Chronic Respiratory Disease

Chronic Respiratory Disease
Volume 17: 1–8

DOI: 10.1177/1479973120912821
journals.sagepub.com/home/crd
SAGE

Physical exercise during acute exacerbations of chronic obstructive pulmonary disease: Australian physiotherapy practice

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Abstract

Evidence supports an important role for pulmonary rehabilitation (PR) after acute exacerbations of chronic obstructive pulmonary disease (AECOPD); however, the role of physical exercise during hospitalisation is less clear. This study evaluated Australian physiotherapy practice and clinical perspectives regarding exercise and physical activity for patients with AECOPD. A national survey of 123 Australian public hospitals was conducted from 2016 to 2017 using a purpose-designed survey measuring self-reported physical exercise prescription, objective measure use, referral patterns and factors influencing service delivery. The response rate was 72% (88 hospitals; 176 physiotherapists). Most physiotherapists (92%) prescribed physical exercise frequently for patients with AECOPD and perceived their role to be important (81%). The most commonly prescribed modalities were ground walking (94%), sit-to-stand (89%) and non-equipment-based lower limb strengthening (79%). Only 32% of respondents offered physiotherapy evaluation during post-discharge outpatient clinic appointments at their hospital. While 71% of respondents indicated they frequently referred patients to PR after AECOPD, rates were significantly higher in those with more cardiorespiratory experience (82%) than those with less experience (66%; $p = 0.026$). Australian physiotherapists frequently prescribe simple physical exercise modalities for patients with AECOPD. PR referral rates appear influenced by clinician experience, which may need consideration in future remedial strategies.

Keywords

Pulmonary disease, chronic obstructive, acute exacerbation, healthcare surveys, physical therapy modalities, physical exercise

Date received: 5 December 2019; accepted: 8 February 2020

Introduction

Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) are clinically impactful events characterised in their pulmonary component by heightened respiratory symptoms (dyspnoea, cough and sputum production)[1] and in their extrapulmonary components by musculoskeletal dysfunction,[2] muscle weakness[3] and decreased physical activity levels.[4–6] Pulmonary rehabilitation (PR) comprising multidisciplinary evaluation, physical exercise training and education/psychological support[7] is one of the most effective therapies to improve important health outcomes in this patient group when applied during the period of disease stability[8] and shortly following

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AECOPD.[9] International guidelines recommend PR to commence within 2–4 weeks of discharge,[10–12] however rates of referral, uptake and completion of PR following AECOPD are suboptimal.[13–15]

Despite important progress regarding the impact of rehabilitation interventions applied *during* the period of hospitalisation for AECOPD,[16–19] data are scant regarding how physiotherapists approach this aspect of clinical practice. This is important to ascertain, as physiotherapists play a key role in the management of patients hospitalised with AECOPD, including referrals to PR after discharge. Many physical exercise modalities and adjuncts exist in the modern physiotherapy repertoire (e.g. neuromuscular electrical stimulation (NMES), whole-body vibration and non-invasive ventilation), with variable effect upon patient outcomes during AECOPD.[20] This, combined with an increasing array of available outcome measures (e.g. measures of exercise capacity, simple function or multicomponent batteries), may give rise to considerable variability in clinical reasoning and practice in this patient group.

The present study therefore aimed to determine current practice and clinical perspectives regarding the physiotherapy management of patients with AECOPD with respect to physical activity and exercise in Australia.

Method

Design

This study was a cross-sectional, paper-based national survey of clinical practice. Ethical approval was obtained from the Human Ethics Committee of Monash University (ref# 0351). For the purpose of this study, an AECOPD was defined as any admission to hospital with an acute onset of sustained worsening of baseline dyspnoea, cough and/or sputum expectoration beyond normal day-to-day variations.[1,21] Physical exercise was defined as planned, structured and repetitive bodily movement aiming to improve or maintain one or more components of physical fitness[22] and may have included interventions such as NMES and whole-body vibration training due to their targeted effects on contractile peripheral skeletal muscle function.

