rating of Perceived Exertion can be used to modulate the prescribed exercise intensity but should not be used as a primary method of determining it.[6,15]

We previously reported that approximately 50% of programs that responded to our survey used arm ergometers for aerobic training.[7] There are several challenges in prescribing exercise using this modality. First, there are few valid exercise testing protocols that use arm ergometry. Using the results of treadmill testing to prescribe the intensity of arm ergometry is problematic because the arms have a small muscle mass compared to the legs; therefore, the VO_2peak during arm ergometry is 20%–30% lower than that obtained during treadmill testing.[16] Using dyspnea to gauge exercise intensity is problematic because arm activity is particularly dyspnea-provoking in people with COPD and, therefore, it is unlikely to correlate with the peak workload obtained on a bike or treadmill test. Second, the principle of specificity of training states that the greatest improvements in performance occur in the modality used for training.[17] While not negating the value of cross-training, the arms are not typically used for endurance that would be developed during training with arm ergometry. It is possible that PR programs use arm ergometry as a means of promoting dyspnea desensitization. If this is the case, then it should be possible to transition patients to other modalities such as treadmills or cycle ergometers after the desensitization period as a means of optimizing aerobic training.

Physiotherapists and kinesiologists/exercise physiologists were responsible for developing exercise prescriptions in the majority of hospital- and community-based programs. The academic preparation for these professions includes exercise

testing and prescription so it is likely that they are familiar with the FITT principle and its application. It is possible, however, that some of these individuals' education did not include content related to prescribing exercise for individuals with chronic lung disease. This may explain why so many respondents judged exercise intensity using the Borg dyspnea scale without reference to an objective measure of intensity during an exercise test. Limited knowledge of exercise responses in people with COPD may also explain why 71% of respondents reported using SpO_2 to monitor exercise intensity. It is also possible the exercise prescription was based on historical practices in the institution. Although published guidelines and statements on exercise prescription for people with lung disease are available our findings suggest that more effective knowledge translation is needed. Standardized courses that are closely tied to accreditation are options to consider.

The most recent ATS/ERS Statement on the key concepts and advances in pulmonary rehabilitation states that strength training, characterized by lifting relatively heavy loads, builds muscle mass and contributes to improved survival, decreased use of health system resources, enhanced exercise capacity and reduced the risk of falling.[1] We were surprised that 93% of the PR programs that responded to our survey used strength training when only 74.5% reported offering conventional aerobic training. However, as oxygen desaturation and high Borg ratings for dyspnea are unusual during strength training, staff may have judged it to be a safer intervention. The AACVPR survey[9] did not publish information on the use of strength training; therefore, we are unable to judge whether our results are comparable to practice in America. The ATS/ERS statement[1] and the ACSM[6] make recommendations about strength training intensity that are based on the 1RM. In contrast to aerobic exercise, very few respondents to our survey used exercise testing or developed a protocol for strength training. Indeed, only 3 respondents reported assessing the 1RM. The ACSM recommends an intensity of 60%–80% of the 1RM.[6] It is probable that programs were using lower loads and higher repetitions to work on muscle endurance that may be in conflict with the ATS/ERS statement, which notes that endurance training produces "suboptimal increases in muscle mass or strength compared with programs that include specific strength training."[1] Strength testing can be challenging and this may account for its limited use in the PR programs responding to this survey. It is possible that most PR programs lack the appropriate equipment or staff expertise for this type of testing, particularly for the lower extremities. However, there are a number of strategies that can be used to predict the 1RM from the number of repetitions and the submaximal weight lifted. One of the most popular is the Brzycki method, which takes minimal time and thus is clinically useful.[18,19] It is encouraging that the majority of our respondents appreciated the need for strength training. Education regarding clinically relevant methods of testing and prescription should be implemented to improve the effectiveness of strength training.

