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Telerehabilitation programmes for patients with cancer and survivors: a protocol for a systematic review

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ABSTRACT

Introduction The global cancer burden is a major public health problem. Cancer rehabilitation is an essential component of survivorship care for preventing complications, decreasing symptoms and improving functional quality of life (QOL). In addition to pre-existing challenges, the COVID-19 pandemic has greatly affected cancer rehabilitation programmes and their delivery to patients. This comprehensive systematic review will assess the efficacy and safety of telerehabilitation on functional outcomes and QOL in patients with cancer and survivors.

Methods and analysis This study was conducted in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols. The following key electronic bibliographic databases will be searched from their inception to April 2021: MEDLINE, Embase, Cumulative Index to Nursing and Allied Health Literature, Cochrane Central Register of Controlled Trials and Physiotherapy Evidence Database (PEDro). We will include randomised controlled trials (RCTs) published in English that examine the effects of telerehabilitation programmes on patients with cancer and survivors. The terms 'telerehabilitation', 'neoplasm', 'RCT' and their analogous terms will be used in our search strategy. Two reviewers will independently complete the study screening, selection, data extraction and quality rating. The PEDro scale will be used to assess the methodological quality of the included studies. Narrative or quantitative synthesis will be conducted on the basis of the final data. The planned start and end dates for the study are 1 March 2021 and 1 May 2022, respectively.

Ethics and dissemination Ethical approval will not be required for this review, and the results will be disseminated in peer-reviewed journals.

PROSPERO registration number CRD42021243467.

Strengths and limitations of this study

- This protocol and the final review will be developed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses and recommendations from the Cochrane Handbook for Systematic Reviews of Interventions.
- Five key databases will be searched: MEDLINE, Embase, Cumulative Index to Nursing and Allied Health Literature, Cochrane Central Register of Controlled Trials and Physiotherapy Evidence Database.
- Two reviewers will independently complete the study screening, selection, data extraction and quality rating. Possible disagreements will be resolved via discussions or consultations with a third author.
- Different types, sites and stages of cancer and anticancer treatments may lead to a large degree of heterogeneity.

INTRODUCTION

Cancer ranks as the second-leading cause of death and is an important barrier to increasing life expectancy worldwide.[1 2] The magnitude of cancer is rapidly growing globally, and there were an estimated 19.3 million new cancer cases and 10.0 million cancer deaths worldwide in 2020.[2] The global cancer burden is predicted to be 22.2 and 28.4 million new cases in 2030 and 2040, respectively.[2 3]

Cancer diagnosis, progression and aggressive treatment often cause functional impairment and disability in both patients with cancer and survivors. Physical or psychological injury may lead to decreased health-related quality of life (QOL) in this population.[4] Cancer rehabilitation, which is an essential component of survivorship care, is needed to prevent complications, decrease symptoms, improve functioning and QOL, attain independence and improve prognosis.[5–7] However, several challenges hinder the expansion of traditional face-to-face cancer rehabilitation, particularly in low-income and middle-income countries.[7 8] Rehabilitation programmes are often long in duration and resource intensive, and access to cancer rehabilitation services is limited because of the lack of specialised providers (most of whom are clustered in tertiary care centres), as well as travel burden, financial burden, time constraints, physical limitations, psychological and emotional burden, and

other hardships.[7–12] A possible solution to address these challenges is to provide telerehabilitation services.

As a domain of telehealth, telerehabilitation uses of a variety of information and communication technologies (ICTs) to deliver rehabilitation services to people over long distances, thus closing geographic, physical and motivational gaps.[13 14] Telerehabilitation services can include evaluation, assessment, monitoring, prevention, intervention, supervision, education, consultation and coaching.[13 14] The ICT used in telerehabilitation may integrate but are not limited to email programmes, text messaging, telephone follow-up, videoconferencing and audioconferencing, wearable technologies, sensor technologies, mobile health applications, patient portals or platforms, virtual reality programmes, therapeutic gaming technologies, and robotics.[13–16] There has been increasing interest in the use of this burgeoning field of telerehabilitation services as technologies continue to evolve.[14] Many examples in the current literature have explored the acceptability, feasibility, efficacy and cost-effectiveness of telerehabilitation in neurological,[17–19] cardiopulmonary,[20–23] musculoskeletal[24–26] and postoperative[27 28] rehabilitation services, thus showing that this field is promising.

