Presentation type: 15 min - Paper session

A5: Medix 21 Bronze sponsor's session
Paediatric Seating in the Classroom and at Home

B5: Rehasense Bronze Sponsor's session
The challenges of power-addons for wheelchair drivers – Rehasense PAWS solutions

C5: Loop Plus Bronze Sponsor's session
Continuous monitoring of wheelchair user's seated behaviour during everyday activities with loop+

D6: Ottobock Bronze Sponsor's session

E5: Melrose Bronze Sponsor's session:
Uniquely You, Made in NZ by Melrose Chairs.

A8: "Bridging the Gap" - Implementing a community therapist led wheelchair assessment clinic within inpatient rehabilitation wards.
Angela Kennedy

A9: Breaking New Ground: Establishing an advanced practitioner (Wheelchair & Seating) role in Hawkes Bay.
Antjedine Borchers

C8: Analysing the cost of failing to include everyone in society with universal design.
Mr Tim Young

C9: Finite element analysis for assessment of tissue-deformation on the buttocks in the context of PI
Carlos Kramer

D9: Preliminary report on the development of a novel front wheel attachment for manual wheelchairs
Dr. Jaimie Borisoff

D10: The effectiveness of clinical, therapeutic seating after the Covid-19 pandemic for long term care patients.
Martin Cominetto

E10: Tales from the field: Using fully customised seating products
Ms Jenni Dabelstein

E11: Novel method of propulsion pattern recognition in a manual wheelchair simulator
Mr Salman Nourbakhsh

E12: Perceived access to livelihoods among spinal cord injury individuals in Tanzania following Motivation Peer Training
Annabelle de Serres-Lafontaine

E13: Longitudinal analysis of OT students' participation in a wheelchair skills boot-camp
Ed Giesbrecht

D14: Physical risk factors influencing wheeled mobility in children with cerebral palsy
Mrs Jackie Casey

E15: Use of activity chairs/standing aids by people with disabilities: results from a Master thesis.
Naja Tidemann

E16: Tales from the field: My love affair with smart electronics
Ms Jenni Dabelstein

D17: Loop Plus Silver Sponsor's session
Case studies of how loop+ quantitative evidence can improve patient engagement in their outcomes

B13: An overview of wheelchair provision education in Canadian occupational therapy programs
Paula Rushton, Ed Giesbrecht

B14: The design requirements of telehealth wheelchair and seating assessment service for Aotearoa: A mixed methods analysis of stakeholder views.
Dr Fiona Graham

C15: Postural asymmetries, pain, and ability to change position of children with cerebral palsy
Mrs Jackie Casey

C16: Their voices: What caregivers say about sleep systems for their children
Ms Jane Hamer

D18: Choosing cushion protection over skin protection?!
Carlos Kramer

D19: COVIDisruption: evolving home-based MWC skills training to full telerehabilitation delivery
Ed Giesbrecht, Dr. Krista Best

A8: “Bridging the Gap” - Implementing a community therapist led wheelchair assessment clinic within inpatient rehabilitation wards.

Angela Kennedy
Canterbury DHB, Christchurch, New Zealand
Physiotherapist

Learning objectives

1. To understand current challenges of working within DHB system to provide timely and accurate equipment provision.
2. To look at a different way to deliver service and improve the patient journey from inpatient to outpatient services
3. To look at innovative ways to educate emerging therapists and maintain accreditation for those existing therapists
4. Review of waiting times, therapist satisfaction and outcomes for clients

Abstract

Burwood hospital is a large rehabilitation hospital based in Christchurch, NZ. It consists of wards dedicated to stroke, older persons health, brain injury, orthopaedic and spinal injury rehabilitation. In Christchurch most of our MOH level 2 wheelchair and seating assessors are based in the community setting which is not currently directly attached to the hospital. Increasing concerns around long delays in referral, lost applications, prescription errors, communication breakdowns and difficulties with clinical support for inpatient staff led to a pilot of an inpatient assessment clinic for clients over 65 that was led by our community level 2 assessors. This presentation outlines how we went about reviewing, planning and implementing the inpatient wheelchair clinic and our results over the last 2 years.

Content references:

1) World Health Organization, 2015, *WHO Wheelchair Service Training Package for managers and stakeholders*, World Health Organization, Geneva, viewed 15 June 2017, from http://www.who.int/disabilities/technology/wheelchairpackage/wstpmanagers/en/
2) GoldbergM, PearlmanJ, RushtonP, et al. The International Society of Wheelchair Professionals (ISWP): a resource aiming to improve wheelchair services worldwide. Br J Occup Ther. 2018;81:671–672.
3) ISO 16840-1:206 - Wheelchair seating — Part 1: Vocabulary, reference axis convention and measures for body segments, posture and postural support surfaces

Presenter biography

I am a Community based physiotherapist who has worked within the CDHB for 25 years (excluding the obligatory few years in UK). I have a special interest in wheelchair and seating provision, education and service development and worked within a specialist wheelchair and seating service for a number of years before moving to generalised community work. Due to increasing demands on the sector we are always

looking for ways to improve service delivery for our clients and best utilise the staffing resource we have available. At home I have a grumpy husband, 2 grumpier teenage children, 2 loving dogs and an indifferent cat.

A9: Breaking New Ground: Establishing an advanced practitioner (Wheelchair & Seating) role in Hawkes Bay.

Antjedine Borchers
Advanced Practitioner wheelchair & seating / Occupational Therapist
Hawkes Bay DHB, Hastings, New Zealand

Learning objectives

1. describe role of Advanced Practitioner in wheelchair and seating at HBDHB
2. compare wheeled mobility service delivery at HBDHB to their own
3. identify need of support for therapists gaining and keeping Level 2 WMPM Enable accreditation

Abstract

Hawke's Bay DHB went through a period where they lost experienced therapists, leading to increased expectations for less experienced therapists, poorer outcomes and longer waitlists for clients, increased stress and decreased job satisfaction for therapists and a struggling service overall. About two years ago there was only one therapist with Wheeled Mobility and Postural Management Level 2 accreditation left at the DHB.

A new, innovative approach was needed, and an Advanced Practitioner role for wheelchair and seating was created. Establishing a new role comes with challenges. The lofty goals set for this role included:

- Providing safe and clinically effective comprehensive assessment and intervention, with demonstration of advanced knowledge and skills to manage complex presentations to patients and their whānau.
- Provide clinical leadership in wheelchairs and seating for therapists in multiple services, including rural areas, acute inpatient teams, adult community teams and child development services.
- To ensure and prioritise a focus on safe and high-quality patient care while weaving together teaching and learning for clinicians.
-

There have been huge achievements in the first year of the role that have proven the value of an Advanced Practitioner role in wheelchairs and seating.

- Reduction in waitlist for patients requiring assessment at all levels
- Monthly Special Interest Groups which have included in-services, presentation of case studies, manual wheelchair skills training and equipment review
- Progress towards regular wheelchair and seating reviews for adults
- A workforce who feel supported and now has an increased interest in gaining accreditation

Conclusion: The establishment of a ground-breaking Advanced Practitioner Role (wheelchair and seating) in Hawke's Bay has turned around the service. The outcomes for patients and clinicians have been significant, and the successes of the role should be shared with other DHBs experiencing the same issues.

Content references:

- Cohen, L., Greer, N., Berlinger, E., & Sprigle, S. (2013). mobilityRERC state of the science conference: Considerations for developing an evidence base for wheeled mobility and seating service delivery. Disability & Rehabilitation: Assistive Technology 8(6), 462-471.
- Greer, N. , Brasure, M. , Wilt, T.J. (2012). Annals of internal medicine: Rockville (MD): Agency for Healthcare Research and Quality (US); Wheeled Mobility (Wheelchair) Service Delivery scope of the evidence
- Owens, J., Davis, D.D. (2020). Stat Pearls Publishing LLC Seating And Wheelchair Evaluation

Presenter biography

Antjedine Borchers, Antjedine.borchers@hbdhb.govt.nz, New Zealand, HBDHB

Antjedine graduated as an Occupational Therapist in 1992 from a German OT School. She currently works for the Hawkes Bay DHB. She has a strong interest in wheelchair and seating provision / 24 hour postural care as well as relationship centred practice. She worked in Paediatrics for most of her career before taking up a position as Advanced Practitioner in wheelchair and seating for the Hawkes Bay DHB.

