TITLE: Exercising in Isolation? The Role of Telehealth in Exercise Oncology During the COVID-19 Pandemic and Beyond

RUNNING HEAD: Telehealth in Exercise Oncology During COVID-19

TOC CATEGORY: COVID-19

ARTICLE TYPE: Point of View

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The COVID-19 pandemic, affecting over 200 countries and territories worldwide, has abruptly altered how we carry out our daily lives. This includes adapting to physical distancing restrictions, and varying degrees of isolating at home or quarantining. The sudden and lasting health impacts of this *new normal* are unknown. Recently reviewed psychological effects of quarantine included post-traumatic stress symptoms, confusion, and anger[1]. The physical impact may include a loss in daily physical activity needed to maintain an adequate health status, and to prevent and manage chronic disease[2]. For people with cancer the health impacts of our *new normal* may be intensified and continue for longer, even as physical distancing restrictions ease. Adults with cancer are commonly immunocomporimsed while receving treatment and may be twice as likely to test positive for COVID-19 and have higher morbidity and mortality after contracting COVID-19[3]. Medical advice, particularly for people receiving immunocompromising cancer treatments, may therefore include spending more time isolating, or adopting stricter physical distancing practices, to minimise the risk of COVID-19 infection.

It is well established that physical activity levels decrease following a cancer diagnosis[4]. And during the COVID-19 pandemic, this vulnerable population may be moving even less. The benefits of exercise for cancer are well-studied and recently updated exercise oncology guidelines recommend weekly moderate-to-high intensity aerobic and resistance exercise training[5]. Evidence from randomized controlled trials suggests exercise can attenuate declines in physical fitness and function during and after anti-cancer therapies[5,6]. Exercise can also improve symptoms, like fatigue, manage anxiety and depression, and improve quality of life[5,6]. In observational studies, higher levels of physical activity after diagnosis also predict improved survival in select cancer types, including breast, prostate, and colon cancer[6].

As long as no vaccine exists, physical distancing is the best available option to stop the spread of COVID-19. However, physical distancing creates an added challenge to providing evidence-based exercise support to people with cancer at a time when exercise support is more

important than ever. Alongside the established benefits of exercise for people living with and beyond cancer, exercise may address key health concerns directly related to COVID-19. First, maintainance of physical fitness may improve the response to a COVID-19 infection, as higher physical fitness levels hold biological potential to be protective against severe COVID-19 reactions[7]. Second, the ability to engage in exercise may also mitigate the negative physical and psychological impacts of self-isolating or quarantining[2]. Lastly, COVID-19 may have changed cancer treatment trajectories for individuals by delaying surgeries or the timing of adjuvant treatment[3]. This may open a window of opportunity to deliver more comprehensive prehabilitation exercise in preparation for planned treatments to improve patient outcomes[8]. Altogether, there is a need to devise strategies to promote or maintain engagement in exercise among people with cancer when typical opportunities to participate in exercise are limited due to physical distancing during the COVID-19 pandemic.

Exercise support throughout the COVID-19 pandemic: Is telehealth the answer?

Identifying strategies to deliver "best-practice" exercise in lieu of restrictions to face-to-face clinical or community-based programs during the COVID-19 pandemic is an unforseen challenge. Evidence suggests home-based exercise interventions may be "less effective" than supervised interventions, as intervention effects tend to be smaller[9]. This may be a consequence of intervention heterogeneity, as the type and level of intervention support varies across studies[10,11]. The level of support from physical therapists or other qualified exercise professionals, access to exercise equipment, and adherence may be key factors influencing home-based exercise intervention effectiveness[12]. Incorporating telehealth in home-based intervention design is one potential way to increase the level of interventional support. Telehealth, telemedicine, or telerehabilitation are broadly used terms that are used to describe distance-based interventions delivered using information and communication technologies to assess, educate, monitor and/or deliver exercise or other healthcare interventions[13]. This can include telephone calls, text

messaging, mobile health or smart phone applications, web-based platforms, and videoconferencing. These interventions are increasingly being studied, however, their quality and effectiveness is still unclear in the exercise oncology setting, including relative to non-telehealth home-based exercise or rehabiliation interventions[11,14,15].

Recent trials evaluating home-based exercise interventions that have incorporated technology to increase the level of interventional support have reported good adherence and favourable effects[16-20]. One randomised trial in 81 women with breast cancer delivered a novel internet-based platform that participants accessed on their own to perform tailored home-based exercise[18]. Optional telephone calls, instant messages, and videoconferencing was also included to allow research staff to receive participant comments and monitor exercise[18]. Improvements in physical fitness and patient-reported outcomes, and high exercise adherence (94%) and participant satisfaction, was reported[18]. An important aspect of this trial was that research staff individualized and modified the exercise throughout the intervention, based on frequent participant feedback[18]. Another randomised trial in 68 women with breast cancer undergoing chemotherapy adopted the same interventional approach using a tailored internet-based platform plus communication with research staff and reported physical fitness improvements and adherence (73%)[19] comparable to published adherence rates of supervised and "face-to-face" interventions in this population[21].