Instrument and participants

As no survey with established validity or reliability existed for the purpose of this study, a custom instrument was created. This was informed by expert opinion of the authorship team and a review of the literature in the field following a search of electronic databases (Ovid MEDLINE, AMED, Embase, CINAHL plus, PEDro and The Cochrane Library) up to April 2017. The purpose of this was to identify common adjunct therapies, outcome measures and instruments used for inpatient rehabilitation of patients with AECOPD, and to inform category response options. An initial survey was drafted and piloted on a representative cohort of four cardiorespiratory physiotherapists (known to the research team but ineligible to participate in the study) for face validity, resulting in minor clarifications to written expression, alterations of some question structures and a small reduction in the total number of survey questions and some item responses. Key areas covered in the final survey (available in Online Supplement) included frequency of service delivery, perceived importance of physical exercise, methods to monitor treatment effectiveness and the nature of follow-up care (including PR referrals). Paper-based surveys were distributed with an accompanying explanatory statement via post in November 2016 to a Senior Cardiorespiratory Physiotherapist at all Australian 'principal referral' and 'large' public hospitals ($n = 125$), identified via a publicly available Government resource.[23] Each site survey was labelled with a unique code to facilitate accurate recording of hospital-level response rates. Recipients were asked to distribute survey copies to all relevant physiotherapists at their hospital who typically treat patients with AECOPD and to return surveys via a reply-paid envelope within 3 weeks of receipt. One reminder letter and a repeat copy of the survey was sent to hospitals that did not reply within this time frame to maximise response rates,[24,25] allowing a further 4 weeks to complete data collection (up to February 2017). Hospitals that did not return a minimum of one survey after this time point were classified as 'non-responders'.

Data analysis

Survey data were analysed using Stata 14 SE (StataCorp, College Station, Texas, USA). As most data were of a nominal (categorical) nature, these were expressed descriptively (frequencies and percentages) and represented visually via bar graphs. Where clinically appropriate, responses from five-point Likert-type scales were dichotomised (e.g. very often/always and often vs. sometimes, rarely and very rarely/never)

Table 1. Demographic characteristics of participants.[a]

Characteristics	
Responses	
Total included hospitals	86
Total included surveys	174
Surveys per site (median/range)	1 (1–10)
Hospital state	
Victoria	25 (29.1%)
New South Wales	25 (29.1%)
Queensland	15 (17.4%)
Western Australia	9 (10.5%)
South Australia	5 (5.8%)
Tasmania	4 (4.7%)
Australian Capital Territory	2 (2.3%)
Northern Territory	1 (1.1%)
Setting (responses/distributed)	
Major city	58/75 (67.5%)
Inner regional (rural, close to urban centres)	19/32 (22.1%)
Outer regional (rural, far from urban centres)	7/11 (8.1%)
Remote (isolated from urban centres)	2/3 (2.3%)
Physiotherapy experience	
General physiotherapy (years), median (IQR)	6 (3.5, 10.5)
Cardiorespiratory physiotherapy (years), median (IQR)	4 (1.5, 8)
Highest qualifying degree	
Entry level degree	127 (73.0%)
Postgraduate masters	38 (21.8%)
Clinical doctorate	0 (0%)
PhD	3 (1.7%)
Other	6 (3.5%)

IQR: interquartile range.
[a]Percentages reflect proportions of final sample yield.

to allow for cross-tabulation against participant subgroupings (e.g. those with less than or greater than 5 years cardiorespiratory physiotherapy experience) via χ^2 tests. Statistical significance was denoted via $p < 0.05$ for such analyses.

Results

Of the 125 targeted hospitals, two surveys were returned by the postal service without reaching the destination (one was permanently closed and the other refused to accept an envelope without a named recipient) and were excluded from the analysis. Responses were received from 88 of 123 sites (rate 72%; median 1 (range 1–10) surveys per site, total 176 surveys), mostly from within major cities (Table 1), however two sites indicated they did not regularly manage patients with AECOPD and were excluded from further analyses. The workforce had a broad range of experience, with almost two thirds (65%) having ≤5 years of experience in the specific area of cardiorespiratory physiotherapy and few possessing postgraduate qualifications (Table 1). Median response count across all questions for the 174 included surveys was 173 (interquartile range 172–174; range 168–174).

