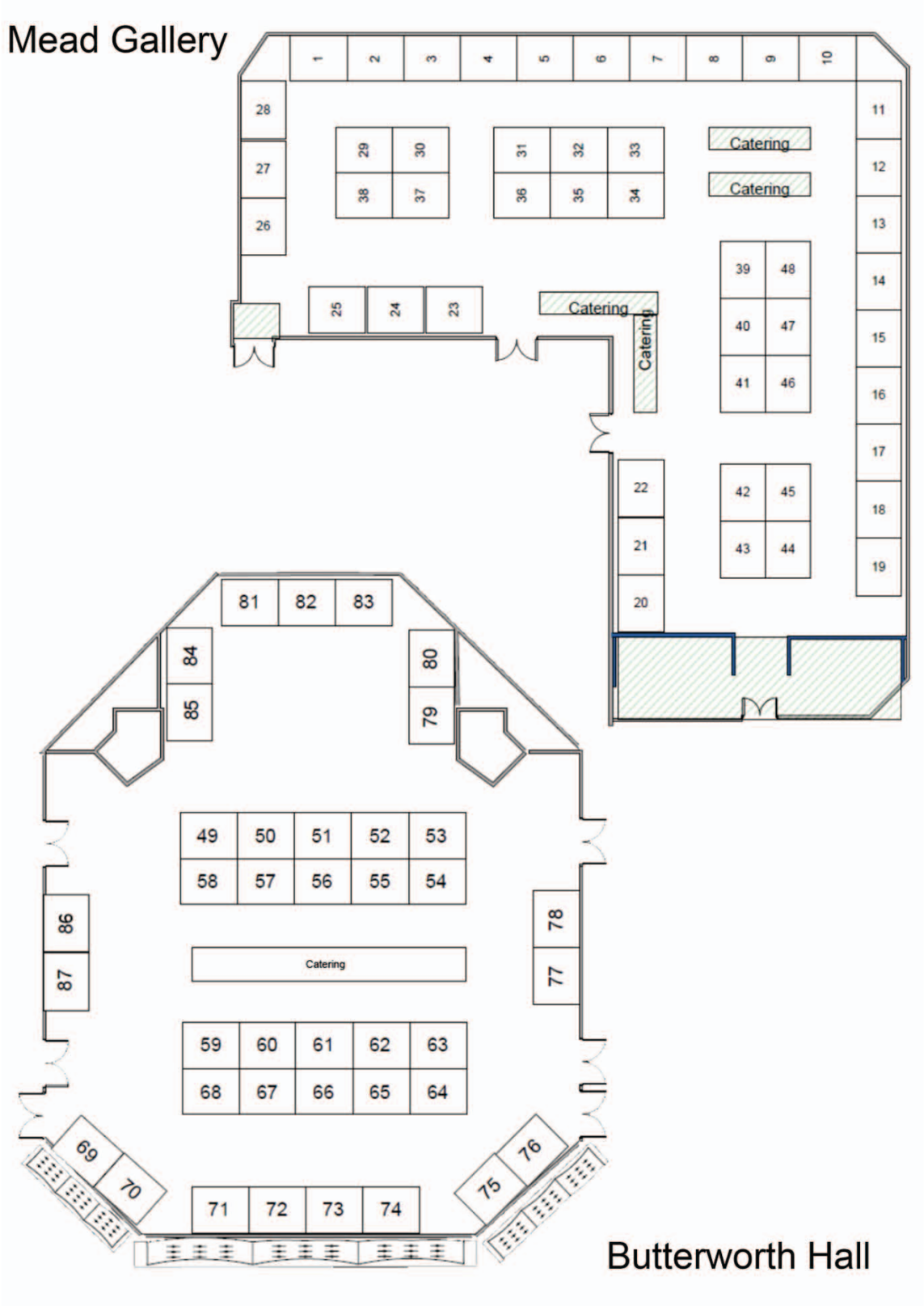
NATIONAL TRAINING EVENT 2011

Exhibition Catalogue and Abstracts of Conference Proceedings

Warwick University
14th and 15th April 2011

www.pmguk.co.uk

EXHIBITION PLAN



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EXHIBITING COMPANIES

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Active Controls

Stand: 52

597 Mantua Blvd.
Sewell,
NJ 08080

Tel: Michael Flowers 001-856-981-0480
Email: info@ActiveControls.com
Website: www.activecontrols.com

Active Controls designs and distributes innovative solutions to improve the operation of wheeled devices. A start up company, Active Controls was founded in 2011 and boasts a combined 80 years of experience in the mobility industry and a passion for improving the user-experience for wheeled devices of all kinds.

