Making Assistive Technology and Rehabilitation Engineering a Sure Bet

Training a Parent in Wheelchair Skills to Improve Her Child's Wheelchair Skills: a Case Study

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ABSTRACT
We tested the hypothesis that training a parent in wheelchair-user and caregiver wheelchair skills would improve the child's wheelchair skills. We studied an 11-year-old girl with spina bifida and her mother. The mother received 4 training sessions averaging 42.5 minutes per session, over a period of 3 weeks. The total pre-training and, 4 weeks after completion of the parent-training sessions, post-training performance Wheelchair Skills Test (WST 4.1) scores for the child were 66% and 69%, for the mother as a simulated wheelchair user were 69% and 84% and for the mother as a caregiver were 93% and 100%. Both the mother and the child perceived the training to be beneficial. This case study suggests the potential for parent training to benefit their children's wheelchair skills abilities.

Keywords:
rehabilitation, wheelchair, skills training, spina bifida

BACKGROUND
The Wheelchair Skills Program (WSP) (1) is designed to improve the ability of wheelchair users to perform specific activities in a safe and effective manner. This training program has been demonstrated to be safe, practical and efficacious in improving the wheelchair skills of adult wheelchair users (2,3) and caregivers (4).

However, the literature is lacking in much information about training children in manual wheelchair skills. Although O'Connell and Bamhart (5) trained children in wheelchair propulsion by strengthening of the upper body, specific manual wheelchair skills were not trained and propulsion was only used as an outcome measure. Hall et al. (6) provided two days of training to six children aged 6-19 years and found a small (9%) but significant improvement ($p = 0.03$) in wheelchair skills ability, as measured with the Wheelchair Skills Test (WST 3.2). Whizz-Kidz (7) and the Association of Wheelchair Children (8) are organizations that offer training programs to

children, but the effectiveness of these programs has not been published in peer-reviewed journals.

We wondered how training a parent in both caregiver and user wheelchair skills would affect the manual wheelchair skills of the child. We reasoned that an informed and skilled parent would be able to assist the child in acquiring needed skills over time. We tested the hypothesis that training a parent in wheelchair-user and caregiver skills would improve the child's wheelchair skills abilities.

METHODOLOGY

Participants

We studied an 11-year-old girl with spina bifida and her mother. The child was using a manual wheelchair for > 8 hours per day for recreation, community and school mobility. She was a household ambulator with the aid of ankle foot orthoses. The participant had completed the Wheelin' Wizards training program through the Izaak Walton Killam (IWK) Health Centre two years earlier.

Ethical Issues

Before beginning, we had ethical approval from the Capital District Health Authority and the IWK Health Centre Research Ethics Boards. The parent provided informed consent for both herself and the child participant and an assent form was completed by the child.

Study Design

This was a single-case design comparing pre-training wheelchair skills to post-training wheelchair skills of the child participant and parent, both functioning as wheelchair users. We also tested the wheelchair skills of the parent as a caregiver.

Wheelchair Skills Training Program

The mother received 4 training sessions at the Nova Scotia Rehabilitation Centre Mobility Centre, averaging 42.5 minutes per session over a period of 3 weeks, using both the caregiver and manual wheelchair user versions of the WSP 4.1 (1). The mother was asked to relay the wheelchair user skills attained during these sessions to the child through parent-directed informal training in the home and community environments. Copies of relevant WSP materials were given to the parent to use as reference materials for independent training. The mother was issued a spotter strap for use during home training sessions.

Wheelchairs

The child was tested and trained in her own wheelchair, an Invacare rigid-frame model with a pan seat, Prism Supreme II cushion, Jay 2 rigid back, 90° hanger angle, adjustable angle footplates, desk-length armrests, brake extensions, rear anti-tip devices and a rear backpack. The parent was provided with a lightweight manual wheelchair for assessment and training purposes in the Mobility Centre.

Outcome Measures

Pre- and post-training total percentage performance and safety scores on WST 4.1 for the child were compared as the primary outcome measure. The post-training WSTs took place 4 weeks after completion of the parent-training sessions. We also looked at the pre- and post-training WST scores for the mother, both as a wheelchair user and as a caregiver, as well as the scores for individual skills. On completion of the study, a final questionnaire was administered to both the child and parent to assess the participants' perceptions.

RESULTS

Confounding Factors

The expected 4-week time available for participant-parent training was shortened due to the participant being hospitalized for an unrelated incident and attending a one-week camp away from home. Also, the participant was diagnosed during the interim with a learning disability that identified problems learning with verbal instructions.

WST Scores – Child

The total pre- and post-training performance scores were 66% and 69%. She improved her score on rolling over a soft surface. The safety scores were 100% pre- and post-training.

WST Scores – Mother as Wheelchair User

The total pre- and post-training performance scores were 69% and 84%. The mother improved her wheelchair-user abilities to fold/unfold the wheelchair, ascending a 10° incline, ascending a 5cm level change, descending a 15cm curb, and performing a 30s wheelie. The safety scores pre- and post-training were 94% and 97%.

WST Scores – Mother as Caregiver

The total pre- and post-training performance scores were 93% and 100%. The mother improved her caregiver skills of folding and unfolding her daughters' wheelchair and her technique when pushing her daughters' wheelchair on a soft surface. The safety scores were 100% pre- and post-training.

Safety

No incidents or accidents occurred during the study.

Perceptions

Both the mother and the child perceived the wheelchair skills training to be beneficial. The mother indicated that the program was extremely valuable in increasing skills and confidence with respect to her child's mobility. She also commented that the program would have been helpful if taught at the time of wheelchair prescription and suggested that a wheelchair be provided to the parent to practice with during home training sessions. The child thought that the wheelie was a difficult skill but reported that she felt that it was easier to get around after her mother's training and she enjoyed having her mother as her trainer.

DISCUSSION

Positive but small changes were noted in the WST scores for the child's skills as a wheelchair user, the parent's skill as a wheelchair user, and the parent's skills as a caregiver. However, post-training weaknesses remained for some skills, suggesting that more practice was needed. Also, more time may be required between completion of the parent training sessions and follow-up testing sessions to allow for adequate training of the child.

The major limitations for this study were the small sample size and brief time-frame. There were also some confounding variables (e.g. inter-current illness). Recommendations for future studies include recruitment of a larger sample size and use of a randomized controlled trial study design. Despite the study limitations and the need for further study, this case study suggests the potential for parent training to benefit their children's wheelchair skills abilities.

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