Physical exercise

Most physiotherapists (92%) prescribed physical exercise frequently (≥60% of patients with AECOPD), however, treatment duration was typically (72%) short (≤20 minutes). The most frequently prescribed training modalities (combined 'very often/always' and 'often' responses) were non-treadmill walking (94%), sit-to-stand (89%) and non-equipment-based lower limb strengthening (79%). Interval training was more often prescribed than continuous training, with lower limb strengthening (83%), upper limb strengthening (74%) and functional training (72%) the most frequently prescribed physical exercise training modalities of these methods (Figure 1). Exercise equipment was used relatively infrequently (Figure 2). The most common adjuncts to physical exercise were breathing control (98%), walking frames (97%), oxygen therapy (91%) and huff and/or cough (74%). Physical exercise was most frequently conducted in patients' rooms (91%), however a third reported running individual sessions in an on-ward gym (32%). While most (81%) physiotherapists felt physical exercise was a fairly or very important aspect of the overall management of patients with AECOPD, 13% rated it as being 'very unimportant'.

Outcome measurement

Physiotherapists perceived the most important targets for physical exercise prescription (combined 'very important' and 'fairly important' responses) were respiratory symptoms (e.g. dyspnoea) (90%), daily activity (87%), quality of life (84%), aerobic capacity (78%) and anxiety/depression (75%). Objective outcome measures were most commonly used for the purpose of monitoring patient progress (85%), establishing a patient's baseline physical function (83%) and informing exercise prescription (80%). The aspects of physical function most frequently monitored objectively were aerobic capacity (72%), general function (69%) and lower limb

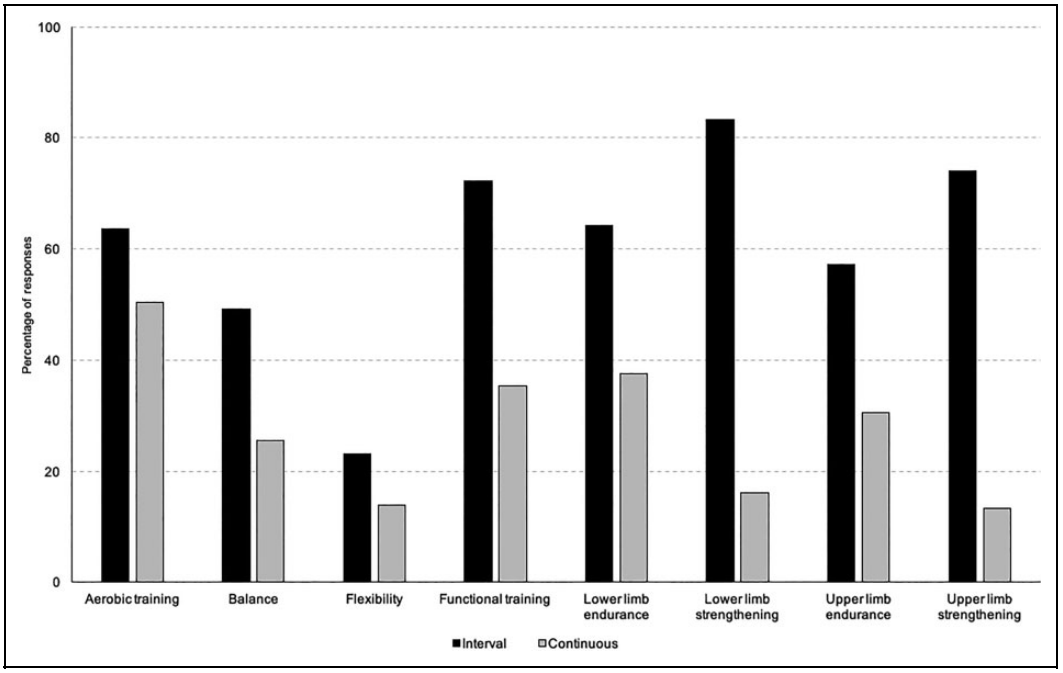

Figure 1. Types of exercise training prescribed for patients with acute exacerbations of chronic obstructive pulmonary disease.

