SHORT REPORT

A Single Blind Controlled Study to Assess the Advantages of Power Assist Wheelchairs

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Pushrim Activated Power Assisted Wheels (PAPAWs) incorporate motors within the wheels which are activated by utilising the Pushrims during manual propulsion. These wheels are detachable and can be retro-fitted to most wheelchair frames (folding and fixed). Even though PAPAWs were found, in laboratory conditions, to reduce effort and energy consumption compared to standard manual wheelchairs, the benefits have not previously been tested in clinical conditions and criteria for prescription are nonexistent for the National Health Service (NHS). This study attempted to address these issues.

Thirty three consenting randomly selected adult self-propelling wheelchair users (17 male, 16 Female, Mean age 47±14.7, range 20-77, 11 SCI, 7 Amputees, 5 CP, 3 MS and 7 Others) underwent four trials each on an outdoor track consisting of a level and gradient component altogether measuring 50 metres. Each of the four trials consisted of participants propelling one of their own MWC, the wheels changed to PAPAWs with the power on and off or a dummy pair. The trials were carried out in a randomised order, with the participants being blinded to the type of wheels. Participants rested for 20 minutes between trials during which they answered a satisfaction questionnaire. Metabolic cost and time for each trial was recorded using the Cosmed K4b2 system. Arm strength was also measured using a spring balance. In this study the Alber M12 Emotion wheels were used.

Significant benefits were found for energy consumption (P<0.001). PAPAW-Off consumed significant more energy than the client's Own (P=0.002). Significant differences were found for time (P=0.002), less time was required to complete the course in their own chair compared to the other wheel types. Scores for the wheel types showed that the PAPAW-On mode scored higher (P<0) than the other types. Users' comments described particular benefits and problems encountered with the PAPAWs-on mode.

This study does not confirm previous laboratory data regarding energy savings with PAPAWs possibly due to the design of the study, but there is a minimal energy saving in these test conditions. The theme emerging from the qualitative study was that PAPAWs would be of benefit for users. Ability to control the PAPAWs was an issue; however participants thought they would be able to over come this with practice. Weight of the PAPAWs emerged as a negative comment. There appears to be a group of high end users who would derive maximum benefit from PAPAWs, particularly users with balanced upper limb control.

Further Information

The team would like to thank the Posture & Mobility Group and the West Midlands Wheelchair Service Managers Group for supporting this work. The findings of this study have been submitted for publication to an international peer-reviewed journal. A full report can be made available upon request