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Telerehabilitation for Patients with Cancer: A Scoping Review

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Abstract

This study was aimed at identifying how telemedicine is used for rehabilitation of patients with cancer. An electronic literature search was conducted using the PubMed database covering January 2015 to October 2020. To be included in the review, studies had to report telerehabilitation interventions for patients with cancer. Randomized controlled trials, quasi-experimental studies, as well as feasibility and usability studies were included, and reviews were excluded. Overall, 33 eligible studies were found but only 22 were considered for inclusion. After a detailed analysis, 16 studies were included. Most of the studies concluded that telehealth systems supporting physical exercise were effective to improve function, quality of life, pain, satisfaction and muscle strength. Limitations in most of the studies included non-randomized design and limited number of subjects. We conluded that more studies are needed for stronger evidence of this type of treatment and to facilitate clinical practice in this field.

Keywords:

Telerehabilitation, Cancer, Exercise, Scoping Review

Introduction

Cancer is a worldwide public health problem and is the second leading cause of death in the United States [23]. Treatments for cancer such as surgery, chemotherapy, radiation therapy and hormone therapy often result in psychological and physiological sequel and side effects that interfere with treatment completion, the ability to function and perform essential daily activities and quality of life [24]. Physical activity is an important component of cancer rehabilitation and is effective in reducing the burden of several specific cancers, including benefits related to physical function, quality of life and cancer-related fatigue [25].

The American College of Sports Medicine concluded that exercise training is safe during and after cancer treatments and results in improvements in quality of life in several cancer survivor groups [25]. Based on these findings, individualized and personalized programs are needed for cancer patients depending on type of cancer, stage of the disease and patient goals to avoid inactivity, disability and worsening of their quality of life. Rehabilitation is a standard part of cancer care and can have the potential to reduce the burden on healthcare system and telerehabilitation has been studied in this field and it was considered highly cost-effective [9].

Unfortunately, many patients don't have access to all the cancer treatments due to problems related with social economics, transportation and several other factors that interfere with the treatment, like work, costs and time. All these factors can seriously impact the patient's access to cancer rehabilitation services in medical facilities. On the other hand, technology has been growing and treatment, nowadays, can be delivered for the patients without the need for face-to-face consultation. Telerehabilitation interventions that harness current and emerging technologies have been suggested as one mechanism that can reduce some barriers to accessing and providing rehabilitation [11].

Remote telerehabilitation has been implemented for different diseases with positive results, but in literature there is a lack of studies that evaluate the approaches used for cancer patients. For this reason, the aim of this review was to identify studies with telerehabilitation for cancer survivals; understand the technology used, exercises and outcomes with this type of treatment that has a potential to grow. The COVID-19 global pandemic has shown the need for and importance of telemedicine. It is clear that the increased use of technolgy has had an impact on healthcare and will likely be a feasible option in the future in this field.

Methods

This scoping review was conducted using the methodological framework of Arksey and O'Malley [19], with five major steps: 1-Identify a research question; 2- Identify relevant studies; 3- Evaluate and select studies to be included; 4- Chart the data; 5- Collect, summarize, and report the results.

The goal of this scoping review was to identify the best telehealth technology and exercises for patients with cancer. Based on this goal, the research question was "How are telemedicine approaches used for cancer rehabilitation?".

An electronic literature search was conducted in the PubMed database in order to identify potential studies to be included on this review. The studies included were published between January 2015 and October 2020. We used the following Boolean search term: (telerehabilitation) AND (cancer) AND ("physical therapy" OR "exercise" OR "cancer rehabilitation"). This research provided 33 potential papers to be included in the study.

The inclusion criteria were studies that reported physical therapy exercises telerehabilitation intervention for patients with cancer. Eligible designs included randomized and non-randomized controlled trials and controlled and non-controlled before–after studies, also were included feasibility studies that reported the intervention treatment. Exclusion criteria was systematic review studies and meta-analysis; no physical therapy treatment, studies with psychological treatment, studies with no pre and post outcomes.

After the inclusion and exclusion criteria used, this review resulted in 22 papers which were relevant to the research question on a preliminary review. All these studies were then read in detail and reviewed, resulting in 16 papers to be included in the final study.

Results

The majority of the studies were published in 2020 and 2018 and only one study published in 2015. Most of the studies were randomized controlled trials (44%), five were classified as

feasibility studies (31%), two pilot study (13%), one prospective clinical trial (6%) and one development and usability study (6%).

The types of cancer identified in the studies were breast cancer, advanced-stage cancer IIIC or IV solid or hematologic cancer, esophagogastric cancer, grade II and II gliomas, lung cancer, esophageal cancer, hematologic cancer, hepatocellular cancer, oropharyngeal cancer, head and neck cancer, and cancer survivors.

The physical therapy intervention varied among these 16 studies. The types of therapy included were: warm-up with resistance and aerobic exercise training and cool-down; incremental pedometer-based walking program with resistive program; aerobic, resistance and inspiratory muscle training; home-based aerobic training; walking distance program; muscle strengthening, coordination and range of joint motion; steps per day program; aerobic exercise, resistance training and large muscle group of flexibility training; warm up, stretching, aerobic and muscle strengthening for lower and upper extremities; aerobic exercise training; aerobic and resistance training and walking program with pedometer, swallowing exercises protocol and communication function.

The technology used for the studies varied from phone calls, web-based systems, fitness platform, rehabilitation app, telephone and/or internet and text messages. Also some studies provided for the patients pulse oximeter, pedometer and Fitbit.

Supervision and communication with patients also varied in each study- from telephone, instant messages and video conference sessions with physical therapists, physician, research staff and health professionals.