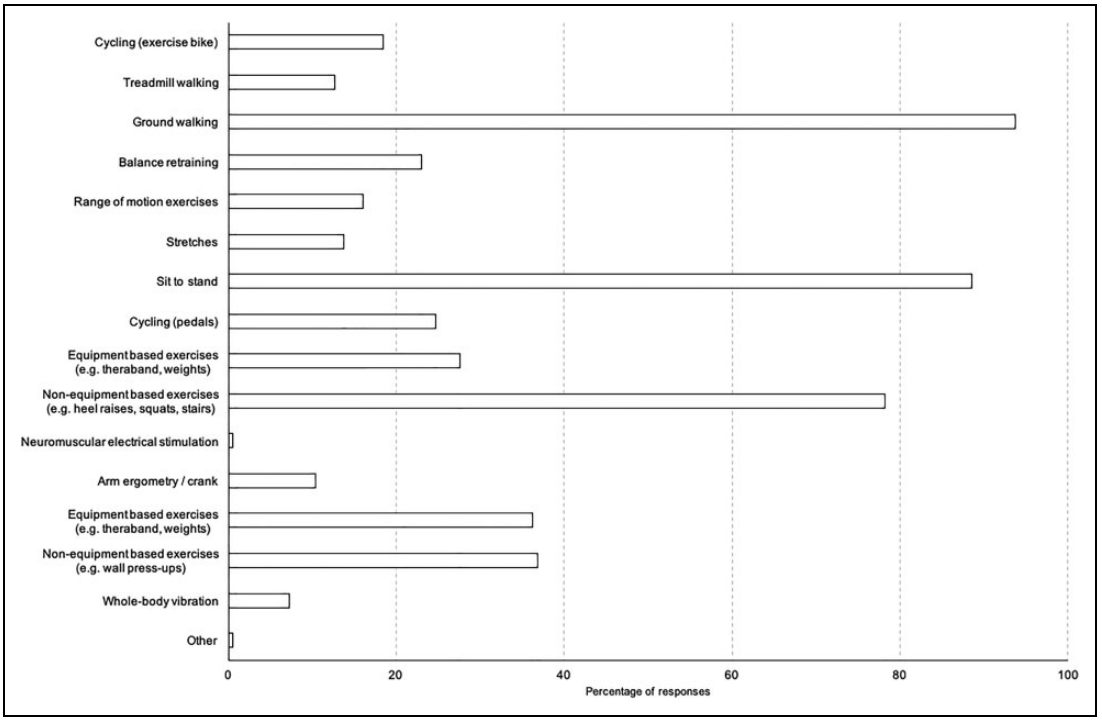

Figure 2. Specific exercise training modalities for patients with acute exacerbations of chronic obstructive pulmonary disease.

strength (36%), while the most common specific outcome measures reportedly used in clinical practice were the 6-minute walk test (39%), sit-to-stand test (32%) and timed up and go (28%).

Physical activity

Three-quarters of physiotherapists reported monitoring patients' physical activity levels and/or sedentary behaviours during AECOPD, with most doing so via

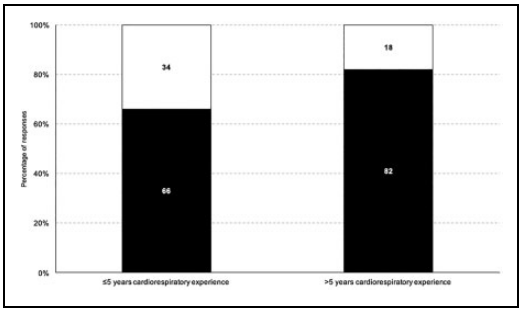

Figure 3. Relationship between clinician experience and referral frequency (combined 'often' or 'very often/always' responses) to pulmonary rehabilitation after discharge ($p = 0.026$ between groups).

direct observation (75%) and only 8% via physical activity monitors. Physical activity was often prescribed during this time, either via verbal or written advice (93%) or a physical activity program (69%), and was commonly prescribed upon discharge (verbal/written advice 83% and home-based physical activity program 67%), but rarely observed or monitored.

