Co-development and evaluation of a community-based telerehabilitation wheelchair training program for children

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INTRODUCTION

Independent wheelchair mobility enables children with physical disabilities to explore and interact with their environment, play and participate in school and meaningful activities [1,2-3]. However, wheelchair use is a complex activity requiring children to perform safely and effectively indoor, community and advanced skills [4]. According to the WHO guidelines (2008), training is a critical step of the wheelchair provision process for promoting an independent and safe use [5].

However, children have few opportunities for wheelchair training, thus increasing their risk of injuries and exclusion [6]. Results from a survey conducted in 43 Canadian rehabilitation centers providing pediatric services indicate that the majority of clinicians realize less than two hours of training, do not practice community and advance skills and do not use an evidence-based program [6]. In fact, clinicians lack time, resources and knowledge to offer training, because they have many concurrent priorities to respond to and no clear guidelines, pediatric specific program and practical intervention tools are available in Canada [6].

A community-based telerehabilitation training program can be a solution to decrease clinicians' burden and overcome barriers to children's access to wheelchair skills training. Scientific evidence demonstrated that telerehabilitation is an intervention modality that increases the accessibility of services and is effective to help children learn new motor skills [7]. Moreover, as there are no in person contact between children and clinician, it is a particularly appropriate modality during times of pandemic.

The Wheelchair Skills Training Program (WSTP) is a renowned program for learning wheelchair skills [4]. An extensive number of studies demonstrated its effectiveness in improving adults' wheelchair skills [8-9]. The WSTP has recently been implemented in telerehabilitation. It significantly increased adults' performance, confidence and satisfaction using their wheelchair [10]. Nevertheless, the evaluation of the use of the WSTP with children demonstrated that the program is less effective with this population (14% average improvement of wheelchair skills compared to 20-25% for adults) [11]. This shows the need to modify the WSTP for children [11]. Daoust et al. (2020) documented the adaptations to make to the WSTP with occupational therapists to facilitate its implementation in pediatric rehabilitation settings. They found that a playful approach, a developmentally appropriate gradation of skills and an electronic intervention modality are needed for a better use of the program in pediatric settings and to improve the collaboration of younger children and their parents during training sessions [12]. In this regard, the presemted study aims to propose a telerehabilitation program for training wheelchair skills based on the WSTP and specifically adapted for 5 to 12 years old children.

OBJECTIVES

1) Adapt the WSTP to create a version for 5 to 12 years old children that could be offered in telerehabilitation (WSTP-Ped) ; 2) Evaluate the feasibility to implement the WSTP-Ped in telerehabilitation in community settings ; 3) Evaluate the effectiveness of the WSTP-Ped for improving wheelchair skills (primary outcome), wheelchair-use self-efficacy and satisfaction with participation.

METHODS

This study uses multi-methods. Participants will be recruited using purposive and convenience sampling methods. We will ask managers of rehabilitation and community organizations with which we have an existing partnership to disseminate invitations to clinicians and community workers who work with pediatric manual wheelchair users for at least 6 months. In addition, clinicians and community workers intervening with this population and with whom we have previously collaborated will be invited by email. Clinicians in rehabilitation settings will disseminate invitation forms to children that : 1) use a manual wheelchair for minimum 25% of their daily mobility; 2) have sufficient cognitive skills to collaborate in the co-development process (n=8)/receive the training program (n=20); 3) have a stable health status. Parents of the children that will be invited to the focus groups will be asked to participate.

Objective 1

A qualitative study based on a participative approach will be conducted. The Photovoice method will be used to co-determine children's needs and preferences regarding wheelchair training. Photovoice is a particularly relevant method for our study population, since it allows children with communication difficulties to express their point of views. Children (n=5) will take pictures and videos of everyday life situations requiring wheelchair skills and of the virtual learning methods they prefer. Then, individual semi-structured interviews based on their pictures and videos will allow the student-researcher to gain a more in-depth understanding of the skills they need to learn and of the virtual learning methods that are appropriate to reach them. Using the results of the Photovoice, an advisory committee, including children (n=3), their parents (n=3), clinicians (n=3) and community workers (n=2), will participate in two focus groups to identify the modifications to make to the WSTP (eg. Skills to practice according to children's age, training tips and games, frequency and duration of training). Thematic content analysis will be carried out. The result of this objective will be the WSTP-Ped.

Objectives 2 and 3

A wait-list crossover randomized controlled trial will be conducted. 20 participants will randomly be assigned to the experimental (WSTP-Ped) and control (usual care) groups. Experimental group will receive the WSTP-Ped for 12 weeks. During this period, feasibility indicators related to process (eg. Attrition rate), resources (eg. Usability of the telerehabilitation platform), management (eg. Fidelity of the intervention) and intervention (eg. Safety) will be documented by the student-researcher [13]. Feasibility indicators will be treated as binary (success or revised). Success indicates small or no modifications have to be made to the WSTP-Ped and revised indicates that major modifications are required. If all indicators related to the intervention are rated "success", the control group will receive the WSTP-Ped after post-intervention data collection to ensure clinical equipoise. If a feasibility indicator related to the intervention is rated "revised", the WSTP-Ped will be modified and re-evaluated before the control group receives it. A blind tester will measure wheelchair skills (Wheelchair Skills Test), wheelchair-use self-efficacy (Wheelchair Use Confidence Scale) and satisfaction with participation (Wheelchair Outcome Measure for Young People) at baseline (before group assignment: T1), immediately after WSTP-Ped (T_2) and 6 months later to assess retention of skills (T_3). Descriptive and covariance analysis (ANCOVA), controlling for baseline score as a covariate, will be performed to compare post-intervention (T_2) scores between the experimental and control groups (statistical significance will be alpha= 0.05 and statistical power 80%). Intention-to-treat analysis will be performed.

EXPECTED RESULTS

It is expected that all feasibility indicators will be rated "success", suggesting the WSTP-Ped will be implementable in telerehabilitation. Wheelchair skills, wheelchair use self-efficacy and satisfaction with participation will be significantly higher in the WSTP-Ped group than in the usual care group.

DISCUSSION

This project will lead to the production of a pediatric wheelchair training program created in partnership with its intended users, thus increasing its acceptability and usability. The community-based WSTP-Ped delivered in telerehabilitation will be a solution to increase the access of children with physical disabilities to wheelchair training. In addition to promoting independent mobility, it will contribute to foster children's healthy development and social participation. To our knowledge, it will be the first randomized controlled trial evaluating the effectiveness of a pediatric wheelchair training program. This study will contribute to expand knowledge on pediatric wheelchair training, which is currently limited.

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