

Research

People attending pulmonary rehabilitation demonstrate a substantial engagement with technology and willingness to use telerehabilitation: a survey

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KEY WORDS

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ABSTRACT

Questions: What is the level of technology engagement by people attending pulmonary rehabilitation? Are participant demographics and level of technology engagement associated with willingness to use telerehabilitation? **Design:** A cross-sectional, multicentre study involving quantitative survey analysis. **Participants:** Convenience sample of people with chronic respiratory disease attending a pulmonary rehabilitation program, maintenance exercise class or support group. **Outcome measures:** The survey assessed the participants' level of technology engagement (access to and use of devices), self-rated skill competence, access to online health information and willingness to use telerehabilitation. **Results:** Among the 254 people who were invited, all agreed to complete the survey (100% response rate). Among these 254 respondents, 41% were male, the mean age was 73 years (SD 10), and the mean forced expiratory volume in 1 second (FEV₁) was 59% predicted (SD 23). Ninety-two percent (n = 233) of participants accessed at least one technological device, of whom 85% (n = 198) reported regularly using mobile phones and 70% (n = 164) regularly used a computer or tablet. Fifty-seven percent (n = 144) of participants self-rated their technology skill competence as good and 60% (n = 153) of all participants were willing to use telerehabilitation. The multivariate regression model found regular computer use (OR 3.14, 95% CI 1.72 to 5.71) and regular mobile phone use (OR 2.83, 95% CI 1.32 to 6.09) were most associated with a willingness to use telerehabilitation. **Conclusion:** People attending metropolitan pulmonary rehabilitation, maintenance exercise classes and support groups had substantial technology engagement, with high device access and use, and good self-rated technology competence. The majority of participants were willing to use telerehabilitation, especially if they were regular users of technology devices. [Seidman Z, McNamara R, Wootton S, Leung R, Spencer L, Dale M, Dennis S, McKeough Z (2017) People attending pulmonary rehabilitation demonstrate a substantial engagement with technology and willingness to use telerehabilitation: a survey. *Journal of Physiotherapy* 63: 175–181] © 2017 Australian Physiotherapy Association. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

For people with chronic respiratory disease, pulmonary rehabilitation has been shown to be effective in reducing dyspnoea and improving quality of life and functional exercise capacity.¹ However, the rates of attendance in Australia are poor, with <1% of people with moderate-to-severe chronic obstructive pulmonary disease (COPD) engaging in pulmonary rehabilitation.² Furthermore, 8 to 50% of people referred to pulmonary rehabilitation do not attend, and 10 to 32% of people who start do not complete the program.³ This can be attributed to the many barriers that exist, which reduce a person's ability to access pulmonary rehabilitation programs. These barriers include travel time and the costs involved in attending the program site, as well as fatigue, inconvenience and disruption caused to daily activities.³ Novel strategies of pulmonary rehabilitation delivery such as telerehabilitation are of interest because they may increase convenient and equitable

access to services, whilst reducing barriers associated with attending centre-based programs for people with chronic respiratory disease.

Telehealth is an evolving healthcare delivery system that employs various technology modalities to overcome the barriers that people face in accessing services. Pulmonary telerehabilitation is defined as the delivery of pulmonary rehabilitation services via telecommunication and videoconference technologies.⁴ There are various models of pulmonary telerehabilitation, including: in-home videoconferencing,^{5–8} videoconferencing from a central centre to a satellite centre,⁹ mobile phone-based exercise programs,¹⁰ a combination of videoconferencing and telephone support,¹¹ and web-based self-monitoring.^{12–14} Two systematic reviews evaluating telerehabilitation programs for people with cardiopulmonary disease concluded that telerehabilitation programs provide similar improvements in exercise capacity as centre-based programs¹⁵ and have higher compliance rates.¹⁶ A recent

study, not included in these systematic reviews, was the first randomised, controlled trial of an 8-week in-home videoconferencing telerehabilitation exercise program compared with usual medical care in people with COPD. The study found that the telerehabilitation exercise group had statistically significant improvements in endurance exercise capacity and self-efficacy with high satisfaction and completion rates compared to the usual care group.^{5,17}

Engaging with pulmonary telerehabilitation using videoconferencing requires patients to have access to and use technological devices with an internet connection. In a COPD telemedicine trial, it was found that technical concerns (eg, not wanting a computer in the home) and personal concerns (eg, feeling too old to adopt new technology) were barriers to people using telerehabilitation.¹⁸ Previous research into the use of technology in other chronic diseases, including diabetes,¹⁹ lung cancer²⁰ and chronic cardio-pulmonary conditions,²¹ have reported mixed results in the access and use of technology. In a diabetic population, the 'willingness' to use telehealth technology was significantly associated with the uptake of telerehabilitation.¹⁹ To date, no research has investigated the access and use of technology, the willingness to use technology for disease management, and the factors relating to accessing health information online in the pulmonary rehabilitation population.

