Effectiveness of remote asynchronous wheelchair skills training for clinicians

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INTRODUCTION

One aspect of the wheelchair-provision process that has become increasingly well recognized as important is the training of wheelchair skills for wheelchair users [1]. The Wheelchair Skills Training Program is a low-tech, high-impact training protocol that draws on both the wheelchair literature and principles of motor skill learning [2]. The value of wheelchair skills training with respect to increased capacity and other outcomes has been well documented for wheelchair users and health-care personnel, including two systematic reviews and meta-analyses [3,4]. There is growing evidence of an association between wheelchair skills capacity and participation [5-12].

However, many clinicians lack the necessary skill and confidence to perform such training, which represents a barrier to widespread implementation of this evidence-based intervention. Although free online materials are readily available, many clinicians do not have ready access to expert feedback as they attempt to learn the motor skills they need.

The objective of this study was to test the hypothesis that self-learning (using online resources and practice in pairs), complemented by periodic expert feedback from a remote expert, can increase the learners’ capacity and confidence in performing wheelchair skills.

METHODS

Design

Prospective cohort study using within-subject comparisons.

Participants

Participants were enrolled across four Spinal Cord Injury Model Systems Centers: Midwest Regional Spinal Cord Injury Care System (Chicago, IL), Northern New Jersey Spinal Cord Injury System (West Orange, NJ), University of Pittsburgh Model Center on Spinal Cord Injury (Pittsburgh, PA), and South Florida Spinal Cord Injury Model System (Miami, FL).

Ethics

Institutional Review Board approval was obtained at each site and participants provided informed consent.

Recruitment

Participants were eligible to participate if they were able-bodied with no restrictions regarding activities of daily living, between the age of 18 and 75 years, and had no upper- or lower-extremity injury that would preclude the ability to use a wheelchair. Participants were enrolled in pairs to ensure that each individual would have a spotter available when practicing skills.
Intervention
Participants were provided with an electronic copy of the Wheelchair Skills Program Manual [13] and instructed to review the introduction to wheelchair skills training (Sections 5.1-5.22), spotter safety (Sections 6.1-6.16), and Sections 7.27-7.35 on 10 intermediate and advanced skills (gap, threshold, low curb ascent/descent, high curb ascent/descent, stationary wheelie, 180 degree wheelie turn, wheelie down steep incline, and wheelie down high curb). Instructional videos were also provided for each skill. Participants were told to practice the skills in pairs, with self-selected frequency and duration of sessions. Each site made manual wheelchairs available for participants. After each session, participants uploaded a training log and videos of themselves practicing. Feedback was provided asynchronously (generally within 1-2 days) by a content expert (RLK) on spotter technique and difficulties identified in the video recordings.

Outcome Measures
Before and after training, participants completed the Wheelchair Skills Test Questionnaire (WST-Q), Version 4.3 [13] to assess their capacity and confidence in performing the 10 manual wheelchair skills. Subtotal 10-item percentage WST-Q capacity and confidence scores were calculated. All questionnaires were completed online through the Qualtrics Survey Platform.

At the end of each session participants were asked to upload a video of themselves with each skill they attempted during the session. Participants were also asked to complete a participant log either by recording responses through video or by logging responses in a Word document. Participant logs included the subject ID, date and location of training, minutes spent practicing, minutes spent spotting, skills practice, successes with skills, difficulties encountered, and the name of video clip(s) submitted to study staff. The remote trainer was alerted by email when new files were uploaded and he provided feedback for each skill on the setting, video quality, Wheelchair Skills Test (WST) score, general comments, spotter issues, and learner issues. File exchange was completed using the University of Pittsburgh Box Platform.

Participants also completed a feedback survey at the end of the training. Participants were asked to indicate agreement (strongly disagree, somewhat disagree, neutral, somewhat agree, strongly agree) on if the training was useful, relevant, easily tolerated, understandable, and enjoyable. Participants also gave feedback on duration, if they would refer others, aspects that they were dissatisfied with or difficult to understand, parts of the course that would be useful to practice, content that should be emphasized or reduced, and other suggested improvements.

Data Analysis
Baseline and follow-up 10-item subtotal percentage WST-Q capacity and confidence scores were compared using paired Wilcoxon Sign Rank tests. Pearson or Spearman correlation was used to evaluate the relationship between time practicing/spotting and the 10-item subtotal WST-Q capacity and confidence scores. Quantitative analysis was used to determine the proportion of participants who achieved capacity for each of the 10 study skills and to analyze participant feedback on surveys.

RESULTS

Participants
Of the 38 participants who completed the study, the majority were young female physical or occupational therapists or physical therapy students. All participants listed interest in the subject matter as their reason for enrolling in the study. No participants were Assistive Technology Professionals.
Sessions
Participants completed the intervention in a mean of 3.1 (1.7) sessions. The mean time spent practicing and spotting in a session was 27.6 (17.2) minutes and 26.1 (16.0) minutes, respectively. Session time varied from 15 minutes to two hours. Total time for practice and spotting across all sessions was 83.1 (46.7) minutes and 78.6 (41.2) minutes, respectively.

Wheelchair Skills Test Questionnaire
Participants significantly improved their subtotal 10-item WST-Q capacity and confidence scores from mean (SD) values of 16.8% (15.6) to 74.7% (18.8) (p < 0.001) and from 48.3% (19.0) to 80.2% (12.3) (p < 0.001).

Individual Skills
The proportions of participants who achieved skill capacity for each skill, in descending order, were threshold (98%), gap (93%), ascent of low curb (85%), descent of low curb (80%), stationary wheelie (80%), wheelie turn-in-place (63%), ascent of high curb (49%), descent of high curb (54%), descent of high curb in wheelie position (46%) and descent of steep incline in wheelie position (44%).

Correlations
The post-training subtotal 10-item WST-Q capacity was correlated with a higher number of sessions (R=0.420, p=0.007), greater time practicing (R=0.425, p=0.006), and greater time spotting (R=0.566, p<0.001). A greater improvement in confidence was correlated with greater time practicing (R=0.573, p<0.001), and greater time spotting (R=0.482, p=0.002).

Participant Feedback
The majority of participants indicated the training was useful (93%), relevant (95%), easily tolerated (85%), and understandable (88%). The majority (80%) of participants felt the duration of training was “just right”, 10% felt it was “too long” and 2% felt it was “too short”. The majority (80%) would encourage others to participate in this type of training.

DISCUSSION AND CONCLUSIONS
Self-study complemented by remote asynchronous feedback was effective in increasing participants’ wheelchair-skills capacity and confidence. This model can be further investigated as a delivery method for improving knowledge translation of wheelchair skills training.

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REFERENCES