For 2011, Active Controls brings forward a breakthrough idea, the JoyBarÔ – a new alternative to joystick controls for power wheelchairs that is safer and easier to use. The patent-pending JoyBar will soon be available in one and two-handed versions in the 3rd quarter of 2011.

Represented by: Michael Flowers and Craig Sweetlove

Active Design Ltd

Stands: 37 and 38

68K Wyrley Road
Birmingham
B6 7BN

Tel: 0121 326 7506
Fax: 0121 327 8807
Email: sales@activedesign.co.uk
Website: www.activedesign.co.uk

Active Design develops and manufactures equipment for a twenty-four hour approach to postural management based upon the well-established and ongoing research programme at Chailey Heritage Clinical Services. The design of the equipment is based on a thorough understanding of the theoretical and practical requirements of the management of posture for people with moderate to severe motor impairment. This unique approach to solving postural equipment problems ensures functional ability is maximised.

Represented by: Jo Jex and Paul Hewett

Assistive Partner Limited

Stand: 59

Bordesley Hall Business Park
The Holloway
Alvechurch
Worcestershire
B48 7QB

Tel: 0844 335 6791
Email: info@assistivepartner.co.uk
Website: www.assistivepartner.co.uk

Assistive Partner has more operational experience in managing Community Equipment and Wheelchair Services and specifying their IT systems than any other single organisation. We have been directly involved with the management of over sixty services in the last decade.
That experience is all in our new UNIQUS Enterprise software for you to share.
UNIQUS Enterprise is like having a virtual team in a box. All ready to call on whenever you need.
It's been uniquely developed to run entire operations, particularly where track & trace records are important in successfully managing products and services.
Use UNIQUS online. Save money. Increase efficiency. We're ready when you are.
Check us out on stand 59 and take away some goodies too.

Represented by: Ian Slaughter (Director) and Julian Cobbledick (Director)

Bartram Associates Ltd

Stands: 67 and 68

First Technicare Division
Unit 10 Acorn Production Centre
105 Blundell Street
London
N7 9BN

Tel: 0207 609 8761
Fax: 0207 607 1062
E-mail: ftsales@bartrams.net
Website: www.firsttechnicare.com
Website: www.bartrams.net

Bartrams specialise in the manufacture, supply and maintenance of the specialised innovative equipment for the NHS including wheelchairs, cushions, beds and mattresses. All our wheelchairs and cushions can be adapted and made to measure to suit individual patients. The products range from bariatric to paediatric uses covering all risk categories. Our newest addition to our Gemstone wheelchair cushion range is Pearl which is an extremely low profile and light weight gel cushion which is only 3 cm thick. It has a unique type of gel that is laminated between two layers of high density, pliable foam.

Represented by: Chris Rose and Kay Oldroyd

BES Rehab Ltd

Stands: 23, 49, 50 and 51

131 South Liberty
Lane
Ashton Vale
Bristol BS3 2SZ

Tel: 0845 1300 237
Fax: 0845 1300 238
Email: info@besbiz.eu.com
Website: www.besbiz.eu.com

Stand 23 BES Rehab Assessment Tools

BES Rehab is presenting its two primary assessment tools: the FSA range of pressure mapping systems and the SmartWheel. The FSA pressure mapping systems come in a range of different sized mats for different applications from seating, to beds, to prosthetics. Just launched is a stretch mat that addresses issues around 'hammocking'.
The SmartWheel is a fantastic tool for therapists and clinicians to analyse and improve the way in which people propel themselves in their wheelchairs. Being able to perform this kind of analysis means that therapists can prescribe and adapt the wheelchair and the seating solution to help prevent injury, and thereby ensure safety and better social integration for the wheelchair user.

The rest of the BES Rehab team can be found downstairs on Stands 49-51, where they are offering solutions around posture management.

Stand 49-51 BES Rehab Posture Management

This year on the BES Rehab stand we are promoting our ability to bring together a collection of world-class products from our portfolio, and combine these with our knowledge and expertise to offer complete seating solutions. We are highlighting our new paediatric backs alongside our breadth of appropriate secondary supports for use with children's wheelchairs. This is part of our approach to seating solutions that can go from home to school, and can adapt as children grow up and their needs change.

To find out more about our paediatric, adult, and bariatric products, and the solutions that they provide, and have a sneak peek preview of the new Bodypoint Catalogue, visit us at stand 49-51. Also join us upstairs at stand 21 to review our assessment tools.

