

Pulmonary Rehabilitation: Improving Access Through Digital Technologies

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The benefits of pulmonary rehabilitation (PR) are well established. However, barriers to being able to access, attend and complete a PR programme are also well documented. Over the years, this has led to a number of alternative models being developed, including digital technologies. Furthermore, nowadays more people are being diagnosed with a chronic respiratory disease at an earlier age, and alternative modes need to be available to provide access to this evidence-based intervention. However, these alternative digital models have their uncertainties due to the lack of evidence base.

Keywords

Access, alternative models, barriers, chronic obstructive pulmonary disease (COPD), chronic respiratory disease, digital technologies, pulmonary rehabilitation

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Pulmonary rehabilitation (PR) is one of the most cost-effective interventions for people with chronic respiratory disease.¹ The evidence base is strong, demonstrating benefits of improving exercise capacity and health-related quality of life. Furthermore, it has been stated that research comparing PR with conventional care is not needed anymore but that research studies should focus on elements of a programme, such as which components are essential, its ideal length and location, and the amount of supervision required.² Within the American Thoracic Society (ATS) workshop, the current definition of PR from the 2013 ATS/European Respiratory Society (ERS) statement is said to remain relevant, providing the flexibility to deliver programmes across a variety of settings.³

Even though the beneficial effects of PR are well established, many people are still either not referred or decline to attend, and this occurs both nationally and internationally, with only 3.7% of adults with chronic obstructive pulmonary disease (COPD) in the USA attending PR in 2012.⁴ Barriers to PR have previously been well documented.^{5–7} These include practicalities such as transport and travel, including the cost of travel and car parking. Patient expectations around time commitment, disruption to routine, lack of knowledge of PR and the perceived benefits may also influence uptake. Others will face barriers to participation due to other health issues – for example, about one-third of patients with COPD also have other comorbidities. The high burden of managing symptoms associated with comorbidities (e.g. pain and fatigue) can further confound the barriers to attendance at PR. Furthermore, patients may have competing disease management priorities, and PR may not take precedence.

Variable access to PR creates unacceptable disparities in quality, evidence-based healthcare. This shortfall in PR service accessibility and capacity results from the lack of adequate PR facilities and inadequate programme commissioning, as well as geographical inaccessibility, which is variable both nationally and internationally.⁸ Some outpatient programmes are not within local proximity or accessible with reliable transport links from the patient's homes; in some rural areas, programmes are lacking entirely. In the USA, 56% of counties do not have PR centres, which worsens to 73% in rural areas.⁹

Healthcare professionals (HCPs) may lack awareness and knowledge of PR, the benefits to the patient and how to refer into programmes and the associated administrative burden, which means that patients may never be referred. Socioeconomic deprivation and ethnic background may also influence referral and uptake among patients. Although it has been shown that patients living in more deprived areas in the UK are less likely to complete PR, those who did complete it had similar clinical outcomes to those that lived in less deprived areas.¹⁰ A lack of culturally responsive models may also affect access, as patients' beliefs and expectations are not met.³

Although some of the barriers may be overcome by improving access to and the quality of service provision, there are still some that require further thought and research. Nowadays, more people are also being diagnosed with chronic respiratory disease at an earlier age. Currently, there is a

lack of evidence to guide clinical practice with regard to interventions for improving uptake.⁶ This has highlighted the need for providing access to and delivering alternative modes of PR, as these may potentially increase uptake and accessibility. The recent pandemic provided an opportunity to explore the move to remote models.

There are a number of alternative home-based rehabilitation models that use a form of digital technologies, e.g. video conferencing, phone calls or web-based applications. The majority are 8 weeks in duration; however, the type of intervention varies from typical aerobic and resistance training as per the UK British Thoracic Society (BTS) guidelines to circuit-based exercises. In some models, equipment is provided to enable patients to replicate the face-to-face exercise programme in the home environment, which may not be pragmatic within a clinical service. The level of supervision also varies depending on the model of rehabilitation.¹¹ The programmes have been shown to be effective in improving exercise capacity and dyspnoea when compared with centre-based rehabilitation, whilst other studies saw no differences between groups, but with higher completion rates in the home-based programme. However, engagement with technology has proven to be difficult in this population, leading to high dropout rates. HCP support was provided with some of the web-based programmes, which may improve adherence and completion. Although there are only a small number of studies using web programmes, they have been found to be safe and feasible with no adverse events.^{12,13}

Overall, the outcomes of these alternative models are varied and should be interpreted individually and with caution due to the limited number of studies, few participants and generalizability into clinical practice.

When including these modes in service delivery, it is necessary to ensure that the core components of a PR programme are considered, e.g. content, exercise modality and dose, and the degree of supervision. Regardless of the level of supervision, guidance in this area suggests that

all participants must have an initial individual face-to-face assessment to include a functional exercise capacity test, enabling appropriate exercise prescription for the patient exercising unsupervised at home, and to assess for safety.^{3,14} Assessing exercise capacity has proven difficult to standardize or prescribe exercise from using remotely delivered tests.¹⁵

It is important that those patients who are eligible for PR are offered a choice of modalities that includes face-to-face PR, as well as an alternative mode in the form of a digital tool to make PR more inclusive for people who would otherwise decline or drop out. However, there is variability internationally, as the UK guidance states that an eligible individual referred for PR should have the opportunity to access directly supervised, centre-based PR first before offering an alternative model.¹⁴ The availability of a blended approach may also provide flexibility and improve adherence and completion.

Further considerations for using digital technologies should include ensuring that individuals are not excluded due to digital literacy and processes are in place to support those less comfortable with using technologies if implemented. Studies in the UK showed that there is a wide variability in access and confidence in using digital technologies, and a significant proportion of patients are unwilling or unable to access web-based healthcare.^{16,17} Other factors influencing this are health literacy and barriers around purchasing technology. Key factors identified by HCPs impacting the delivery of remote rehabilitation included an appropriately skilled and sufficient workforce, access to reliable technology and equipment, and also the resources and support for skill development.¹⁸ Currently, there is no standardized way of measuring digital literacy and who would benefit or not from a digital programme. This highlights that training is required to support both HCPs and patients in the broader implementation of these alternative models within services, which, despite an increase in remote delivery of service, remains challenging. □

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