C8: Analysing the cost of failing to include everyone in society with universal design.

Mr Tim Young
Smart Access Ltd, Hamilton, New Zealand
Director

Learning objectives

1. To raise the awareness of the importance of robust data collection of accessibility features in infrastructure, and of the travel patterns of people with disabilities.
2. To explain to participants some of the accessibility features that we collect that they may have not thought about as being important.
3. To encourage participants to ask their organisation or local government to collect such data.
4. At the end of the session participants will be able to identify a range of accessibility features in infrastructure and explain to others why this type of data collection is important.

Abstract

Currently, there is no used method (or desire) for local and central governments to conduct a cost-effectiveness analysis of implementing universal design (UD) and failing to implement UD in infrastructure and public transport. There is a lack of data collected to provide economists and governments information about where infrastructure accessibility features are present, and a lack of data about where disabled people travel. Without this data no further economic insights can be made.

Smart Access provides comprehensive accessibility audits collecting GPS location data, photos of the accessibility features, and a timestamp.

The information is easy to see in the Smart Access application. It allows users to plan a safe journey before leaving their house, no matter what their ability levels is.

Unlike past audits that have only collected data on four accessibility features and have not been easily accessible to the general public, we are collecting detailed data on 35 different variables identified through extensive consultation with the disabled community, with all information easy and free for the public to access with the Smart Access application.

Users can choose to see only the accessibility features that affect their travel, so they can effectively plan the best travel route that meets their specific needs. This information allows Council staff to prioritise infrastructure upgrades with extensive data, to improve on your evidence-based approach.

Content references:

Project Sidewalk out of the University of Washington is the next closest research to use machine learning to automatically detecting accessibility features but is limited to 4 accessibility features and is not very accurate. Saha et al. (2017) developed Project Sidewalk, which uses ‘citizen researchers’ or

crowdsourcing to allow people online to virtually research and assess physical accessibility for manual wheelchair users.

De Jonge and Schraner (2010) have the most advanced method to assess the cost of not providing assistive technology (AT) or universal design to develop an inclusive society. The researchers aimed to measure the effectiveness of assistive technology (AT) and universal design (UD) while also developing a cost-effectiveness analysis that can take into account the many variables within a complex conceptualisation of effectiveness.

To do this, de Jonge and Schraner (2010) decided to use the World Health Organisation's (WHO) framework called the International Classification of Functioning, Disability and Health (ICF). They followed the classification of activities and participation to identify effectiveness and the classification of environmental factors to identify the relevant costs.

Other than the ICF, models to assess accessibility in infrastructure include the Pedestrian Planning Guide, Universal Design Principles and the Guide to Road Design.

Research on this topic seems to be quite limited which is why I'm completing my PhD in Environmental Planning this year to expand the knowledge in this area.

Presenter biography

Tim Young has a background in educational psychology, research, and app development. He is now a research assistant with the Burwood Academy of Independent Living, and a consultant to central and local governments on accessibility issues.

Tim also focuses on using technology to solve accessibility issues after facing many accessibility issues in his own experiences as a tetraplegic. He has a business, Smart Access, which collects and sells data on 33 accessibility variables to local governments to help better prioritise infrastructure spending. Smart Access also provides this data to the public with an app. A town/city-wide accessibility audit gives Councils the information they need to link transport routes to key amenities with universal design, so all of the public can access public facilities.

C9: Finite element analysis for assessment of tissue-deformation on the buttocks in the context of PI

Carlos Kramer
Vicair, Wormer, Netherlands
International Educator

Learning objectives

1. Upon completion of this session, attendees will be able to understand finite element modeling.
2. Upon completion of this session, attendees will be able to understand how to use finite element modeling to do analysis.
3. Upon completion of this session, attendees will be able to understand that finite element modeling is a valid model to do analysis.

Abstract

A pressure injury (PU) is defined in the international guidelines as localized damage to the skin and/or underlying tissue as a result of pressure or pressure in combination with shear. Tissue damage that characterizes pressure injuries occurs as a result of intense and/or prolonged exposure to sustained deformations in compression, tension or shear, or a combination of these loading modes.

At the basis of finite element modeling (FEM) lies the development of a representative model of how a real-life object is going to behave when it is met with a specific boundary condition (i.e. pressure applied to the buttocks). MRI tissue deformation data serve as boundary constraints to solve the FEM for the imaged tissues.

Techniques available for assessment of internal deformation are magnetic resonance imaging (MRI), elastography, and ultrasound. These imaging techniques can be used in combination with a subject-specific theoretical finite element analysis (FEA) to estimate deformations, strains and stresses throughout the tissue structures. [EPUAP Guidelines, 2019]

Finite element analysis is often used because of its capability of handling complex geometries and modeling the non-linear behavior of tissues. Finite elements are geometrical shapes of a specific size and are found within a domain. The sum of all elements describe the whole continuum (i.e. soft tissue). By calculating the boundary conditions of these finite elements, you can learn about tissue behavior under stresses.

Finite element analysis has become widely used to model human soft tissue behavior and large tissue deformation. Also in the field of pressure injury research.

After introducing FEM/FEA we will share the first results of a comparison between an air based cushion and a foam cushion.

Content references:

1) Guideline, T. I. (2019). *Prevention and Treatment of Pressure Ulcers / Injuries : Clinical Practice Guideline The International Guideline*.
2) Macron, A., Pillet, H., Doridam, J., Rivals, I., Sadeghinia, M. J., Verney, A., Rohan, P., Doridam, J., & Rivals, I. (2019). *Is a simplified Finite Element model of the gluteus region able to capture the mechanical response of the internal soft tissues under compression ? To cite this version : HAL Id : hal-02332239 Is a simplified Finite Element model of the gluteus region abl*.
3) Lee, W., Won, B. H., & Cho, S. W. (2017). Finite element modeling for predicting the contact pressure between a foam mattress and the human body in a supine position. *Computer Methods in Biomechanics and Biomedical Engineering*, *20*(1), 104–117. https://doi.org/10.1080/10255842.2016.1203421
4) Luboz, V., Petrizelli, M., Bucki, M., Diot, B., Vuillerme, N., & Payan, Y. (2014). Biomechanical modeling to prevent ischial pressure ulcers. *Journal of Biomechanics*, *47*(10), 2231–2236. https://doi.org/10.1016/j.jbiomech.2014.05.004

Presenter biography

Carlos Kramer specialised himself in seating and positioning through gaining practical experience whilst working for long term care centres, rehabilitation centres and rehab vendors. His educational background is in physics and before pursuing his passion in the industry, he spent 7 years teaching in schools on all levels. He expanded his knowledge of seating and positioning through his close relations and now colleagues Sharon Sutherland-Pratt, Bengt Engström and Bart Van der Heijden. Carlos is the head of education at Vicair since 2012 and continues to combine his expertise in teaching and passion for seating to provide high quality education in the field worldwide.