Referral practices

The provision of physiotherapy care or PR for patients with AECOPD was mixed, with 40% indicating this formed part of a routine procedure (e.g. care bundle) upon admission and 54% reporting it was routinely instigated upon hospital discharge. Most physiotherapists (66%) reported that monitoring recovery of physical function after discharge was infrequent (combined 'very rarely/never', 'rarely' and 'sometimes' responses), and only 31% offered physiotherapy evaluation during post-discharge outpatient clinic appointments.

Most physiotherapists (71%) reported referrals to PR after AECOPD were frequent (combined 'often' and 'very often/always' responses), however, the rate of self-reported referrals to PR was significantly greater in those with greater (>5 years) cardiorespiratory experience (82%) than those with less ($\leq$5 years) experience (66%) ($p = 0.026$; Figure 3). Various factors reportedly contributed to decisions regarding referral to follow-up physiotherapy or PR after AECOPD. These are summarised in Figure 4.

Discussion

This study provides representative cross-sectional data describing physiotherapy practice in Australia regarding physical exercise prescription, outcome measurement, clinical reasoning and referral practices for patients admitted to hospital due to AECOPD.

One of the main study findings was the high rate of physical exercise prescription for patients during AECOPD, and the perception this represents an important aspect of inpatient care. This is consistent with a previous study relating to this patient group[25] but contrasts with a recent international guideline for the management of patients with AECOPD that 'suggest[s] not initiating PR during hospitalisation (conditional recommendation, very low quality of evidence)'.[12] This specific recommendation has been subject to some criticism[26] in the light of several studies demonstrating the safety, feasibility and effectiveness of interventions commenced early during the course of AECOPDs.[16,18,19,27–29] It is difficult to speculate why self-reported clinician opinion and practice would differ in this respect.

Our data suggest clinicians place heavy emphasis upon exercises that reflect simple, short lower-limb functional tasks such as walking, rising from a chair and stepping up stairs (Figure 2). This may reflect the pragmatism of acute public healthcare (e.g. time pressures and limitations of accessing equipment) or could suggest a preference towards tasks capable of translating into the home setting after discharge. We did not examine this reasoning in the present study but confirmatory data would be of clinical interest. We found it interesting that most respondents reported using outcome measures to monitor patients' progress, establish baseline function and to inform exercise prescription and most commonly for the purpose of evaluating aerobic capacity, presumably via tests such as the 6-minute walk test. This is interesting, as the (typically) short admission duration for such patients, combined with their heightened symptomatic burden and uncommon access to routine follow-up physiotherapy service after discharge, means the opportunity for gains in aerobic capacity during the period of hospitalisation is restricted. This was highlighted in a recent study that showed physical activity levels to be not only extremely low during the inpatient admission but also stagnant from day 2 (mean 586 steps/day) to day 7 (mean 652 steps/day).[4] Many physiotherapists reported monitoring physical activity levels and sedentary behaviours in our study, and it would be interesting to observe longitudinally whether efforts to modify this behaviour may reflect a more realistic paradigm shift in clinical practice for these patients.

