Remotely-Based Pulmonary Rehabilitation

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Despite numerous benefits, traditional Pulmonary Rehabilitation (PR) as a resource remains underutilized in chronic lung disease. Less than 3% of eligible candidates for PR attend one or more sessions after hospitalization due to many barriers, including the ongoing COVID-19 pandemic. Emerging alternative models of PR delivery such as home-based PR, tele-rehabilitation, web-based PR, or hybrid models could help address these barriers. Numerous studies have tested the feasibility, safety, and efficacy of these methods, but there is wide variability across studies and methods. We conducted a literature review to help determine if these alternative delivery methods watered down the effectiveness of PR.

tele-rehabilitation pulmonary COPD

1. Introduction

Pulmonary rehabilitation (PR) is a “comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors” [1]. It is an integral part of the management of patients with various respiratory diseases, along with other well-established modalities (e.g., oxygen, inhalers, and non-invasive ventilation). PR improves exercise capacity [1][2][3], limb muscle function [1][2][4], and health-related quality of life [1][2][5]. PR reduces symptom burden [1][2][6], healthcare costs [1][2], hospitalizations [1][2], and other unplanned health care utilization [1][2]. Moreover, it has been shown to decrease mortality [7], as well as anxiety and depression [1][2]. Despite numerous benefits, PR as a resource remains underutilized. Less than 3% of eligible candidates for PR attend one or more sessions after hospitalization [8][9][10]. Several barriers affect PR attendance and adherence. Enthusiasm of the referring physician, travel and distance to the PR center, caregiver knowledge and availability, smoking history, lack of trained manpower, and suboptimal funding are some of the most common barriers [1][11]. In a systematic review by Young et al., travel and transport were consistently reported as barriers across studies [12]. The current COVID-19 pandemic has significantly impacted clinic-based PR program enrollment and attendance, as people with chronic respiratory diseases are at an increased risk of severe COVID-19 disease [13], and many have been advised to stay at home and avoid in person contacts. This recommendation has led to a further widening in the already existing gap in care for those living with respiratory diseases. Emerging alternative models of PR delivery such as home-based PR, tele-rehabilitation, web-based PR, or hybrid models could help address these barriers and close the gap.

2. Discussion

Remotely-based PR is a feasible option for people living with chronic lung diseases, especially those with COPD [14][15][16][17][18][19][20][21][22][23][24][25][26][27][28][29][30][31][32][33][34]. It may also be an option for patients recovering from the remote effects of COVID-19 [35][36][37][38]. Despite the different technologies used for telecommunication, these studies support tele-rehabilitation as a feasible option. In all the studies, both an educational component and a physical activity component was present [39][14][15][16][17][18][19][20][21][22][23][24][35][36][25][26][27][28][29][30][31][32][37][38][33][34].

When compared to no rehabilitation, tele-rehabilitation was effective across studies. It consistently showed statistically significant improvements in exercise capacity [15][16][20][24][35][36][26][28][29][30][32][37][38][34] and dyspnea perception [17][20][22][23][24][28][30][37][38][34] as well as a decreased 30-day mortality and readmission rates for acute exacerbations due to COPD [33]. This makes tele-rehabilitation an attractive option for patients who have significant barriers to attending conventional, clinic-based PR. When compared to conventional PR, tele-rehabilitation was found to be equally effective in the majority of studies. Multiple non-inferiority trials showed no significant difference in outcomes between groups, and instead found tele-rehabilitation to be as effective as conventional PR [17][19]. Hansen et al. (2020), failed to show that telehealth was superior to conventional PR, however participants in the tele-rehabilitation group had higher completion rates [14].

Despite several studies showing feasibility and non-inferiority to conventional PR, the acceptance and implementation of remotely based tele-rehabilitation has been slow and highly variable over the years [40]. The current COVID-19 pandemic has greatly impacted conventional, in-person rehabilitation enrollment and attendance. This has re-focused the spotlight on tele-rehabilitation as an option for patients with chronic lung disease. However, the studies are heterogeneous in design with small sample sizes, use inconsistent outcome measures, and most importantly, use a wide variety of technologies [41]. Another major hurdle that has likely reduced the uptake of remote-based PR is the paucity of data regarding its cost effectiveness. Tele-rehabilitation involves using complex technology and equipment to monitor patients, and it also needs trained manpower—which can be expensive. Many insurers are willing to pay for conventional PR but not tele-rehabilitation [42]. Wide-spread acceptance of tele-rehabilitation in the healthcare system across the US is hampered by regulations and restrictions by state governments and policies of insurers [43]. Limitations such as potential for injury, digital and health literacy, and lack of appropriate device/internet connection remain. It is important to understand when tele-rehabilitation is safe and which subtype of patient benefits the most from tele-rehabilitation. Small studies have shown that tele-rehabilitation is safe with no major adverse events, [39][16][17][19][21][24][35][30][31][37][33], but large studies are lacking. The majority of the literature focuses on patients with COPD, thus making it difficult to extrapolate benefits to other lung diseases [44]. Challenges with digital literacy and familiarity are encountered especially in elderly frail patients. In a study by Chaplin et al. [20], high dropout rates were seen in the tele-rehabilitation group with technological challenges being the major reason. Investigators were required to modify their platform according to patient feedback.

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