Discussion

This scoping review aimed to explore the existing telerehabilitation studies for patients with cancer. We included 16 papers that met our criteria and the major findings were that exercises with telerehabilitation for patients with different types of cancer can improve functional capacity, cognitive functioning, quality of life [2]; reduce of pain and hospital length of stay [3]; improvement of fatigue, physical well-being, emotional well-being, anxiety [4], improvements in absolute VO2 peak and BMI [5]; improvement of affected and non-affected side handgrip, abdominal, back and lower body strength [6]; physical fitness, systolic blood pressure, diastolic blood pressure, waist girth, mental health, social functioning, general health [10]; improvements on measurements of strength and endurance [14]. Also, we found some positive effects on feasibility [4, 5, 8, 11, 13, 17]; acceptability [11,14, 16] and cost-effectiveness [9].

These findings are compatible with several studies that physiotherapy with telerehabilitation is feasible. The systematic review with meta-analysis from Egmond et al, showed that telerehabilitation in surgical populations is feasible and also increased the quality of life. As the effectiveness of telerehabilitation compared with usual care on physical outcomes is considered to be at least equal, this may be an important reason to choose physiotherapy with telerehabilitation instead of usual care for surgical populations [20]. The improvement of quality of life was a major outcome for most of the studies, but on the systematic review from Bártolo et al, a trend toward reducing distress and improving QoL was found, but estimated effect sizes were typically small ($d < 0.5$) [21].

We included in this review only five randomized controlled trials, one quasi-RCT and one pilot of RCT; five feasibility studies; two pilot studies, one development and usability study and one prospective clinical trial. Therefore, more powerful studies are needed on literature for cancer telerehabilitation, with more uniformity of reports in clinical trials; develop clinical practice guidelines, and integrate exercise and rehabilitation services into the cancer delivery system are needed [22].

As we know from literature: “Exercise is beneficial before, during, and after cancer treatment, across all cancer types, and for a variety of cancer-related impairments. Moderate-to-vigorous exercise is the best level of exercise intensity to improve physical function and mitigate cancer-related impairments. Therapeutic exercises are beneficial to manage treatment side effects, may enhance tolerance to cancer treatments, and improve functional outcomes. Supervised exercise yielded superior benefits versus unsupervised. Serious adverse events were not common” [22]. The exercises used in the study from this review were a combination of aerobic exercises, resistance training, swallowing training and walking distance program and were supervised by web-based system, apps and telephone calls.

Conclusion

This review indicates that telehealth exercises for patients with cancer are beneficial and feasible, but mixed methods are frequently used for the study design, technology, exercises and outcomes. Further research is needed to describe the best method, protocol and technology to achieve a better clinical practice for tele remote treatment for patients with different types of cancer.

Table 1 – Study Design and Participants Characteristics

Authors, year	Type of Study	Type of cancer
Galiano-Castillo et al, 2017	RCT	Breast Cancer
Cheville et al, 2019	RCT	Advanced-Stage Cancers
Piraux et al, 2020	Feasibility Study	Esophago-gastric Cancer
Gehring et al, 2018	A pilot RCT	Grade II and III gliomas
Galiano-Castillo et al, 2016	RCT	Breast Cancer
Ji et al, 2019	Prospective Clinical Trial	Lung Cancer
Egmond et al, 2020	Feasibility Study	Esophageal Cancer
Longacre et al, 2019	RCT	Advanced Cancers
Frensham et al, 2018	A pilot RCT	Cancer Survivors
MacDonald et al, 2020	Pilot Study	Cancer Survivors
Kim et al, 2020	Development and Usability	Hepatocellular Carcinoma
Vallerand et al, 2018	Feasibility Study	Hematologic Cancer Survivors
Schwartz et al, 2015	RCT	Cancer Survivors
Villaron et al, 2018	Feasibility Study	Various Cancers
Wall et al, 2017	Pilot Study	Oropharyngel Cancer
Collins et al, 2017	Feasibility Study	Head and Neck Cancer

Table 2 – Intervention Characteristics

Authors, year	Technology	Outcomes
Galiano-Castillo et al, 2017	Web-based system	6MWT; Auditory Consonant Trigrams and Trail Making b Test.
Cheville et al, 2019	Telephone calls	Activity Measure; Pain interference; Quality of life
Piraux et al, 2020	Web-based system	Feasibility; 6MWT, Fatigue; Quality of life, Anxiety and Depression
Gehring et al, 2018	Telephone calls + Home visit	Patient-reported physical activity, VO2 peak; BMI
Galiano-Castillo et al, 2016	Web-based system	Quality-of-Life; Pain; Handgrip; Isometric abdominal test; Sit-to-stand test; Fatigue
Ji et al, 2019	Rehabilitation app	6MWT, Dyspnea; Quality of life; Service satisfaction
Egmond et al, 2020	eHealth platform	Musculoskeletal/cardiovascular functions and activities
Longacre et al, 2019	Telephone and/or internet	Quality of life; Intervention costs
Frensham et al, 2018	Web-based system	Physiology; Physical fitness; Quality of life; 6MWT
MacDonald et al, 2020	Web-based system + Fitbit	Feasibility; Physical symptoms; Physical activity
Kim et al, 2020	mHealth Care App	6MWT; Grip test; Chair stand test; Quality-of-Life
Vallerand et al, 2018	Telephone calls	Self-reported aerobic exercise behavior; Quality of life; Fatigue
Schwartz et al, 2015	Web-based system	6MWT; 1-repetition maximum body strength
Villaron et al, 2018	log book + text messages	Level of physical activity (pedometer); Fatigue
Wall et al, 2017	Web-based system	Perceptions via structured questionnaires/interview
Collins et al, 2017	Web-based system	Service outcomes; Costs; Costumer satisfaction

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