D9: Preliminary report on the development of a novel front wheel attachment for manual wheelchairs

Dr. Jaimie Borisoff[1,2], Prof. James Laskin[3,4]
[1]British Columbia Institute of Technology, Vancouver, Canada. [2]Elevation Products, Vancouver, Canada.
[3]University of Montana, Missoula, USA. [4]Praxis Spinal Cord Institute, Vancouver, Canada
Dr. Jaimie Borisoff, Research Director
Prof. James Laskin, Professor

Learning objectives

Upon completion of this session, participants will be able to:

1. Identify 3 wheelchair add-on devices that improve wheeling outdoors
2. Describe the novel features and benefits of a new front wheel attachment for manual wheelchairs
3. Compare and contrast end-user and therapist feedback about the novel device and general issues experienced by users when wheeling outdoors

Abstract

The small front caster wheels of manual wheelchairs are necessary for the stability and maneuverability needed by wheelchair users, especially indoors or on hard level surfaces. Unfortunately, “casters are [also] parasites” [1] and greatly inhibit wheeling on soft or uneven terrains such as grass, trails, or snow [2-4]. The Freewheel® is the best-known front wheel attachment for manual wheelchairs that help solve this problem by lifting the casters off the ground [2]. These add-ons improve wheelchair propulsion [5] by reducing the rolling resistance via a single large diameter front wheel [3]. Unfortunately, these add-ons all suffer from the same problem: they are cumbersome to attach and difficult to carry/store when not employed, and thus cannot transition quickly and simply from outdoor to indoor wheeling; consequently, they are left behind at home far too often. To address these problems, a novel front wheel attachment, named SWIVL™, was developed by following a user-centred design process embedded in the Praxis Spinal Cord Institute technology incubator program [6]. Like its competitors, SWIVL™ is attachable to the wheelchair’s footplate; but uniquely, it is stowable - folded up between the user’s legs or underneath their seat, thus preserving nominal wheelchair performance at all times when not required. When desired, SWIVL™ is deployed in seconds by reaching down and “swiveling” it out till it touches the ground. Then with a small “pop” or wheelie it snaps into place and lifts the casters off the ground. When not needed it can be quickly returned to its stowed position. Therefore, individuals can easily shift between using SWIVL™ when outdoors and regular castors when indoors. End-user feedback, collected at several stages of the device’s development, will be presented. We hope that devices such as SWIVL™ can promote greater participation outdoors and contribute to the individual’s autonomy.

Content references:

1) Denison I. The art of wheelchair setup. The 13th International Seating Symposium; Pittsburgh, PA. 2000.
2) Denison I and JF Borisoff. Initial Evaluation of the FreeWheel™ Wheelchair Attachment. Rehabilitation Engineering and Assistive Technology Society of North America. Toronto, ON. June 2011.
3) Chan FHN, M Eshraghi, MA Alhazmi, BJ Sawatzky. The effect of caster types on global rolling resistance in manual wheelchairs on indoor and outdoor surfaces. Assistive Technology. 30(4):176-182. 2018.
4) Berthelette M, DD Mann, J Ripat, C M Glazebrook. Assessing manual wheelchair caster design for mobility in winter conditions. Assistive Technology. 32: 31-37. 2020.
5) Choukou M-A, KL Best, M Potvin-Gilbert, F Routhier, J Lettre, S Gamache, J Borisoff, DH Gagnon. Scoping Review of Propelling Aids for Manual Wheelchairs. Assistive Technology. 28:1-15. 2019.
6) In conversation with Praxis SCI Incubate cohort member Elevation Products. https://praxisinstitute.org/in-conversation-with-jaimie-borisoff-elevation/

Presenter biography

Dr. Borisoff is the Canada Research Chair in Rehabilitation Engineering Design at the British Columbia Institute of Technology, an Adjunct Professor at the University of BC Department of Occupational Science & Occupational Therapy, and a Principal Investigator at ICORD (International Collaboration on Repair Discoveries). His lab performs rehabilitation engineering research and development about various assistive and therapeutic technologies for people with disabilities. Projects include the development of "dynamic" wheeled mobility devices that allow users to quickly change their wheelchair configuration on-the-fly to suit different daily activities, such as the Elevation™ ultralight wheelchair by PDG Mobility, and most recently the SWIVL™ "Stow & Roll Front Wheel™" that instantly switches a manual wheelchair into outdoor mode (with low rolling resistance) whenever you need it and quickly retracts again for full indoor maneuverability.

D10: The effectiveness of clinical, therapeutic seating after the Covid-19 pandemic for long term care patients.

Martin Cominetto
Seating Matters, Belfast, Ireland
Clinical Director, Occupational Therapist

Learning objectives

Delegates will learn to identify and understand the:

1. Impact that poor sitting posture has upon the long term care patients and their caregivers
2. Contribution of specialized seating in reducing pressure injuries
3. Effects of Covid-19 for the long term care patient as a result of prolonged isolation and 'lockdown' measures.

Abstract

As the immediate effects of Covid-19 became increasingly apparent, we are only now beginning to understand the possible long term effects on patients physical ability, function and wellbeing, as a result of prolonged isolation and 'lockdown' measures. This presentation explores the possible challenges that patients may face as a result of covid-19 and the results of a previous clinical trial examining the effectiveness of individualised seating assessment within long term care facilities and how it can significantly impact the health and wellbeing of patients and caregivers.

This study demonstrates that specialized seating can contribute to a reduction in pressure injuries and postural correction, increased saturated oxygen levels, functional ability and social interaction.

Prescribed seating may contribute to a reduction in pressure injury incidence and increased functional ability. It highlights that each patient is different, requiring individualized evaluation of seating needs before making recommendations for an appropriate seating system. This research provides evidence based pressure management through therapeutic seating.

The findings from the research are replicated by clinicians worldwide who continue to improve patient care through utilizing therapeutic seating to reduce pressure injuries, encourage early mobilization and reduce caregiver manual handling. Having conducted this ethically approved, clinical research in real life care settings, it makes it manageable for the outcomes to be replicated to improve clinical practice

Content references:

Daly, O., Casey, J., Martin, S., Tierney, M., McVey., O. 2013. The effectiveness of specialist seating provision for nursing home residents. Ulster University: Northern Ireland.

Presenter biography

Martin Cominotto is a senior seating specialist and education director at Seating Matters Australia. Martin started his clinical career as a Pharmacist, specialising in complex chronic disease management in the community. Martin is responsible for all clinical training and education for Seating Matters in Australia and New Zealand, as well as complex seating prescription.

E10: Tales from the field: Using fully customised seating products

Ms Jenni Dabelstein
Gizmo Rehabilitation, Brisbane, Australia
Physiotherapist/Complex AT Prescriber

Learning objectives

1. Identify 3 key factors that indicate when bespoke seating products may provide appropriate clinical solutions, in contrast to off-the-shelf solutions.
2. Identify and utilise 3 key strategies for success when prescribing bespoke seating products.
3. Understand processes required to effectively mould and fit bespoke seating products

Abstract

Fully bespoke, custom-moulded wheelchair seating products have long been available, however accessing them has often required repeat travel to a specialist seating clinic. In current times, custom products manufactured from digitised moulds can be easily created from the field, with the client sitting in their own mobility base, in their own home. This ease of moulding and digitising makes bespoke products now easily accessible to clinicians and clients alike.

While bespoke products are now more accessible than ever off-the-shelf products have become increasingly modular, adjustable and customisable, to better meet the needs of clients with atypical posture and anatomy.

So, for which clients should clinicians consider a fully bespoke system instead of a customisable off-the-shelf item? What are the key strategies for success when using bespoke products, and what are the potential pitfalls? What processes are required, to successfully assess, prescribe, mould and fit bespoke seating? In this presentation, I will describe the process for identifying need, highlight assessment requirements and provide insight into the moulding and fitting process. This will be informed by case studies from my own clinical practice, including clients with severe global physical impairment as well as clients using active wheelchairs, including sports applications.