Represented by: Mark Amos, Stephen Cavanagh, Linsay Stevenson, Shirley McKenna, Ryan Pearson and Alex Capewell

Blatchford Ltd

Stand: 27

30 Atlas Way
Atlas North
Sheffield
South Yorks
S4 7QQ

Tel: 0114 263 7900
Fax: 0114 263 7901
Website: www.blatchford.co.uk

Blatchford Seating is a progressive and innovative custom seating manufacturer and clinical service provider to UK NHS Wheelchair Services & Ireland.
We pride ourselves on our clinical rather than sales approach to seating provision, making sure that each individual client gets the best possible assessment and seating solution from our wide range of products and partnership provided items.

Represented by: Richard Earl (Seating Manager), Martin Denby (Seating Clinician), Ed Earl (Seating Clinician), Ken McCrea (Clinical Services General Manager), and Caroline Desjardins (Wheelchair Therapist)

C & S Seating Ltd

Stand: 32

19 Stirling Road
Castleham Industrial Estate
St Leonard's on Sea
East Sussex
TN38 9NP

Tel: 01424 853 331
Fax 01424 854 018
Email: info@cands-seating .co.uk
Website: www.cands-seating.co.uk

Established since 1991 C & S Seating Ltd has been supplying postural control to both the NHS and the private sector. Our range of positioning aids includes T Rolls and Log Rolls both available in waterproof and Terrycloth fabric. These rolls assist in the control of posture in lying. We also supply the Alternative Positioning Roll (APR) in two sizes, this is on a sturdy but light frame and is designed if greater control of adduction is required. To see our full range including the inflatable T Roll, designed for ease of packing at holiday time, along with the Knee/Leg support visit our web site.

All our fabrics are chosen with comfort and ease of care in mind and have been tested to European and UK flammability standards, BS EN ISO 12952 parts 1-4

Represented by: Trevor Platt and Catherine Scott

Chunc Posture and Mobility

Stands: 11 and 12

Tarsmill Court
Rotherwas
Hereford
HR2 6JZ

Tel: 01432 377512
Fax: 01432 377516
Email: sales@chunc.co.uk
Website: www.chunc.com

Chunc is committed to providing world class posture and mobility solutions for young people. Our range of attendant controlled wheelchairs is designed in close collaboration with health care professionals, carers and parents. This continuing partnership enables our design team to create unique products that effectively provide for an extensive variety of needs experienced by disabled young people and those involved in their care.

We will be introducing the Chunc Tilt and Recline and our new I-Back at PMG NTE.

We will introduce you to our QLK-100, a collaborative venture with QStraint which makes life easier for the parents when using an access vehicle.

We look forward to talking to you and helping you find solutions for your clients.

Attending the conference as delegates and available on our stand: Tim Dines, Danny Green, Mike Cherrington, Ruth Cowen and David Willis.

For assessments and demonstrations please call 01432 377512 and speak to Jane, Lucie or Jess who will arrange a date and time suitable for you and your family.

Represented by: Tim Dines (Business Development Manager), Ruth Cowen (Sales London East and East of England), Danny Green (Sales London West and South East England), Mike Cherrington (Sales West Midlands and West Country), and David Willis (Sales North of England)

Consolor Ltd

Stands: 7, 8, 9 and 10

Unit A3 The Forelle Centre
Black Moor Road
Ebblake Industrial Estate
Verwood
Dorset
BH31 6BB

Tel: 01202 827650
Fax: 01332 730233
Email: info@consolor.co.uk
Website: www.consolor.co.uk

Consolor Ltd was born through a desire to provide the best possible seating solutions with a service to match. At this year's conference we would like to invite you to take a walk through the widest range of 'true' special seating solutions available from just one company. This vast range includes off the shelf combinations, fully bespoke solutions, dynamic innovations, through to our new adjustable carved foam systems, all of which are fully supported by our exciting new range of accessories.

We are also delighted to be able to showcase the most universal interfacing solution on the market today, which will transform the way we interface all of our seating systems onto (and transfer between) wheelchairs.

We look forward to you putting us to the test.