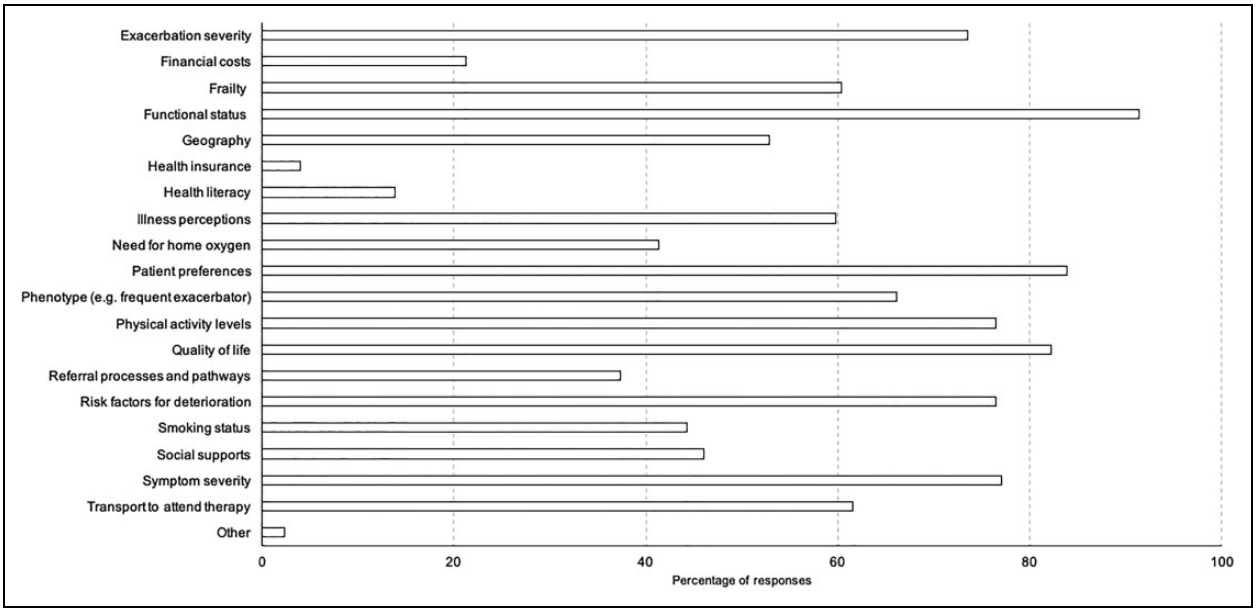

Figure 4. Perceived importance (combined 'fairly important' or 'very important' responses) of factors influencing decisions to refer patients for follow up physiotherapy / pulmonary rehabilitation after discharge.

Most respondents felt that referrals to PR after AECOPD were quite common. We know, however, that actual international referral and uptake rates after AECOPD are very poor (less than 10%).[13–15] To the best of our knowledge, our data suggesting an increased self-perceived rate of referrals by physiotherapists with greater experience (>5 years) working in the cardiorespiratory field (Figure 3) is the first of its kind. While one could speculate those with less experience have less responsibilities to initiate PR referrals or may lack familiarity with referral procedures, it is important to note this group reflects the majority (65%) of the workforce represented in this survey. We suspect the higher referral rate is more likely due to differences in clinical reasoning and practice attributable to acute respiratory medicine expertise, as has been previously demonstrated.[30–32] Those with more experience may proactively seek to overcome barriers to PR referrals after AECOPD. If so, this might suggest implementation of evidence-based rehabilitation in this patient group is optimised when experienced (rather than junior) clinicians are placed at the forefront of the patient–clinician coalface.

Limitations

As the survey used for this study was purpose-designed, evidence of its psychometric properties (e.g. validity and reliability) is lacking. Findings can only be considered representative of practice in 'principal referral' and 'large' Australian public hospitals, which could theoretically differ from that observed in smaller hospitals or the private sector. We deemed this to pose an acceptable sampling error risk due to the challenges of comprehensively sourcing such other data and the predominance of such patients being typically managed in public health. Our choice to disseminate the survey via a paper-based mail service addressed to a generic therapist meant we could not guarantee all surveys reached all intended recipients (on delivery or return). Some opinions or practices may therefore be underrepresented. This could possibly be overcome via personalised contact methods (e.g. phone or email), however, we opted against this in our *a priori* ethics protocol. Self-reported surveys can be inherently prone to recall bias or inaccuracy, and we were unable to verify the accuracy of perceived practices versus actual practice (e.g. rates of referral to PR after AECOPD). Finally, the extended time between data collection and publication may give rise to speculative changes in clinical practice, however, we do not feel this adversely affects the novel insights gained from this study.

Conclusions

Australian physiotherapists frequently prescribe physical exercise for patients with AECOPD and perceive it to be an important component of their overall

management. There is considerable variability, however, regarding the way such services are provided to individual patients. Rates of referral to PR after discharge appear to be influenced by greater clinician experience, suggesting this attribute may be worth considering in future initiatives that seek to modify this aspect of patient care.

Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: CO was the recipient of a Lung Foundation Australia/Boehringer-Ingelheim COPD Research Fellowship in 2016–2018, unrelated to the present work.

Ethics approval

This study was approved by the Monash University Human Ethics Committee (project number 0351).

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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Data accessibility statement

Data from this study can be made available upon direct request to the contact author.

Supplementary material

Supplemental material for this article is available online.

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