In recent years, there have been a proliferation of studies on telehealth-related oncology, most of which focus on the feasibility and technical properties of technologies, diagnosis and treatment approaches, user experience, or symptom monitoring.[29] Earlier systematic reviews regarding telehealth interventions in this territory involved application research on current technology and services,[30 31] acceptability studies,[32] studies on self-management programmes,[33 34] and studies on certain types of tumours.[35–38] In addition, clinical effectiveness measures were mostly psychosocial, symptomatic or QOL related.[39–45]

However, only a small amount of evidence exists on the effectiveness of telerehabilitation programmes for patients with cancer and survivors, and most pieces of evidence have diverse emphasis. Two studies systematically reviewed evidence on the benefits of psychoeducational interventions that use telecommunication technologies for patients with cancer[46 47] and showed promising findings. A recent review explored and confirmed the usefulness of the telehealth approach for occupational therapy practice in cancer survivors,[48] but two other studies on remotely delivered physical activity showed results that were not as positive.[49 50] Additionally, the COVID-19 pandemic has broadly disrupted medical care and expedited the transition of cancer rehabilitation programmes to a remote-delivery format,[51] thus increasing the urgency of understanding the efficacy and safety of such a model. Given the current status of research in this field, this comprehensive systematic review aims to study the efficacy and safety of telerehabilitation on functional outcomes and QOL in patients with cancer and survivors to inform future models of care for cancer rehabilitation.

Table 1 Eligibility criteria

PICOS	
Participant	Adult patients with cancer or survivors
Intervention	Telerehabilitation (eg, remotely guided on-line or virtual reality motor training, occupational exercises at home using sensor technologies)
Comparison	Face-to-face rehabilitation, usual care
Outcome	Primary outcomes: health-related QOL, physical function Secondary outcomes: cancer-related symptoms, anthropometrics, psychometric properties, biomarker analysis, survivorship, adverse events, patient satisfaction and compliance, etc
Study design	RCT reported in English

QOL, quality of life; RCT, randomised controlled trial.

METHODS

Study registration

The planned start and end dates for the study are 1 March 2021 and 1 May 2022, respectively. This protocol was developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Protocols.[52] The final systematic review will be conducted in line with the PRISMA statement[53] and the guidance of the Cochrane Handbook for Systematic Reviews of Interventions.[54]

Inclusion criteria for study selection

Studies will be included in the final review if they meet the inclusion criteria defined by PICO elements (p=participant, I=intervention, C=comparison and O=outcomes)[55] and the types of studies. Table 1 shows a summary of the inclusion criteria.

Types of participants

Adult patients with cancer or survivors (≥18 years of age) will be considered irrespective of sex, race, site of cancer, type and stage of cancer and type of anticancer treatment received. Cancer survivors refer to those who have been diagnosed with cancer, have successfully completed curative treatments or have transitioned to maintenance or prophylactic therapy.[56 57]

Types of interventions

Participants in the experimental group will receive telerehabilitation programmes. In the context of this study, telerehabilitation is considered as any rehabilitation programme delivered by healthcare professionals (physical, occupational or speech therapists; exercise trainers; neuropsychologists; etc) via ICT to patients with cancer and survivors. Telerehabilitation can be delivered to a satellite healthcare centre or directly into the patient's home and can be performed in a group or individually. Telerehabilitation programmes that use 'store and forward'/asynchronous or real-time/synchronous interaction will be included. Telehealth interventions for the purposes of patient education or communication, self-administered management without the supervision of healthcare professionals, remote symptoms or monitoring

of physiological parameters alone (ie, telemonitoring) will be excluded.

Types of comparator(s)/control

We will include studies that compare telerehabilitation programmes with face-to-face rehabilitation treatments, such as centre-based (outpatient) rehabilitation, inpatient rehabilitation, home visits or no rehabilitation control.

Types of outcome measures

Primary outcomes

1. Health-related QOL was assessed using validated measures. Examples include the Functional Assessment of Cancer Therapy General and related site-specific cancer module, The European Organisation for Research and Treatment of Cancer Core Quality of Life Questionnaire V.3.0 and related site-specific cancer module, Short Form (36) Health Survey, Patient-Reported Outcomes Measurement Information System (PROMIS)[29] and PROMIS Cancer Function 3D Profile.
2. Physical function was assessed using the validated measures, for example, the timed up-and-go test and 6 min walk test for testing physical performance; the cardiopulmonary exercise test and moderate-to-vigorous physical activity test for testing functional capacity; and impairment measures for testing range of motion, muscle strength and flexibility.