While our survey methodology allowed us to conduct the most extensive investigation of exercise testing and prescription practices at a national or international scale to date, it also presents some limitations. Programs were asked to identify one person to complete the survey and we suggested that they consult with other program members as needed. It is possible that inaccurate or incomplete information was submitted if this consultation did not happen; however, we did contact programs when clarification of responses was required. We did not provide a definition of strength training in the survey, which may explain why such a large number of programs reported providing strength training when other responses suggested that it was more likely they were referring to muscular endurance training. Finally, our survey did not specifically ask about the barriers or rationale for exercise testing and prescription, which may have provided insight into reasons for deviations from recommended practices. Despite these limitations, we believe the survey results provide valuable information that will allow us to improve exercise content in Canadian PR programs. Furthermore, similarities in responses between our survey and the one conducted by the AACVPR suggest that our results are relevant to programs outside Canada.

Conclusion

The majority of PR programs responding to our survey offered structured aerobic and strength training. This training may not be optimal due to limited individualization of intensity for both aerobic and strength exercise. The lack of differences between hospital-based and community-based settings suggests that the reasons why programs fail to meet testing and prescription recommendations have a common origin. The limitations we identified were similar to those reported by the AACVPR.[10] Guidance on exercise testing and training is available from the ACSM and in professional society publications, suggesting that more effective knowledge translation strategies are needed.

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Appendix

Table A1. Survey questions on exercise testing and prescription practices in Canadian pulmonary rehabilitation programs.

Question	Response options
Program characteristics – exercise (general)	
1. What types of exercise training does your program provide? (Check all that apply)	Aerobic Strength Flexibility Balance Other (please specify)
Program characteristics – exercise (aerobic)	
2. Do you develop an AEROBIC exercise prescription for your program participants?	Yes No
3. If "Yes," which components are included in your prescription?	Intensity (ie, how hard the aerobic exercise is) Mode (ie, treadmill, bike, free walking, elliptical machine etc.) Frequency (ie, number of sessions per week) Duration (ie, the length of each session) Interval training (give details of the length of training and rest intervals) Progression (ie, how the intensity and/or duration is increased)
4. Who develops the aerobic exercise prescription? (check all that apply)	Physiotherapist Exercise physiologist/kinesiologist Nurse Respiratory therapist Physician Other (please specify)
5. Do you use exercise testing to establish and AEROBIC exercise prescription?	Yes No
6. If you answered 'YES" to the question above, which tests do you use? (check all that apply)	Six-minute walk test Incremental shuttle walk test Endurance shuttle walk test Submaximal constant load exercise (bike or treadmill) Does the test include an electrocardiogram? Y/N Does the test include gas exchange measurements? Y/N Symptom-limited incremental exercise test (bike or treadmill) Does the test include an electrocardiogram? Y/N Does the test include gas exchange measurements? Y/N

(*Continued on next page*)

Table A1. (*Continued*)

Question	Response options
7. How do you determine the intensity of the exercise? (check all that apply)	BORG Dyspnea 10 point scale Rating of Perceived Exertion (RPE) Metabolic Equivalents (METS) % of max predicted heart rate (HR) % of actual max heart rate (HR) % of max work rate (watts) % of heart rate reserve % of VO2 max/peak SpO_2 % of anaerobic threshold Other (please specify)
8. Which modalities do you use in the aerobic exercise component of your program?	Cycle ergometer Treadmill Free walking: hallway, track etc. Arm ergometer Stair climbing Elliptical training Schwinn cycle Rower Other training strategies: one legged cycling, interval training Other (please specify)
9. Do you give a discharge exercise prescription?	Yes No
10. If "YES," please state the exercise parameters that you use.	
Program Characteristics – Exercise (Resistance/Strength)	
11. Do you include STRENGTH training in your pulmonary rehabilitation program?	Yes No
12. If "YES," do you include: (check all that apply)	Lower extremity Upper extremity Core
13. Do you use exercise testing to establish a strength training prescription?	Yes No
14. If you answered "YES" to the question above, which tests do you use? (check all that apply)	1 Repetition Max using standardized protocol 3 Repetition Max using standardized protocol 10 Repetition Max using standardized protocol Patient's ability to lift 10x Other (please specify)
15. Do you use a protocol for resistance training?	Yes No
16. If "YES," do you include: (check all that apply)	Number of repetitions Number of sets