

Exploring powered mobility use in early childhood: a panel discussion

Chaired by Tim Adlam, Principal Engineer, Designability & Associate Professor, Global Disability Innovation Hub, Department of Computer Science, University College London

A. Powered mobility interventions for young children aged <5 years: A systematic mixed methods review and economic model of effectiveness and cost-effectiveness

Nathan Bray, School of Health Sciences, Bangor University, North Wales

Additional authors: Jennifer McAnuff, Louise Tanner, Fiona Beyer, Dawn Craig, Jane Noyes, Dor Wilson, Lorna Tuersley, Aimee Grayston, Rhiannon Tudor Edwards, Niina Kolehmainen

Background: Mobility limitations are a leading cause of childhood disability. Provision of early powered mobility interventions is an emerging health technology proposed to (i) support the immediate and life-course development, activity, and participation of children with mobility limitations, (ii) enhance the wellbeing of their families, and (iii) reduce societal impacts of mobility limitations. To inform decision-making and further research related to early powered mobility interventions there is now a need for a synthesis of existing evidence.

Aims: The aim of the Early Mobility and Powered Wheelchair Review (EMPoWER) project was to examine and model the relative effectiveness and cost-effectiveness of powered mobility provision for young children (<5 years) compared to the more common practice of powered mobility provision for children aged ≥5 years. The review also reports evidence related to acceptability, feasibility, and pathways to change.

Methods: This is an ongoing mixed-methods systematic evidence synthesis and economic modelling study, funded by the National Institute for Health Research (NIHR). The evidence synthesis used established methods to identify relevant quantitative, qualitative, and mixed-methods research from bibliographic databases, grey literature sources, and through consultation with topic experts including parents and young people. Two reviewers independently completed the screening, quality appraisal, and data extraction. All relevant outcomes were considered including: children's life skills, independence, autonomy, and participation; parental health; social care and education costs. For the economic model, costs related to different components of powered mobility interventions were gathered from the United Kingdom National Health Service (NHS) wheelchair services, charitable organisations, and published government reports. Wider economic costs and benefits to the NHS, families, and society were also considered.

Preliminary findings: 7,128 papers were identified and 85 were included, comprising 88 discrete studies: 2 randomised controlled trials, 38 non-randomized comparative quantitative studies, 32 descriptive non-comparative studies, 2 mixed methods studies, and 14 qualitative studies. 26% of included studies involved a single participant, and 60% involved ≤10 participants. 69% of studies involved children with cerebral palsy, 26% involved only children with cerebral palsy, and 64% involved children aged <5 years.

Data from included studies will be synthesised into a logic model and evidence maps incorporating: key powered mobility intervention elements (i.e. provision and maintenance of equipment, training, and environmental adaptations); relevant outcomes and measures; pathways to change; intervention moderators; factors related to acceptability and feasibility.

Conclusions and impact: The evidence synthesis, logic model, and economic modelling will inform planning and recommendations for powered mobility provision and future research. In light of the scarcity of robust effectiveness studies, the current evidence is more informative for when: selecting

outcomes for evaluations of early powered mobility provision; choosing pathways to target in intervention design; considering feasibility and acceptability of implementation.

Email: n.bray@bangor.ac.uk

B. Beginning power mobility in British Columbia

Roslyn Livingstone, Sunny Hill Health Centre for Children, Vancouver

Our three-phase early power mobility research project is embedded in clinical practice, increasing engagement of both families and therapists to consider power mobility as an intervention for both traditional and non-traditional power mobility learners.

We start early with child and family led exploratory group sessions called Power Mobility Days including children from 9 months on. In the last two years we provided six-month loans of four novel early power mobility devices (Wizzybug, Bugzi, Tiger Cub and ride-on toy cars) to 46 children, and we are now exploring the impact of a second device loan with 9 of these children.

Our third phase is an expanded loan program with embedded research measures. We are incorporating an expanded range of devices and increasing flexibility in loan length and timing. For example, some children may progress through several short-term loans of different devices before applying to provincial funding for a paediatric power wheelchair, while other children who are anticipated to walk may use power mobility devices in the short-term to assist in achieving specific learning goals.

We are also exploring different models of intervention: individual loans to families; shared loans between children; and loaning devices to therapists and child development centres for group and individual sessions.

Our key message: introduce augmented mobility methods early, and allow families and community therapists to determine the approach that works for them - power mobility interventions can be more than just a replacement for walking!

Email: rlivingstone@cw.bc.ca

C. An introduction to the future of inclusive paediatric mobility design

Cara O'Sullivan, previously Principal Designer at Queen Elizabeth Foundation working on the re-design of the Bugzi. Currently a PhD researcher at University of Liverpool, exploring the future of paediatric inclusive mobility design in collaboration with Alder Hey children's hospital, and supported by the Hugh Greenwood Legacy for Children's Health Research.

Bugzi is a beginner power chair for children typically aged between 1-6 years; until now, the design has not been updated since its development over 15 years ago. Although Bugzi is a great introduction to powered mobility, there are various functions which children could benefit from once they become more experienced power chair users which are not offered by the choice of existing paediatric power chairs available to them. The aim of the Bugzi redesign is not only to introduce these new functions but to also bridge the gap between children growing out of Bugzi

before they can access UK wheelchair services, whilst exploring the unmet wants and needs of children, parents, therapists and other stakeholders involved in the services surrounding paediatric powered mobility.

The redesign project has been approached with the principles of Inclusive Design which places the child's wants, needs and goals at the centre of the specification, which changed the brief from designing 'a wheelchair' to designing 'an inclusive adaptable learning tool'. The redesign is now in the stage of prototyping and development, exploring solutions which prevent children needing to switch between multiple different wheelchairs as their needs change.

Beyond the Bugzi redesign, a broader research project has been established between Alder Hey Children's Hospital and the University of Liverpool. The project seeks to holistically explore and map optimal experiences and outcomes for all stakeholders involved in paediatric assistive mobility, with the purpose of creating a blueprint to steer and facilitate future interventions in product, technology and service innovations. The expected outcome of this research is a framework for the future of inclusive paediatric mobility design.

Email: cara1@liverpool.ac.uk