Represented by: Kieran Cheer, Simon Keeling, Steph Bayley and Russell Mears

Days Healthcare, a division of Patterson Medical Ltd

Stands 5, 6, 25

North Road
Bridgend Industrial Estate
Bridgend
CF31 3TP

Tel: 01656 664700
Fax: 01656 664750
Email: info@dayshealthcare.co.uk
Website: www.dayshealthcare.co.uk

Days Healthcare is a leading provider of daily living aids in the UK. The company is a trading division of Patterson Medical Ltd, an international distributor of specialist medical equipment which incorporates the Days, Homecraft, Mobilis Rolyan and Physio-Med brands.

Offering more than 12,000 product lines designed for independent living and mobility, we provide everything from simple and practical tools for everyday activities, to more sophisticated aids such as electric wheelchairs and portable mobility scooters.

Whether you're looking for lightweight manual wheelchairs designed for part-time use or high-performance customised electric chairs, we offer a wide range of manual and power wheelchairs to suit all requirements. Visit us on stands 5, 6 and 25 in the Mead Gallery to find out about our latest range of chairs, cushions and accessories, and to view demonstrations from our experienced team of wheelchair experts.

Represented by: Brent McIvor (Senior Wheelchair Specialist), Eric Cooper (Wheelchair Specialist), Mark Riggs (Product Manager), Arron West (Sales Manager), Jon Lewis and Nick Cooke

Dynamic Europe Ltd

Stand: 22

Finepoint Way
Kidderminster
Worcestershire
DY11 7FB

Tel: 01562 826600
Fax: 01562 824694
Website: www.dynamiccontrols.com

Dynamic Controls specialises in the medical mobility market. We are committed to enhancing the lives of people with disabilities. Our philosophy is to combine an understanding of mobility product users and our R&D expertise to help deliver the best possible solutions. We understand that people have different needs and wants, and that informs our thinking when designing products.

Our products range from simple to use, drive only controllers to modular control systems that can be customised to suit a wide range of needs. We have also recently launched the iPortal which allows the user to operate an iPhone or iPad using the wheelchair joystick. All our products are renowned for reliability and quality and we offer an unrivalled level of support.

Dynamic Controls is a global organisation with corporate headquarters in New Zealand and regional offices in the United Kingdom, North America and Asia.

Represented by: Claudia Bundhoo, David Porter and Jim Lucas

G-code Technology Limited

Stand: 18

12 Hadrian Close
St. Albans
Hertfordshire AL3 4JY

Tel. 01727 810 270
Fax: 01727 853359
Mobile: 07821 761 517
(Robert Wright)
Email: info@g-codetechnology.co.uk
Website: www.g-codetechnology.co.uk

G-code Technology Limited – Medicarve Systems

G-code Technology Limited is a supplier of EU and US made industrial CAD/CAM/CNC machines.

Our 30 years of industry experience has enabled us to channel our expertise in the use of CNC to provide products for use in the medical market-place.

G-code Technology is proud to launch MEDICARVE, an engineering solution for the production of highly specialist seating.
Medicarve offers a fast, more accurate, clean technology and above all lower costs outcomes in an easy to learn package.

Medicarve Digital Seating Systems is comprised of a 3D handheld portable scanning device, CADCAM software package for importing scanned data, incorporating the ability to edit or modify cushion shapes and generate toolpaths.
The 3 axis CNC machine comes with a choice of bed sizes and generous –axis gantry heights. Installation and training is all part of the package.

Represented by: Robert Wright (Sales Director) and Graham Orritt (Technical Director)

Gel Ovations Europe Ltd

Stand: 64 and 65

2 Stover Road
Yate
Bristol
BS37 5JN

Tel: 01454 285071
Fax: 01454 314501
Email: info@gelovationseurope.com
Website: www.gelovationseurope.com

Gel Ovations Europe offers a complete range of Gel Wheelchair Accessories offering the user complete comfort and positioning where needed. All of our products look great, are easy to fit, leave a professional finish and provide pressure relief where it's most needed. We also supply the unique Synergel Gel Pad that offers enhanced pressure relief in many situations where cushions just can't reach. This now comes in many more exciting shapes and sizes including a toilet style cut out and 'Stick On' spinal pads. This year we are also launching the FORTA brand of Wheelchairs. Watch out for the FORTA TRIAL 4x4 Off Road Wheelchair!!

Represented by: James Payne, John Payne and Jim Mabbutt

Gerald Simonds Healthcare Ltd

Stand: 66

9 March Place
Gatehouse Way
Aylesbury
Bucks
HP19 8UA

Tel: 01296 380200
Fax: 01296 380278
Email: info@gerald-simonds.co.uk
Website: www.gerald-simonds.co.uk

Gerald Simonds is one of the leading national suppliers of wheelchairs and pressure relieving seating systems in the UK. Our dedicated seating and mobility specialists work with you, the healthcare professionals, to provide the best possible solution for the end user. With seating from Jay and Vicair and wheelchairs from all the leading manufacturers in the world including TiLite, we really do offer the best in mobility and seating solutions. Do visit our stand during the exhibition where our specialists will be on hand to meet you and chat about our products and services.