Content references:

1) Crane B, Wininger MA & Call E. (2016) Orthotic-Style Off-Loading Wheelchair Seat Cushion Reduces Interface Pressure Under Ischial Tuberosities and Sacrococcygeal Regions. Archives of Physical Medicine & Rehabilitation, Volume 97, Issue 11, p1872-1879, available from https://www.archives-pmr.org/article/S0003-9993(16)30080-6/fulltext
2) da Silva FP, Beretta EM, Prestes RC, Kindlein JW. Design and milling manufacture of polyurethane custom contoured cushions for wheelchair users. Australas Med J [Internet]. 2011 [cited 2015 Oct 22];4(9):500-6. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3562910 PubMed: PM23393542
3) Angsupaisal M, Maathuis CGB and Hadders-Algra M. Adaptive seating systems in children with severe cerebral palsy across International Classification of Functioning, Disability and Health for Children and Youth version domains: a systematic review. Dev Med Child Neurol 2015; 57: 919–931. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/dmcn.12762

Presenter biography

Jenni Dabelstein is a Physiotherapist who works exclusively as a prescriber and consultant in the area of prescribing complex assistive technology. Her special interests include biomechanics, specialised seating and all types of wheeled mobility, including sports wheelchairs. Jenni has worked within the disability sector for over 3 decades, in a great variety of roles, including clinical, research, consultancy, education and business roles. She has a depth of knowledge and experience regarding specialised equipment and the industry that surrounds it, as well as a range of formal qualifications. Jenni strives to bring formal assessment together with theory and practical knowledge in order to generate positive outcomes for her clients via the latest assistive technology. As well as running her busy private consultancy, Jenni is a current Board member of ARATA and a National Classifier in the Paralympic sport of Boccia, and continues to present regularly at industry workshops, seminars and conferences.

E11: Novel method of propulsion pattern recognition in a manual wheelchair simulator

Mr Salman Nourbakhsh, Ms Zeinab Sobhanigavagni, Dr Philippe Archambault
McGill University, Montreal, Canada

Learning objectives

1. Upon completion of the session, participants will be able to:
2. Identify four wheelchair propulsion patterns.
3. Understand how DeepLabCut Library was used to extract the wrist position coordinates using a simple webcam.
4. Understand how machine learning technique was used to classify the propulsion type.

Abstract

Background. Propulsion pattern recognition in a manual wheelchair (MWC) simulator contributes to better identify the users' propulsion techniques. It can provide them with appropriate feedback and training, in order to prevent chronic shoulder pain.

Objective. The first objective was to track and find the coordinates of the user's wrist in a recorded video. The second objective was to classify the set of wrist coordinates, which is associated with one push cycle, to one out of four possible patterns.

Methods. We used a simple webcam to record users from the side view, while they propelled the pushrim. Then, by using the open-source DeepLabCut library, we tracked and extracted the wrist position. Approximately 2000 push cycles were recorded. 80 percent of these data were used to train a machine learning algorithm and the remaining 20 percent were used to test the results, to classify the trials according to four possible propulsion patterns: arcing, semi-circular, single loop over pushrim or double loop over pushrim.

Results. We implemented three different machine learning models. First was the baseline naïve bayes, second was the random forest, and finally the last and the best was LSTM. Random forest trained the data faster but with lower accuracy. The accuracy achieved by our wrist tracking and propulsion pattern classification method, using LSTM, was around 90%.

Discussion. Three different ML models were implemented: Naïve Bayes as a reference model; Random Forest; and LSTM that outperformed the other models. Random Forest training was faster but resulted in lower accuracy comparing with LSTM model. The effectiveness of X and Y coordinates were evaluated using Random Forest. The Y coordinate resulted in a better performance by a great margin. The prediction was fast enough to be used in real time prediction.

Content references:

1) Slowik, Jonathan S., Philip S. Requejo, Sara J. Mulroy, and Richard R. Neptune. "The influence of speed and grade on wheelchair propulsion hand pattern." *Clinical biomechanics* 30, no. 9 (2015): 927-932
2) Slowik, Jonathan S., Philip S. Requejo, Sara J. Mulroy, and Richard R. Neptune. "The influence of wheelchair propulsion hand pattern on upper extremity muscle power and stress." *Journal of Biomechanics* 49, no. 9 (2016): 1554-1561
3) Morgan, Kerri A., Susan M. Tucker, Joseph W. Klaesner, and Jack R. Engsberg. "A motor learning approach to training wheelchair propulsion biomechanics for new manual wheelchair users: A pilot study." *The journal of spinal cord medicine* 40, no. 3 (2017): 304-315
4) Jayaraman, Chandrasekaran, Carolyn L. Beck, and Jacob J. Sosnoff. "Shoulder pain and jerk during recovery phase of manual wheelchair propulsion." *Journal of biomechanics* 48, no. 14 (2015): 3937-3944

Presenter biography

Salman Nourbakhsh is a Ph.D candidate in rehabilitation science at McGill university. His background is in mechanical engineering. He graduated from École de téchnologie supérieure (ÉTS) based in Montreal in master of science in automated manufacturing engineering in 2016. His passion in health along with his background in Engineering, motivated him to do his Ph.D in an interdisciplinary program, application of robotics in rehabilitation science. Salman wishes to be able to contribute to enhance human quality of life.

E12: Perceived access to livelihoods among spinal cord injury individuals in Tanzania following Motivation Peer Training

Annabelle de Serres-Lafontaine[1,2], Krista Best[2,1], Charles Batcho[2,1], Delphine Labbé[3]
[1]Université Laval, Quebec, Canada. [2]Center for Interdisciplinary Research in Rehabilitation and Social Integration (CIRRIS), Quebec, Canada. [3]University of Illinois, Illinois, USA
Annabelle de Serres-Lafontaine, OT Student and research assistant
Krista Best, Researcher and assistant professor
Charles Batcho, Researcher and associate professor
Delphine Labbé, Researcher and assistant professor

Learning objectives

Upon completion of the presentation, participants will be able to :

1. Describe the use of the International Classification of Functioning to explore access to livelihoods among individuals with spinal cord injury and what is affecting their inclusion and social participation in their community.
2. Identify personal, occupational and environmental facilitators and barriers to access to livelihoods among individuals with spinal cord injury, increasing our understanding of the challenges these individuals face daily.
3. Define strategies to refine current programming of peer training programs to meet the needs of individuals with spinal cord injury and bring awareness in the communities.

Abstract

Only 2% of people with disabilities in developing countries have access to basic services rehabilitation[1]. Peer training (PT) and Entrepreneurial Skills Training (EST) are provided by Motivation (non-profit organization) and Moshi-Cooperative University to enhance independence and occupational engagement of individuals with spinal cord injury (SCI) in developing countries[2]. The purpose of this study was to evaluate the perceived impact of PT and EST on the livelihoods of individuals living with SCI in Tanzania.

Design. Qualitative. Participants. Convenience sample of individuals with SCI who received 1-3 PT home visits (advocacy, skin/bladder/bowel care, and wheelchair skills) and 3-days of EST (economic development, entrepreneurship, and savings/support groups). Photovoice procedures. Preparatory workshop; provision of cameras/training; time to capture meaningful photos; selection of 5 best photos and group discussion; captioning photos using 5 standardized questions[3] to convey message. Analysis. Inductive content analysis of photos and captions and grouped according to the International Classification of Functioning.

Results. Ten participants (5 females) participated in Photovoice (i.e., participatory community-based approach developed to empower marginalized groups[4] and increase our understanding of the challenges disabled people face daily[5]). Two interrelated themes emerged: 1) **"Influencing factors"**, revealing participants' inclusiveness in the community influenced by their activities and participation, personal factors (i.e., self-esteem, self-efficacy) and environmental factors; and 2) **"Empowerment"**, explaining participants' perceptions about advocacy and awareness as well as their hopes for changes and a meaningful life in their community. All participants emphasised the importance of accessibility: while

some were able to overcome obstacles (e.g., attend church, see a doctor), others perceived continued inaccessibility inhibited meaningful occupations (e.g., buying/selling at local market).

Conclusion. PT and EST had meaningful impact on the lives and livelihoods of individuals with SCI in rural Tanzania. Continued effort to overcome accessibility issues and advocate for their needs may further enhance attainment of gainful occupations.

Content references:

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Presenter biography

Annabelle de Serres-Lafontaine (OT student) is a graduating student in the clinical master program in occupational therapy at Université Laval and has completed the research profile. She has been a research assistant at Cirris since summer 2019 under the primary supervision of Dr. Krista Best and has completed three research internships for which she received fellowships. Her responsibilities are multiple, including mentoring, active participation in bilingual exchange groups to improve the quality of research at Cirris, participation in various trainings and her involvement in many projects. She has acquired research skills in qualitative and quantitative analysis through literature reviews, file reviews, interviews, focus groups, data analysis and article writing. Her main contributions are for the development of an adapted physical activity toolkit for community organizations in Quebec and the accessibility of services and the confinement experienced by individuals with a spinal cord injury in Quebec and Vancouver.