Secondary outcomes

Cancer-related symptoms (pain, fatigue, nausea/vomiting, dyspnoea, sleep disturbances, appetite loss, constipation and diarrhoea), anthropometrics, psychometric properties, biomarker analysis, survivorship, adverse events, patient satisfaction and compliance. These outcomes should be assessed using validated tests and scales.

Types of studies

Randomised controlled trials (RCTs) reported in English and published as full text will be included. Studies will be excluded if they are quasirandomised trials, animal research, uncontrolled trials, case reports, conference proceedings, abstracts, dissertations or reports in books or have no available data for analysis.

Search methods for the identification of studies

The following key electronic bibliographic databases will be searched from inception to April 2021: MEDLINE, Embase, Cumulative Index to Nursing and Allied Health Literature, Cochrane Central Register of Controlled Trials, and the Physiotherapy Evidence Database (PEDro). RCTs that evaluate the effectiveness of telerehabilitation programmes for patients with cancer and survivors by setting the comparators/controls mentioned above will be included. The strategy will search for 'telerehabilitation' AND 'neoplasms' AND 'RCTs'. For the 'intervention', 'participants', and 'study design' concept, we will combine synonyms and MeSH terms with the 'OR' operator. Online supplemental material appendix 1 shows the proposed search strategy for MEDLINE via Ovid. This strategy will be adapted for use with other databases. In addition, we will check the reference lists of all included trials and relevant systematic reviews to identify potentially eligible studies.

Data collection

Study selection

The retrieved records will be imported into the bibliographic software EndNote V.X9. Any duplicates will be identified and removed using EndNote. Two review authors (YH and NS) will independently screen the titles, abstracts and keywords of the remaining articles by using predefined criteria. After preliminary screening, we will retrieve the full text of all potentially eligible articles, and two review authors (YH and NS) will independently review them in detail. The explicit reasons for the exclusion of ineligible studies will be recorded. Any disagreement will be resolved via discussions or consultations with a third author (FZ). Figure 1 shows a flow chart of the selection procedure.

Data extraction and management

Two review authors (YH and NS) will use a predesigned data collection Excel form to independently extract the following data from the included studies:

1. General information: article title, journal, publication year, first author, corresponding author, country of study, aim of study, trial registration, study funding source and possible conflicts of interest.
2. Study characteristics: study design, randomisation method, blinding method, allocation concealment and completeness of outcome data.
3. Participants: sample size, baseline participant characteristics, cancer site, type and stage of cancer, type of anticancer treatment and comorbidities.
4. Interventions: type, frequency, intensity and duration for telerehabilitation and comparators.
5. Outcomes: outcome measurements, time points reported, follow-up duration and adverse events.

Methodological quality assessment

Two review authors (YH and NS) will independently assess the methodological quality of each selected study by using the PEDro scale.[58] Possible disagreements will be resolved via discussions or consultations with a third author (FZ). The PEDro scale is considered a valid and reliable measure of the methodological quality of RCTs in physiotherapy and has moderate interrater reliability.[58 59] This scale consists of 11 criteria. Considering that the first item is not utilised in calculating the score, the scale has a possible range of 0–10, with higher scores indicating a higher quality. On this scale, the cut-off for high-quality methodology is ≥6 points.[58]

Data analysis and synthesis

Cochrane Review Manager V.5 will be used for the meta-analysis. In our study, a meta-analysis concerning the effect