Represented by: Allison Moore, Caroline Smith, Sandra Jolliffe-Grimes, Lisa Parry, Beverley Keicher, Andy Roberts and Barbara Byrom

Greencare Mobility

Stand: 75 and 76

Simcox Court
Riverside Park Road
Middlesbrough
TS2 1UU

Tel: 01642 223322
Fax: 01642 223313
Email; Sales@greencaremobility.co.uk
Website: www.greencaremobility.com

Greencare make individually built wheelchairs to meet a range of needs. We are increasingly ‘chosen’ when other chairs have failed to suit. With chair seat sizes from 13” up to 24” and occupant weights to 28 stone (175kg) the Greencare chair can be configured to meet most needs. Despite being individually built to a clients’ exact measurements and with national support for assessment and handovers Greencare chairs are often less expensive than market alternatives. That’s one of the advantages of a small UK manufacturer over the large importers. Greencare are a service based company – a friendly voice at the end of a phone, helpful staff, next day delivery is possible and chairs can be supplied on ‘approval’.

Represented by: David Batty, Colin Scarsi and Heather Simpson

Handicare Ltd Mobility

Stands: 16 and 17

82 First Avenue
Pensnett Estate
Kingswinford
West Midlands
DY6 2 FJ

Tel: 0845 0745 945
Fax: 0845 0745 946
Email: sales@handicare.co.uk
Website: www.handicare.co.uk
Website: www.handicare.com

Handicare are fast growing into a major supplier of mobility products, stairlifts, bathroom safety and moving & handling equipment.

Our wheelchairs use the exclusive, highly adaptable Sedeo seating system which provides step less adjustment in every direction for perfect posture and support.

Our wide range of both manual and powered wheelchairs include some now recognised models such as Alex, Puma, Beatle, Ibis XP, Ibis XC, Cirrus, Legend, Emineo & Exigo. These wheelchairs are modular and offer the healthcare professional huge benefits with simple adjustability and flexibility. This system delivers impressive on-going cost effectiveness as just one wheelchair can be adjusted to fit practically any patient. The benefits for a busy assessment centre are that time and money are saved daily.

A huge range of postural, positional seating and back supports mean that these products are becoming increasingly successful with professional healthcare assessors country wide.

Please come and see us today

Represented by: Darren Legg & Barrington Burrell

The Helping Hand Company

Stands: 86 and 87

Bromyard Road
Ledbury
Herefordshire
HR8 1NS

Tel: +44 (0)1531 635678
Fax: +44 (0) 1531 635670
Email: sales@helpinghand.co.uk
Website: www.lowzone.co.uk

With over 25 years experience in postural support, our extensive range of static pressure management delivers off the shelf contouring, shaping and position to deliver good seating posture: addressing balance, stability; distributing pressure over the greatest area possible to prevent damage and maximising function. Clinically endorsed and prescribed through specialist wheelchairs services around the UK, you are guaranteed an assured purchase direct from the manufacturer to your client, all under one roof.

Simple, fast and effective - long lasting, low maintenance, in over a million combinations. All products within the range positively support outcomes of a pressure ulcer prevention care plan.

We also provide a range of support services:

- Local supported pressure mapping clinics
- Quick and easy online ordering
- Specials are our standard, live prescription builder and customised design facilities at the touch of a button
- Full line stock management
- Learnzone: Training for all service users

Represented by: Lara Bryant (Sales and Marketing Manager), Sarah Swann (Field Sales Manager), Jenny Harding (Area Sales Manager North), Mitch Preedy (Area Sales Manager Midlands), and Jackie Middleton (Area Sales Manager South)

Invacare Ltd

Stands: 13, 14, 15, 79, 80, 81, 82, 83, 84 and 85

Pencoed Technology Park
Pencoed
CF35 5HZ

Tel: 01656 776222
Fax: 01656 776220
Email: uk@invacare.com
Website: www.invacare.co.uk

Stands 13- 15 Invacare Specialist Rehab

With the continued expansion of the Specialist Rehab team we have developed our product portfolio to offer great value and innovation. Our aim is to create the strongest and most clinically effective seating and positioning line in the industry.