E13: Longitudinal analysis of OT students' participation in a wheelchair skills boot-camp

Ed Giesbrecht, Victoria Erives, Jeffrey Coletti
University of Manitoba, Winnipeg, Canada
Associate Professor

Learning objectives

On completion of the presentation, participants will be able to:

1. identify the outcomes of wheelchair skills training with OT students;
2. describe the trends over time between different student cohorts;
3. discuss how skill capacity and confidence relate to clinical practice self-efficacy

Abstract

Training skills for effective wheelchair use is one of 8 key components outlined as best practice in wheelchair service provision. However, the extent of training provided in rehabilitation is variable, frequently addressing only basic skills [1]. Clinicians identify limitations in knowledge, confidence and capacity to teach and demonstrate these skills as contributing to this disparity [2]. One strategy to ameliorate this issue is improving knowledge, confidence and capacity during entry-to-practice professional programs. A survey of Canadian occupational and physical therapy programs reported only 76% included wheelchair skills training and less than 50% use a standardized curriculum such as the Wheelchair Skills Program [3]. Several studies have reported on the use of pragmatic intensive training workshops, or wheelchair skills "boot camps", in occupational therapy professional programs [4-7]. While these studies report significant improvements, point estimates vary and have wide confidence intervals due to small size single cohorts and variations between bootcamp delivery. Variability may be related to baseline differences and whether change scores are constant or relative. A Canadian university OT program has conducted wheelchair skill bootcamps for consecutive cohorts since 2013, collecting outcomes on capacity and confidence with skill performance and, more recently, clinical self-efficacy. This presentation will report on analysis of 8 years of data (n= 308) collected from annual bootcamps run at a single site. We will report on more precise outcome estimates; trends and differences across cohorts; differences across skill subsets (basic, intermediate & advanced); relative versus raw score change; change score controlling for baseline; and associations between skill capacity, confidence in skills, and confidence to apply in clinical practice. Findings will be applied to future practice with bootcamp-based education among professions providing wheelchair service delivery.

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Presenter biography

Ed Giesbrecht began working as an occupational therapist in 1994, developing a particular interest in assistive technology and wheeled mobility, serving as clinical specialist in an Assistive Technology clinic in Winnipeg, Canada. His research interest drew him to academia to pursue a master's and PhD degree. He is an Associate Professor in the department of Occupational Therapy at the University of Manitoba. His research focuses on strategies to address wheelchair mobility skills and training, improving entry-to-practice education, and winter mobility.

D14: Physical risk factors influencing wheeled mobility in children with cerebral palsy

Mrs Jackie Casey[1,2], Associate professor Elisabet Rodby-Bousquet[1,3]
[1]Lund University, Lund, Sweden. [2]Belfast Health & Social Care Trust, Belfast, United Kingdom. [3]Centre for Clinical Research, Västerås, Sweden
Mrs Jackie Casey, Advanced Practitioner Occupational Therapist
Associate professor Elisabet Rodby-Bousquet, Physiotherapist

Learning objectives

Upon completion of this presentation, participants will be able to:

1. Describe what ratio of children with cerebral palsy independently use manual wheelchairs indoors or outdoors
2. Recognise that the majority of children with cerebral palsy do not independently self-propel a wheelchair
3. List at least 2 risk factors for not being able to independently use wheeled mobility indoors or outdoors
4. Compare how many children with cerebral palsy use manual and powered mobility outdoors

Abstract

Background: There is a lack of understanding of the factors that influence independent mobility and participation in meaningful activities. The purpose of this study was to analyse physical factors influencing independent use of manual and power wheelchairs in a total population of children with cerebral palsy (CP).

Methods: A cross-sectional study based on the most recent examination of all children with CP, born 2002–2013, reported into the Swedish cerebral palsy registry (CPUP), from January 2012 to June 2014. There were 2328 children (58 % boys, 42 % girls), aged 0–11 years, at all levels of gross motor function and hand function. Hazard ratios adjusted for age and sex were used to calculate the risk for not being able to self-propel based on Gross Motor Function Classification System (GMFCS) levels, upper extremity range of motion and hand function including Manual Ability Classification System (MACS), House functional classification system, Thumb-in-palm deformity, Zancolli (spasticity of wrist/finger flexors) and bimanual ability.

Results: In total 858 children used wheelchairs outdoors (692 manual, 20 power, 146 both). Only 10 % of the 838 children self-propelled manual wheelchairs, while 90 % were pushed. In contrast 75 % of the 166 children who used power mobility outdoors were independent. Poor hand function was the greatest risk factor for being unable to self-propel a manual wheelchair, while classification as GMFCS V or MACS IV-V were the greatest risk factors for not being able to use a power wheelchair independently.

Conclusions: The majority of children with CP, aged 0–11 years did not self-propel manual wheelchairs regardless of age, gross motor function, range of motion or manual abilities. Power mobility should be considered at earlier ages to promote independent mobility for all children with CP who require a wheelchair especially outdoors.

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Presenter biography

Jackie Casey works as an Advanced Practitioner Occupational Therapist in specialised seating in the Rehabilitation Engineering Centre, a regional service for Northern Ireland. Employed 3 days per week in this service by Belfast Health & Social Care Trust. Here I guide local therapists into interpreting postural assessments into optimal wheelchair seating systems that enable persons with complex physical disabilities and their families (where appropriate) to optimise their ability to independently function, engage in everyday life, and have fun.

Currently studying 2 days/ week on PhD with Department of Clinical Medicine – Orthopaedics, Lund University. Undertaking registry-based research with a population of Swedish children with cerebral palsy (CP) aged birth to 18 years. Primary focus of my research is an exploration of the relationship between postural asymmetries, deformities and contractures, pain, and ability to change position upon supine lying, sitting and independent wheelchair mobility of these children.

D15: Power-wheelchair users with severe cognitive impairment can improve their capacities

Alice Pellichero[1,2], PhD Lisa Kenyon[3], PhD Krista Best[1,2], PhD Éric Sorita[4], PhD François Routhier[1,2]
[1]Université Laval, Québec, Canada. [2]Center for Interdisciplinary Research in Rehabilitation and Social Integration (Cirris), Québec, Canada. [3]Grand Valley State University, Grand Rapid, USA. [4]Université de Bordeaux, Bordeaux, France, PhD Candidate

Learning objectives

At the end of this presentation, participants will be able to:

1. describe power wheelchair training approaches applicable for users with cognitive impairment
2. discuss whether a future power wheelchair user has learning potential
3. discuss how learning potential may be considered in terms of anticipating improvements in PWC performance

Abstract

Introduction. Power-wheelchairs (PWC) facilitate mobility, occupational engagement and social participation. Training future PWC users during PWC provision is a recommendation from the World Health Organization. However, individuals with cognitive impairment may be precluded from PWC provision before they get a chance to benefit from training.

Objectives. Identify PWC training approaches available to individuals with cognitive impairment; and explore the influence of training on PWC capacities and on cognitive scores for PWC users with cognitive impairment.

Method. A systematic revue of the literature was realized (MEDLINE, CINAHL, EMBASE, PsycINFO, Web of Science). Studies (inclusive of research designs) including PWC users (all ages) who received PWC training and reported PWC capacities and cognitive scores. Two authors independently screened study eligibility. Levels of evidence (*Oxford Center for Evidence-Based Medicine*) and methodological quality (*Mixed-Methods-Appraisal-Tool*) were noted. (PROSPERO, CRD42019118957)

Results. Ten studies were included, including two randomized control trials and six single research design. Five included children and two included older adults. Seven PWC training approaches were identified (from the most standardized to the most individualized). The ten studies reported significative improvements of PWC capacities after PWC training. Four studies presented that the cognitive scores also improved after training.

