Clinical complications associated with two low-cost 12-inch wide pediatric wheelchairs

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ABSTRACT

Objective: To compare real-world utility (as identified by participants) and clinical complications associated with use of two different makes of 12-inch wide low-cost pediatric wheelchairs.

Design: Observational cohort study, comparing findings from use of 10 wheelchairs donated by the local Kenyan manufacturer and 20 wheelchairs donated through an overseas non-governmental organization.

Setting: Primary school for children with disabilities in Kenya, with an on-site rehabilitation team.

Participants: Children with disabilities who required and were fitted with the donated 12-inch wide wheelchairs.

Interventions: No intervention was used in this observational study. Wheelchairs were maintained by the rehabilitation team as required.

Main Outcome Measures: Feedback from children and health professionals, as well as clinical assessments by a Physical Medicine & Rehabilitation specialist at the end of the study period.

Results: Feedback was obtained from 26 children with disabilities who had opportunity to use the donated wheelchairs, as well as from 9 health professionals regarding wheelchair components. All 26 children were examined for clinical complications. Eight reported musculoskeletal difficulties. For two children, pressure ulcers developed in relation to wheelchair use. Other problems noted and reported are presented. Lap-trays were reported as a key aspect of the pediatric wheelchairs allowing improved participation in schooling. Many children used their wheelchairs for play, particularly for racing. Areas to focus upon for improvement include brakes, casters, leg-rests, and tires.

Conclusions: Low-cost pediatric wheelchairs that are properly fitted to children with disabilities are helpful in improving school participation and play. Various aspects of design are important to consider.

Learning Objectives:

1. Discuss the importance of aligning research with international guidelines
2. Explain the utility of wheelchair design with respect to participation
3. Describe clinical complications that may be associated with elements of wheelchair design

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BACKGROUND

This social accountability study aimed to implement and facilitate the guidelines of the World Health Organization regarding manual wheelchair provision in less resourced settings (1). Prior to the Wheels Project, children at the study site requiring wheelchairs were simply placed in any donated wheelchair, most of them being adult-sized. Many complications resulted.

This study facilitated the training of local rehabilitation professionals in the fitting and maintenance of pediatric wheelchairs, as well as an understanding of potential complications. The Wheels Project provides a feedback mechanism to local and donor wheelchair manufacturers, with the aim of improving low-cost pediatric wheelchair provision overall.

METHODS

The Association for the Physically Disabled in Kenya (APDK) and Joni and Friends were interested in collaborating in this study in order to get feedback on their respective 12-inch pediatric wheelchair design. APDK donated 10 wheelchairs to the non-governmental organization working with children with disabilities at a boarding school in Kenya to support this study. Joni and Friends donated twenty 12-inch Regency wheelchairs for this purpose. Ethics approval was sought and obtained from BethanyKids Kenya, LeTourneau University in the U.S.A. and Queen's University in Canada. A letter of support was obtained from the Ministry of Medical Services in Kenya.

Therapists providing rehabilitation to children with disabilities at a primary boarding school in Kenya were trained in wheelchair prescription and supervised in their provision of 12-inch wheelchairs to children who required them at the school. Consent and assent forms were provided to the guardians of the children and children for consideration; children were included as participants in the study if they and their guardians agreed. Participants were interviewed and assessed by a specialist in Physical Medicine & Rehabilitation (primary author) 5 months after wheelchairs were provided, using an interpreter as necessary. Most children spoke both English and Swahili. Children were examined for musculoskeletal and skin complications, interviewed about pain, and utility of their chair, specifically for use in school and at play. They were also asked to provide feedback on the functioning of their wheelchairs, which were also assessed at the end of the study period for repair and maintenance needs.

RESULTS

Twenty-six participants completed the study. During the time period covered, five children switched wheelchairs (3 from Regency to APDK chairs, 2 to other wheelchairs, and 1 became ambulatory). For those who were in two different wheelchairs during the time period, feedback was obtained on both. Seven reported musculoskeletal-related upper extremity pain (eg.. shoulder, biceps, or wrist pain), all related to use of the Regency wheelchair. One reported a pressure sore at the right achilles tendon, also related to use of the Regency wheelchair. Because of the short leg segment to footrests on the Regency wheelchair, pressure ulcers developed in two participants using that wheelchair.

Maintenance issues for both wheelchairs included loose brakes and brake levers, lateral supports and casters, stuck brakes and flat tires (APDK).

Sixteen children reported that the laptrays were very helpful for their participation in classes. The Regency laptray was slightly larger, and provided a lip to stop implements from rolling off. Only one reported being able to use the classroom desk while in the wheelchair. Three participants reported using their desks and regular chairs in class because their wheelchair could not fit into the class (not enough space overall). One mentioned the inability for the wheelchair to fit into the classroom bathroom.

Eleven participants reported playing in their wheelchairs. Most used them for racing. The others did not play in their wheelchairs. They would usually come out of the chair to engage in play activities. Those who used the wheelchairs for racing reported casters and footrests getting in the way, and one mentioned that racing was easier without lateral supports to get in the way.

DISCUSSION

Key steps involved in wheelchair service delivery identified by the WHO that this study addressed included assessment, prescription, product preparation, fitting, follow-up and maintenance. Education and training was provided as necessary, thereby facilitating sustainable transfer of skills and knowledge. In the course of this first phase of the Wheels Project, the need for wheelchair skills training became evident. Thus, appropriate wheelchair skills training was incorporated into the second phase of this study (to be presented elsewhere).

Some clinical complications did develop as a result of wheelchair design (eg. Regency wheelchair leg segment length). This information will be fed back to the manufacturer, as it is important to rectify such design elements. Other feedback by participants has been fed back to the manufacturers as well (eg. suggestions regarding size and design of APDK laptrays and modification of wheels). During the course of the study, other design suggestions were fed back to the manufacturers with respect to durability of materials and assembly process (forthcoming manuscript).

Children do use their wheelchairs for play and at school. Design considerations should include such activities. Direct monitoring and feedback from children who use the chairs is helpful and necessary for ongoing improvements.

CONCLUSIONS

Low-cost pediatric wheelchairs that are properly fitted to children with disabilities are helpful in improving school participation and play. Various aspects of design are important to consider.

APDK Wheelchair

Regency Wheelchair

REFERENCES

1) Guidelines on the provision of Manual Wheelchairs in less resourced settings, Armstrong et al., WHO, 2008

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