Therefore, the research questions for this cross-sectional, multi-centre survey were:

1. What is the level of technology engagement by people attending pulmonary rehabilitation, including the access to, use of and self-reported level of competence in using technology devices?
2. Are a participant's demographics and factors related to technology engagement associated with the likelihood of researching health information online and willingness to use telerehabilitation?

Methods

Study design and participants

A cross-sectional, multicentre survey was conducted between December 2015 and April 2016. A convenience sample was used whereby people attending one of nine Australian metropolitan pulmonary rehabilitation programs, maintenance exercise classes or patient support groups, and with a chronic respiratory or cardiac disease were eligible to participate in the study. People were excluded if they could not understand or communicate using spoken English. To avoid non-response bias, investigators were permitted to read the survey to anyone requiring assistance or unable to read English, but able to converse in English. Details of the participants' medical history, lung function test results and demographic details were obtained with consent from their medical records.

Survey

A purpose-designed survey was developed; it contained 26 questions with pre-determined responses regarding the participants' demographics, engagement with technology, self-rated computer and internet skill competence, and views of technology use in healthcare. The survey questions asked about access to technological devices, the frequency and reasons for using them, and the willingness to use telerehabilitation. Telerehabilitation was defined as the ability to interact (speak, listen and see) with the physiotherapists in real time on the device's screen, using videoconferencing software whilst exercising at home. One question allowed participants to express in writing their motivations for, or against, the use of telerehabilitation. The survey was pilot tested on a group of ten pulmonary rehabilitation attendants at one metropolitan hospital. Minor wording changes

were made based on feedback to enhance understanding and comprehension of the questions. The final survey had a Flesch reading ease score of 70 (easy to read).²² The survey, the results for each question, and an indication for how some variables were combined for statistical analysis are presented in Appendix 1 (See eAddenda for Appendix 1).

Sample size

An online survey sample size calculator was used to determine an adequate sample size for this study. The overall COPD population in Australia is approximately 1.5 million people.²³ A confidence level of 95% with a margin of error (confidence interval) of 7% was chosen, and resulted in a sample size of 196 participants. Assuming a response rate of 80%, 245 people were needed for the survey.

Data analysis

'Technology engagers' were defined as participants with personal access to and use of at least one technological device in their home. 'Technology non-engagers' were defined as participants with no access to or use of any technological device. Differences between technology engagers and non-engagers were assessed using independent sample t-tests and cross-tabs with Fisher's Exact *p*-value significance set at 0.05. Univariate cross-tabs were calculated to determine the unadjusted associations between the variables of age, gender, education and number of comorbidities to the primary outcomes of the participants' access and use of devices and their self-reported skill competence. The univariate cross-tabs were repeated to determine the independent associations of the variables and primary outcomes to the secondary outcomes of the participants' willingness to use telerehabilitation and research health information online. If more than two significant univariate associations were established for a given outcome, a multivariate regression analysis assessed them together for confounding factors. The threshold for significance in the multivariate analysis was $p < 0.05$. A regression model was then created with the remaining significant associations to determine which variables were most suggestive of having high device access with regular use, good self-rated computer skill competence, researching health information online, and being willing to use telerehabilitation. The descriptive and quantitative analysis was performed using commercial software^a for participant characteristics and outcome data.

One researcher (ZS) manually coded the responses to the optional open-ended question in the survey into categories of the participants' willingness or not to use telerehabilitation. The coded categories were organised into themes through discussion between two members of the research team (ZS, ZM).

Results

Participants

In total, 254 people were screened and invited to participate in the study, all of whom completed the survey (100% response rate) (Figure 1). The primary respiratory diagnoses of these participants were: COPD (63%, $n = 161$), bronchiectasis (11%, $n = 29$), asthma (9%, $n = 23$), pulmonary fibrosis (4%, $n = 10$), shortness of breath (3%, $n = 8$) and other respiratory conditions (9%, $n = 23$). Of the 254 participants, 92% ($n = 233$) were classified as technology engagers. Participant characteristics are shown in Table 1. The majority of participants had moderate airflow limitation, spoke English as their primary language, were retired, and had a high proportion of comorbidities. Technology non-engagers were significantly older ($p < 0.001$) than technology engagers and had a greater proportion of people who had completed a lower level of education ($p = 0.039$).

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