Conclusion. Acknowledging that individuals with severe cognitive impairment can improve their PWC capacities, people with severe cognitive impairment could not be precluded to PWC provision before they get a chance to improve their capacities. Next steps in research will be to identify the best learning strategies to train future PWC users with cognitive impairment.

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Presenter biography

Alice Pellichero is an occupational therapist. At the beginning of her career she worked in France in rehabilitation centers is neurology services with adults. She is currently conducting a clinical research project as part of the doctoral program in clinical and biomedical sciences at Université Laval (Québec City, Canada). She is attached to the Interdisciplinary Research Center for Rehabilitation and Social Integration (CIRRIS) and is under the direction of Dr. François Routhier (CIRRIS), Dr. Krista Best (CIRRIS) and Dr. Eric Sorita (Bordeaux University). The aim of her research project is to enhance powered mobility device provision through better assessment and training. Realization of this research will lead to the development of a novel PWC driving program that may improve access to PWC mobility for individuals who may have otherwise been excluded. In turn, successful PWC mobility could improve participation and quality of life for the individuals.

E15: Use of activity chairs/standing aids by people with disabilities: results from a Master thesis.

Naja Tidemann[1,2], Ph.D. Erika G. Spaich[1]
[1]Neurorehabilitation systems group, Department of Health Science and Technology, Aalborg University, Aalborg, Denmark. [2]VELA - Vermund Larsen A/S, Aalborg, Denmark
Naja Tidemann, PhD student
Ph.D. Erika G. Spaich, Associate Professor

Learning objectives

1. Have knowledge of the purpose of the activity chair and the standing aid.
2. Describe areas of use of the activity chair and the standing aid as well as the benefits of using these assistive technologies when performing activities of daily living by people with disabilities.
3. Discuss the users' satisfaction with these assistive technologies.

Abstract

Background: In Denmark 750,000 adults live with varying degrees of limited functionality due to mobility impairments. Municipalities grant them large quantities of assistive technologies, including activity chairs and standing aids, to alleviate the consequences of their impairments (1,2). The purpose of the activity chairs and standing aids is to improve the mobility and enhance the capability of the users to engage independently in activities of daily living.

Objective: To investigate the areas of use of the activity chair and the standing aid as well as the impact of using them when performing activities of daily living by people with disabilities living at home. Furthermore, to evaluate the level of user satisfaction.

Methods: Empirical data was collected from 22 users with two standardized research tools. IPPA (3,4) was used to gather information regarding the areas of use and the difficulty to perform activities of daily living from five users and part A of QUEST 2.0 (5, 6, 7) was used to evaluate user satisfaction by 17 other users.

Results: Regarding the areas of use, the activity chair and the standing aid were used in relation to 13 activities, among them cooking at the kitchen table, emptying and filling the dishwasher and the washing machine, and taking food in and out of the refrigerator. There was an overall improvement of the IPPA score when using these two assistive technologies during 2-4 weeks (20,83 [20 – 21] score before; 11 [10 – 11,25] score after, expressed as median [25 % - 75% quartiles]). Users ranked the level of satisfaction with the activity chair and the standing aid between satisfied and very satisfied.

Conclusion: The activity chair and the standing aid had a positive impact on helping users in their activities of daily living, which resulted on them being satisfied or very satisfied with their assistive technology.

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Presenter biography

Naja Tidemann (ntj@hst.aau.dk) has a bachelor degree in Occupational Therapy from University College of Northern Denmark (UCN) from 2014 **and a** MSc in Clinical Science and Technology from Aalborg University from 2017. She is currently employed at VELA – Vermund Larsen A/S and is enrolled as a PhD student at Aalborg University - Department of Health Science and Technology, Denmark. Her research interest is in the field of assistive technology and is currently working on a research project concerning effect measurements of activity chairs for people with disabilities.

E16: Tales from the field: My love affair with smart electronics.

Ms Jenni Dabelstein
Gizmo Rehabilitation, Brisbane, Australia,
Physiotherapist/Complex AT Prescriber

Learning objectives

1. Identify 3 key factors that indicate when smart electronics may enhance power wheelchair function and/or safety for power wheelchair users or carers.
2. Understand 3 clinical applications of smart electronics to enhance clinical outcomes.
3. Be able to utilise processes at assessment and fitting, to effectively prescribe and integrate smart electronic functions.

Abstract

Over the past 5 years, it has become much more common to prescribe power wheelchairs with multiple power seating functions, including tilt-in-space, backrest recline, legrest elevate and seat elevate. Hardware and software options are available that allow users even with severe physical impairments to both drive a power wheelchair and access power seating functions. The benefits of self-determination in mobility are now accepted as wide reaching, so shared control and supervised driving scenarios are also becoming more common. However, with complexity of power wheelchairs functions comes complexity of chair operations, which can make generating consistent and positive clinical outcomes more challenging.

My own experience is that, while complex power wheelchairs potentially offer incredible functionality, in practice they can be somewhat intimidating and overwhelming. This is particularly the case for users with any degree of cognitive impairment, where the use environment is often quite risk-averse and any mishaps may result in reduced opportunities for self-drive. Fortunately, in tandem with proliferation of advanced power wheelchair functions has come an array of smart electronic features that simplify operations and enhance safety. These include through-drive controls, memory seating, programmable smart actuators, both automatic and programmable safety features and advanced programming options. In my own clinical practice, I have fallen a little in love with smart electronics and regularly use smart features and programming to simplify operations for users and carers, and help to generate more consistently positive clinical outcomes. In this presentation I will explore some smart electronic features that I use regularly to make chair operations easier, simpler and safer for users and carers alike.

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Presenter biography

Jenni Dabelstein is a Physiotherapist who works exclusively as a prescriber and consultant in the area of prescribing complex assistive technology. Her special interests include biomechanics, specialised seating and all types of wheeled mobility, including sports wheelchairs. Jenni has worked within the disability sector for over 3 decades, in a great variety of roles, including clinical, research, consultancy, education and business roles. She has a depth of knowledge and experience regarding specialised equipment and the industry that surrounds it, as well as a range of formal qualifications. Jenni strives to bring formal assessment together with theory and practical knowledge in order to generate positive outcomes for her clients via the latest assistive technology. As well as running her busy private consultancy, Jenni is a current Board member of ARATA and a National Classifier in the Paralympic sport of Boccia, and continues to present regularly at industry workshops, seminars and conferences.

B13: An overview of wheelchair provision education in Canadian occupational therapy programs

Paula Rushton[1], Ed Giesbrecht[2]
[1]University of Montreal, University of Montreal, Canada. [2]University of Manitoba, Manitoba, Canada
Paula Rushton, Associate Professor
Ed Giesbrecht, Associate Professor

Learning objectives

On completion of the presentation, participants will be able to:

1. describe wheelchair education content provided in Canadian university OT programs
2. identify how Canadian curricula maps against the WHO 8-step process
3. discuss strategies to enhance wheelchair-related content in university programs

Abstract

In Canada, occupational therapists (OTs) play a central role in wheelchair service provision. Inadequate training during entry-to-practice professional education has been identified as a major concern worldwide in delivering proper wheelchair service (Fung et al., 2020; Giesbrecht et al., 2021). A survey of 21 Canadian OT and physiotherapy (PT) university programs reported marked variability in delivery of wheelchair skills education to students (Best et al., 2015). To address this issue, we undertook a project to develop a national profile of wheelchair education provision in Canadian university OT curricula and a strategy for addressing identified gaps. Educators from each OT program were invited to participate in the study. Educators from participating universities completed a single site-specific online survey regarding wheelchair service provision education in their curriculum. Survey data were mapped according to the WHO 8-step wheelchair provision process and time committed to teaching each step. Semi-structured interviews were then conducted with participants to confirm and complete the program-specific mapping. Twenty-eight educators from 13 of the 14 Canadian OT programs (93%) were enrolled. Participants ranged in age from 31 to 63 years (48 ± 8 years) and were mostly women (n=23) with full-time faculty member positions (n=15). Only the *Assessment* (mean = 7.2 hours) and *Prescription* (5.7 hours) steps were covered in all programs and were the most comprehensive. *Funding/Ordering* (n=12, 1.4 hours) and *Fitting/Adjusting* (n=11, 1.9 hours) steps were addressed in most programs, but with more limited coverage. About 75% of programs included *Referral* (n=10, 0.9 hours) and *Training* (n=10, 3.8 hours) steps, while just over half incorporated *Product Preparation* (n=7, 1.8 hours) and *Follow-up/Maintenance* (n=7, 1.1 hours) steps. There is considerable variability in the number of curriculum hours, methods of delivery, and methods of evaluation in Canadian OT curricula. Educators articulate multiple barriers to making and implementing curriculum improvements.