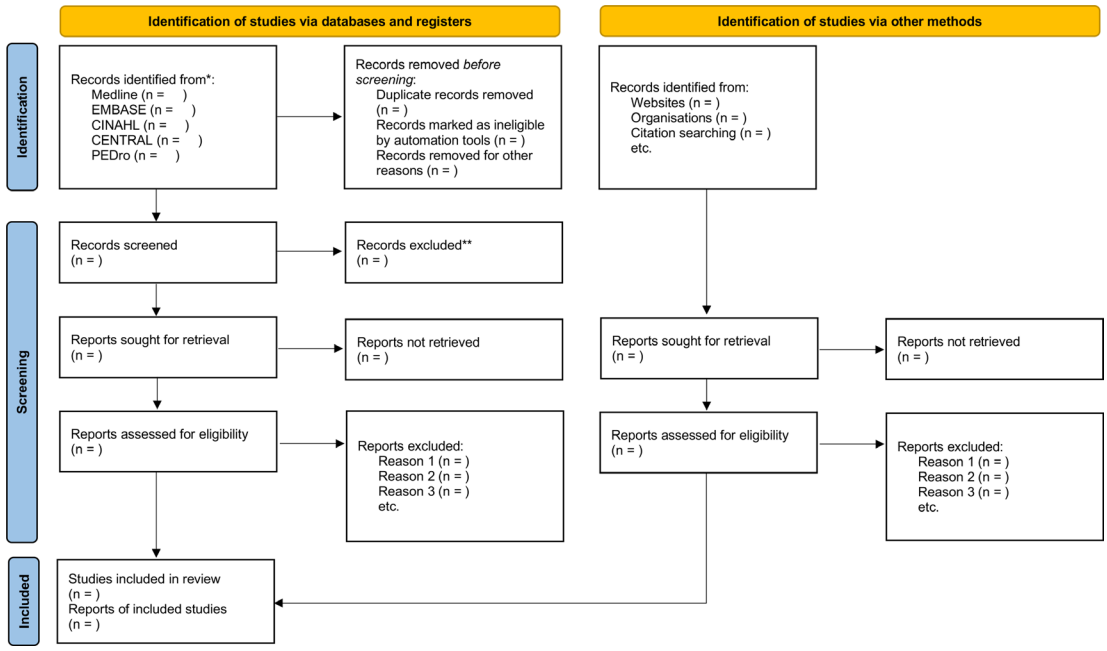

Figure 1 Flow chart of the study selection procedure. *Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers). **If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.

of telerehabilitation programmes will be conducted if at least two studies used homogeneous outcome measures or measured similar constructs.

The summary results are computed in different ways according to the data type. For continuous data, standardised mean differences as and 95% CIs will be computed. For dichotomous data, ORs and 95% CIs will be computed.

The χ^2 test and I^2 statistic will be used to assess heterogeneity across studies.[54 60] If p>0.1 and I^2 <50%, a fixed-effect model will be adopted for data combination. If p>0.1 and I^2 ≥50%, a random-effect model will be adopted for data combination, and obvious heterogeneity will be considered between the studies. If p≤0.1, statistical significance will be considered, and a subgroup analysis or a narrative description will be performed.[54] The narrative description will synthetise findings from multiple studies and primarily adopt text and words to summarise and explain the findings from the included studies.[54 61]

When sufficient data are available, prespecified subgroups will be established on the basis of gender; comorbid condition; type, frequency, intensity and duration of telerehabilitation programmes; and site, type and stage of cancer to explore the factors that might be related to the strength of the effect. If the data permit, sensitivity analyses will be performed to examine the robustness and reliability of the results by omitting specific trials from the overall analysis.

If more than 10 trials are included in the meta-analysis, we will construct a funnel plot to explore the potential publication bias.

The overall quality of each summarised evidence will be evaluated using the Grading of Recommendations Assessment, Development and Evaluation system at four levels: high, moderate, low or very low.[62] Two review authors (YH and NS) will independently assess the quality of the evidence by using GRADEpro software (https://gradepro.org), and possible discrepancies will be resolved via discussions or consultations with a third author (FZ).

Patient and public involvement

This systematic review protocol does not directly involve the patients or general public. Data will be collected from published articles retrieved from the main databases and manually searched.

Ethics and dissemination

Ethical approval will not be required for this review protocol. The results of the final review will be disseminated in peer-reviewed journals.

DISCUSSION

The COVID-19 pandemic has prompted calls for the accelerated introduction of alternative models of cancer rehabilitation service delivery, including home-based telerehabilitation.[9 51] In the realm of cancer rehabilitation, this new care model has great potential to facilitate access to services; allow the continuity of rehabilitation; improve care equity; and counteract geographic, demographic and socioeconomic barriers. However, this is likely to reveal new disparities between healthcare professionals and patients. For example, the reliance on technology is central to the delivery of telerehabilitation and creative ways to overcome this obstacle maybe needed.[9] In addition, the manner in which to conduct an adapted

virtual physical examination also needs particular attention.[9 63]

The final review will systematically and comprehensively assess the efficacy and safety of telerehabilitation programmes on functional outcomes and QOL in patients with cancer and survivors. This protocol provides the current status of research in this field, and we hope that the final review will be helpful in supporting decision-making processes related to health policies and rehabilitation programmes.

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Contributors YH, NS and FZ contributed to the conception and design of the study. NS registered the protocol in the PROSPERO database. YH drafted the protocol. FZ revised the protocol critically for important intellectual content. XH, WZ and XL designed the search strategy. YH, XH, WZ, XL, NS and FZ participated in the design of data acquisition, analysis and interpretation. All authors read and approved the final protocol. FZ is the guarantor of this protocol.

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Competing interests None declared.

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