To-date, many exercise interventions incorporating telehealth and technology prescribe unsupervised exercise and focus on self-management or strategies to promote behaviour change to increase levels of physical activity. In a recent review summarising interventional support for home-based exercise interventions in oncology, technology emerged as a prominent strategy across 122 studies (53% of all included studies)[10]. Technology was often used for physical activity self-monitoring, such as through the use of physical activity (n = 66 studies) or heart rate monitors (n = 29 studies). Other studies (n = 33) utilized videos in the form of DVDs, online

websites, or smartphone applications to provide visual guidance and exercise instructions, but not necessarily real-time guidance from qualified rehabilitation or exercise professionals. Home-based exercise, however, does not necessarily have to mean "unsupervised" exercise. Thus, a key research question includes evaluating telehealth interventions that mimic the delivery of traditional supervised exercise interventions to improve key physical fitness, patient-reported and health outcomes in people living with and beyond cancer. Of particular interest is the potential of videoconferencing telehealth platforms that allow exercise professionals to demonstrate and provide exercise guidance virtually in real-time, while participants complete the intervention from home.

Special considerations for future telehealth exercise support in oncology settings

An obvious advantage of telehealth is that guidance from a qualified exercise professional can be provided to patients at home, limiting the need for travel or non-essential exposure. Certain videoconference platforms can be used to provide one-on-one individually tailored exercise sessions, but also have the potential to be used to deliver interventions in a virtual "group-based" setting that mimics supervised group exercise training. Although, whether a virtual group environment offers the same psychosocial support as in-person settings is unknown. Beyond the COVID-19 pandemic, telehealth can reach those living in regional or remote communities, where exercise oncology resources may be limited, or those who prefer exercising from home. Home-based interventions also overcome commonly reported exercise barriers, such travel, access to facilities, and cost[22]. Prominent disadvantages and key considerations, however, include a potential lack of exercise equipment, inadequate space for exercising at home, limited access to technology or low technology-literacy, inability to assess patients in-person, and potential limitations around safety, namely in-person monitoring of exercise response (i.e., heart rate, blood pressure) and hands-on assistance with exercise or movement technique. Further, the cost and training needed to use and navigate specific telehealth platforms may also be a potential

barrier to intervention design and delivery.

Where to go from here?

Since the start of the COVID-19 pandemic, there has been expanding appreciation for virtual health management and the use of telehealth and technology to deliver care to people with cancer across a variety of health disciplines. For exercise and rehabilitation experts, there is a unique opportunity to test and deliver telehealth exercise interventions in both clinical supportive cancer care and research trials. To our knowledge, the feasibility and effectiveness of telehealth videoconference interventions that closely model in-person clinic visits or traditional supervised exercise training interventions (eg, 30- to 60-minute sessions, 2-3 days per week) has been underexplored and is an exciting area for exercise oncology research. This would involve a physical therapist or other qualified exercise professional guiding participants through individualized programs virtually and in real-time. While there may be some limitations with this type of intervention approach, including access to typical gym or machine-based equipment, progressive moderate-to-high intensity exercise training using body weight, free weight or elastic band exercises may still be possible. Physical therapists in clinical and community-based settings have already adopted this approach to replace face-to-face sessions due to COVID-19 restrictions and in parallel to changing patient or client preferences. This represents practice-based evidence that will guide current and future scientific investigations, as clinical demand brings forward key research questions. Testing the effectiveness of such interventions may be achieved in the design of new clinical exercise oncology trials, but also as ongoing trials modify protocols so that they may safely continue during the COVID-19 pandemic.

Understanding the feasibility and effectiveness of specialized telehealth exercise and rehabilitation interventions relative to in-person interventions is needed to advance our knowledge on this topic. Practice-informed research should be guided by the question: can telehealth effectively replace face-to-face supervised exercise? Physical therapists and the field of

exercise oncology more broadly can adapt to the *new normal* brought on by the COVID-19 pandemic and will hopefully produce new and needed evidence on exercise telehealth interventions along the way.

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KEYWORDS: Oncology, Exercise, Telemedicine, Coronavirus

ACCEPTED: July 27, 2020

SUBMITTED: June 10, 2020

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Disclosures

The authors completed the ICJME Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

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