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Presenter biography

Ed Giesbrecht began working as an occupational therapist in 1994, developing a particular interest in assistive technology and wheeled mobility, serving as clinical specialist in an Assistive Technology clinic in Winnipeg, Canada. His research interest drew him to academia to pursue a master's and PhD degree. He is an Associate Professor in the department of Occupational Therapy at the University of Manitoba. His research focuses on strategies to address wheelchair mobility skills and training, improving entry-to-practice education, and winter mobility.

Paula Rushton is an Associate Professor in the School of Rehabilitation, Occupational Therapy Program at the University of Montréal and a researcher at the CHU Ste-Justine Research Center. Her research is focused on measurement, intervention, knowledge translation and education related to improving the wheeled mobility of both adults and children through an improved wheelchair service provision process. From the measurement, intervention and knowledge translation perspective, Rushton's expertise lies in the domains of wheelchair skills and wheelchair confidence. From the education perspective, Rushton has been working with the International Society of Wheelchair Professionals to enhance wheelchair content in health care professional university curricula globally.

B14: The design requirements of telehealth wheelchair and seating assessment service for Aotearoa: A mixed methods analysis of stakeholder views.

Dr Fiona Graham[1], Dr Pauline Boland[2], Ms Sally Wallace[1], Ms Bernadette Jones[1], A/Prof Will Taylor[1]
[1]University of Otago, Wellington, New Zealand. [2]University of Limerick, Limerick, Ireland
Dr Fiona Graham, Senior Lecturer
Dr Pauline Bolan, Lecturer
Ms Bernadette Jones, Lecturer
A/Prof Will Taylor, Lecturer

Learning objectives

1. Learners will appreciate the socio-technical and technology acceptance factors influencing uptake of telehealth service design for wheelchair and seating assessment.
2. Learners will gain insight into the perspectives of wheelchair users on current in person wheelchair assessment services in New Zealand and of the potential for telehealth service delivery.
3. Learners will reflect on their own potential use of telehealth, in their current roles as wheelchair user, assessor, manager or service funder.

Abstract

Telehealth is often proposed as a means to improve equity of access to services for those living rurally, and those with complex health or disability needs [1]. COVID19 has seen an unprecedented shift to the use of telehealth internationally. However research evidence on the effectiveness of telehealth remains minimal, particularly for those with complex disability and rehabilitation needs. The presentation demonstrates a robust analysis of the design requirements of a telehealth service from the perspective of multiple stakeholders viewpoint, particularly wheelchair users, and Māori [3,4].

Purpose: To determine the design requirements of a tele-health wheelchair assessment service for key stakeholders in complex wheelchair and seating assessment, with particular attention for Māori.

Methods: Mixed methods using electronic survey, followed by interview and focus groups.

Results: Surveys were completed by 114 stakeholders including wheelchair users, their family members, assessors, technicians and managers. Twenty three assessors and 19 wheelchair users took part in a combination of interviews and focus groups. Telehealth assessment was anticipated to improve service quality, particularly the timeliness of services (52/92, 57%) and prioritisation of the urgency of assessment (71/92, 77%). Māori wheelchair users largely had infrastructure in place for telehealth assessment (10/11, 91%) and held positive expectations of it. Focus groups and interviews with assessors and wheelchair users indicated eight themes highlighting issues with current in-person service delivery, the potential and pitfalls of tele-delivery.

Conclusion: Substantial dissatisfaction with current wheelchair assessment services among wheelchair-users provides context to the successful design of a telehealth assessment service. Training in conducting

telehealth wheelchair assessment is needed that incorporates culturally safe communication practices and support of wheelchair-user autonomy while identifying solutions that achieve wheelchair-user goals.

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Presenter biography

Fiona Graham is a Senior Lecturer with the University of Otago teaching postgraduate interprofessional rehabilitation. Her research areas include telehealth in rehabilitation, knowledge translation and participation focused interventions, particularly for paediatric populations. She resides in Christchurch, New Zealand.

C15: Postural asymmetries, pain, and ability to change position of children with cerebral palsy

Mrs Jackie Casey[1,2], Dr Andreas Rosenblad[3], Associate Professor Elisabet Rodby-Bousquet[1,4]
[1]Lund University, Lund, Sweden. [2]Belfast Health & Social Care Trust, Belfast, United Kingdom. [3]Uppsala University, Uppsala, Sweden. [4]Centre for Clinical Research, Västerås, Sweden
Mrs Jackie Casey, Advanced Practitioner Occupational Therapist
Dr Andreas Rosenblad , Statistician
Associate Professor Elisabet Rodby-Bousquet, Physiotherapist

Learning objectives

Upon completion of this presentation, participants will be able to:

1. Identify how postural asymmetries are present in children with cerebral palsy across all levels of gross motor skills
2. Describe the associations between having postural asymmetries and the ability to change position in sitting and supine
3. Report the prevalence of pain experienced by these children with cerebral palsy
4. Describe the relationship between having postural asymmetries and having pain

Abstract

Purpose: To examine any associations between postural asymmetries, postural ability, and pain for children with cerebral palsy in sitting and supine positions.

Methods: A cross-sectional study of 2,735 children with cerebral palsy, 0-18years old, reported into the Swedish CPUP registry. Postural asymmetries, postural ability, the gross motor function classification system levels I–V, sex, age and report of pain were used to determine any relationship between these variables.

Results: Over half the children had postural asymmetries in sitting (n= 1,646; 60.2%) or supine (n=1,467; 53.6%) as reported on the Posture and Postural Ability Scale. These increased with age and as motor function decreased. Children were twice as likely to have pain if they had an asymmetric posture (OR 2.1–2.7), regardless of age, sex and motor function. Children unable to maintain or change position independently were at higher risk for postural asymmetries in both supine (OR 2.6–7.8) and sitting positions (OR 1.5–4.2).

Conclusions: An association was found between having an asymmetric posture and ability to change position in sitting and/or lying; and with pain. The results indicate the need to assess posture and provide interventions to address asymmetric posture and pain.

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Presenter biography

Jackie Casey works as an Advanced Practitioner Occupational Therapist in specialised seating in the Rehabilitation Engineering Centre, a regional service for Northern Ireland. Employed 3 days per week in this service by Belfast Health & Social Care Trust. Here I guide local therapists into interpreting postural assessments into optimal wheelchair seating systems that enable persons with complex physical disabilities and their families (where appropriate) to optimise their ability to independently function, engage in everyday life, and have fun.

Currently studying 2 days/ week on PhD with Department of Clinical Medicine – Orthopaedics, Lund University. Undertaking registry-based research with a population of Swedish children with cerebral palsy (CP) aged birth to 18 years. Primary focus of my research is an exploration of the relationship between postural asymmetries, deformities and contractures, pain, and ability to change position upon supine lying, sitting and independent wheelchair mobility of these children.

C16: Their voices: What caregivers say about sleep systems for their children

Ms Jane Hamer
Rehabilitation Teaching and Research Unit (RTRU), Otago University, Wellington, New Zealand. Waitemata District Health Board (WDHB), Auckland, New Zealand, Paediatric Physiotherapist and Clinical Leader of Physiotherapy, WDHB

Learning objectives

1. Identify 4 themes emerging from the study regarding caregivers experience of implementing sleep positioning systems in children with neurodevelopmental disabilities
2. Identify 2 facilitators to successful use of sleep systems
3. Identify 2 barriers to successful use of sleep systems

Abstract

Neurodisability is defined as 'a group of congenital or acquired long-term conditions attributed to impairment of the brain and/or neuromuscular system that create functional limitations' (1). Muscle imbalance, weakness, and spasticity impact gross motor ability, may cause asymmetry leading to hip displacement, scoliosis and contractures which impact on pain, sleep, participation, activity and functional aspects of everyday life for both the child and their family (2). 24hr postural management (24hr PMP) is an intervention used to support children with complex neurodisability address body positions across their whole day, typically with equipment in sitting, standing, walking and lying, but also includes surgery, medication, Botox, splinting, and active exercise (3). Sleep systems are one aspect of 24hr PMP, and are individualised high or low tech lying equipment aimed at supporting the body in neutral lying positions. Some International Guidelines have influenced the adoption of 24hr PMP (4,5,6), with research on this intervention focused mainly on musculoskeletal alignment (7,8). However, there is limited evidence into the effectiveness of sleep systems and little on the families experience (9, 10, 11), and despite the practice recommendations, clinical experience indicates variance in caregivers' engagement with and adherence to this approach.

Method: A Masters by Thesis is currently being undertaken to explore caregivers experience of implementing sleep systems, and identify barriers and enablers to use. Using Interpretive Descriptive methodology, purposive sampling recruited eight caregivers from the wider Auckland region (New Zealand), with semi-structured interviews undertaken. Data is being analysed with themes emerging of caregivers experience of implementing sleep positioning systems

Results: Emerging themes, and barriers and facilitators to the use of sleep systems will be described. This study aims to contribute to the body of knowledge in the field of night-time postural care as this may help inform clinical practice and improve care for this population.

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Presenter biography

Jane Hamer is a paediatric physiotherapist and also the Clinical Leader of Physiotherapy (part-time), for WDHB (West Auckland and North Shore of Auckland). She has worked with children for 25+years, and is currently undertaking a Masters in Rehabilitation at Otago University.

D18: Choosing cushion protection over skin protection?!

Carlos Kramer
Vicair, Wormer, Netherlands
International Educator

Learning objectives

1. Upon completion of this session, attendees will be able to understand that moisture at the skin cushion interface affects both the barrier function and inflammatory response of loaded skin, making is more vulnerable to PU occurrence
2. Upon completion of this session, attendees will be able to understand that support surfaces with a microclimate management function show significant lower skin hydration levels compared with support surfaces without a microclimate management function
3. Upon completion of this session, attendees will be able to understand that the focus should be shifted from protecting the cushion against moisture to protecting the patient against moisture to prevent MASD and PU development

Abstract

The skin performs a variety of important physiological roles including protection from environmental exposure, preservation of internal homeostasis and thermoregulation. The moisture barrier is an essential component of this function. Moisture- Associated Skin Damage (MASD) pathophysiology is related to both recurrent chemical and physical irritation to the skin barrier, triggering inflammation and subsequent skin damage. The association between prolonged exposure to skin surface moisture and irritants to changes of mechanical skin properties of the skin and underlying tissue is linked with the risk of pressure ulcer development with the increase of the coefficient of friction and tissue stiffness changes. Moisture at the skin cushion interface affects both the barrier function and inflammatory response of loaded skin, making it more vulnerable to PU occurrence.

Support surfaces with a microclimate management function show significant lower skin hydration levels compared with support surfaces without a microclimate management function. When cushions were tested with a cover, the moisture dissipation over time increased relative to a similar cushion due to the wicking properties of the cushion cover.

Prolonged contact between skin and the moisture leads to hyperhydration, erythema and even breakdown of the skin barrier, making the skin more vulnerable for MASD and PU development. Therefore, the focus should be shifted from protecting the cushion against moisture to protecting the patient against moisture to prevent MASD and PU development.

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Presenter biography

Carlos Kramer specialised himself in seating and positioning through gaining practical experience whilst working for long term care centres, rehabilitation centres and rehab vendors. His educational background is in physics and before pursuing his passion in the industry, he spent 7 years teaching in schools on all levels. He expanded his knowledge of seating and positioning through his close relations and now colleagues Sharon Sutherland-Pratt, Bengt Engström and Bart Van der Heijden. Carlos is the head of education at Vicair since 2012 and continues to combine his expertise in teaching and passion for seating to provide high quality education in the field worldwide.

D19: COVIDisruption: evolving home-based MWC skills training to full telerehabilitation delivery

Ed Giesbrecht[1], Dr. Krista Best[2], Dr. Francois Routhier[2], Dr. Celine Faure[2], Dr. Julie Faieta[2]
[1]University of Manitoba, Winnipeg, Canada. [2]Université Laval, Quebec, Canada
Ed Giesbrecht, Associate Professor

Learning objectives

On completion of the workshop, participants will be able to:

1. describe factors that create barriers to wheelchair skills training ;
2. identify benefits of peer trainer and eHealth approaches to skills training;
3. discuss how an eHealth training intervention can be effective in a mid/post-COVID context.

Abstract

Many individuals receive a manual wheelchair (MWC) to address mobility impairment, yet they experience restricted social participation and mobility because they lack *skills* to independently, safely, and effectively use their MWC (Smith et al., 2016). Access to comprehensive *MWC training* is constrained by expense and limited availability of skilled therapists, demands of patient or clinician travel, and lack of community-based training opportunities, particularly in rural areas (Best et al., 2016). Alternative and disruptive rehabilitation approaches are required that are clinically effective, cost-effective, and sustainable (Giesbrecht & Miller, 2017). Two strategies have demonstrated the potential to reduce burden on the healthcare system: delivery in the community via a mobile device training app and use of peer trainers. These approaches are compatible and synergistic to ameliorate training issues among MWC users in a way that is cost-effective; delivered in an optimal time and context; and in a sustainable way. *Training to Enhance Adaptation and Management for Wheelchair users* (TEAMWheels) was initially developed as a 4-week, community-based program integrating in-person peer-led and independent eHealth home training components. Our purpose was to *evaluate the effect* of TEAM Wheels on participation, MWC skill capacity, self-efficacy and quality of life in an RCT design. Shortly before implementation, the COVID-19 pandemic created conditions where in-person training and data collection became impossible. In response, our team rapidly reconfigured TEAM Wheels to be delivered entirely via eHealth. The peer-training component was modified to be delivered using a secure teleconferencing application using the same computer tablet as the home training application. Data collection was adapted with a variety of online, telephone and secure teleconferencing options to meet specific participant needs. This presentation will describe the TEAM Wheels intervention elements, detail the strategies employed to adapt the intervention mid-course into eHealth delivery (while respecting COVID-19 precautions), and provide preliminary study findings.

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Presenter biographies

Ed Giesbrecht began working as an occupational therapist in 1994, developing a particular interest in assistive technology and wheeled mobility, serving as clinical specialist in an Assistive Technology clinic in Winnipeg, Canada. His research interest drew him to academia to pursue a master's and PhD degree. He is an Associate Professor in the department of Occupational Therapy at the University of Manitoba. His research focuses on strategies to address wheelchair mobility skills and training, improving entry-to-practice education, and winter mobility.

Dr. Krista Best is an Assistant Professor in the Faculty of Medicine at Université Laval and a Quebec Health Research Foundation Junior 1 Scholar at the Centre for Interdisciplinary Research in Rehabilitation and Social Integration in Quebec, Canada. She dedicates 90% of her time to her research in mobility, social participation and adapted physical activity. Dr. Best has expertise in developing and evaluating community-based wheelchair skills training programs for manual and power wheelchairs, including clinician-led, peer-led and mHealth approaches to training. As a Canada Vanier Scholar during her PhD, she published the first evidence for peer-led approaches to wheelchair training. While most of her research has focused on adults, she has recently begun to investigate best practices in children and youth. A member of the Wheelchair Skills Program editorial committee since 2001, Dr. Best continues to inform the evolution of the Wheelchair Skills Program.