This year the Specialist Rehab team will be showcasing the well established Pro-tech and Flo-tech range along with the highly customised Freedom Designs seating systems. In addition, following our recent partnership with James Leckey Designs the Spectra XTR with Leckey KIT will be on display.

Visit our stand to enter the prize draw for your chance to win a FREE, full delegate place at the 2011 ESS conference in Dublin, which includes accommodation.

The Specialist Rehab team now have the capability to address a vast spectrum of client needs so come visit us in the Mead Gallery, stand numbers 13-15.

Invacare Specialist Rehab Stand, represented by: Mark Babb, Adrian Turner. Andy Boyes, Steve Nash and Robert Wheeler

Leckey Products, Leckey representatives: Kay Thomas, Stephen Kirkpatrick, Mark Draper, Laurence Buchmann and Kayleigh Culter-Moore.

Stands 79 – 85

Invacare is a world-leading manufacturer and distributor of mobility products, specialist seating and homecare equipment designed to maximise independence and promote active lifestyles. Showcasing on the mobility stand will be the very latest in powerchair innovations that offer cost effective solutions for your clients.

In addition, there will be new products from the Rea range including the recently launched Rea Focus and the improved Azalea Base featuring Rea's innovative Dual Stability System; plus the renowned Action NG range; and exclusive active chairs from Küschall.

This year Invacare's comprehensive Specialist Seating range including Leckey will be available on stands 13-15 in the Mead Gallery.

Innovation and value from Invacare.

Mobility Stand, Invacare representatives: Kevin Humphries, Peter Hubbard, Dave Stock, Mark Wing, Sandy Burrell and Peter Land

International Seating & Mobility Ltd

Stands: 31 and 36

Unit 2, Westside Cambrian Industrial Estate
Coed Cae Lane
Pontyclun
CF72 9EX

Tel: 01443236990
Fax: 01443239355
Email: info@intsm.com
Website: www.INTSM.com

International Seating and Mobility has both the products and techniques to aid your clients who use a wheelchair and can help you provide a better service to all your customers. We are focused on the provision of the correct clinical solution for the wheelchair user. All of the products have been developed to meet specific roles within the clinic. We are sole UK distributors of V-trak hardware, a hardware range that is used widely in attaching bespoke systems such as Matrix and foam carve. New hardware and headrests will be on show at PMG NTE stand.

Represented by: Dr Steve Bannister, Rodney Palmer, Andrew Edwards and Russell Penman

Karomed Ltd

Stand: 24

Tel: 01460 66033
Email: pressurecare@Karomed.com
Website: www.Karomed.com

Karomed have been manufacturing cushions for over 25 Years. The most popular cushion provided by Karomed is still the patented TRANSFLO RANGE. This range of cushions are compared to many other manufacturers' cushions at up to three times the cost of the Transflo Range.

Karomed are able to provide a standard cushion which will support patients up to 32 Stone with no restrictions to the depth or width of the cushion. The range of cushions provided through Karomed are from a cut foam thus preventing a restricted choice of bespoke sizes; additionally charging no extra for any size up to 21" in overall diameter. Should any larger size be requested a minimal charge is added.

Karomed have always been keen to provide free assessment stock for Wheelchair Services. Visit our stand and book your meeting.

'Start making your assessments more cost effective'

Represented by: Mike Igoe and Paul Mills

Matrix Seating Ltd

Stand: 62

28 Greville Park Avenue
Ashtead
Surrey
KT21 2QS

Tel: 01372 274456
Fax: 01372 274456
Email: sales@matrixseating.com
Website: www.matrixseating.com

Matrix Seating is a small company that focuses on new and innovative products. We launched the Heads First range of head supports last year and the response from anyone using them has been very good. Three basic shapes with numerous combinations enable the optimal fit to be achieved for every client. After R&D with a range of clients we believe this product should be considered by every wheelchair service. Please also take a look at the Matrix Seating System which we redesigned 8 years ago which gives adaptability in seating and the potential for orthotic spinal correction.

Represented by: Sylvia Baird (or Ron Clarke) and Steve Cousins

Otto Bock Healthcare Plc

Stands: 69 and 70

32 Parsonage Road
Englefield Green
Egham
Surrey
TW20 0LD

Tel: 01784 744900
Fax: 01784 744901
Email: bockuk@ottobock.com
Website: www.ottobock.co.uk

Otto Bock Healthcare Plc are manufacturers of mobility products. Our expertise and technologies have set standards throughout an entire market sector because they are focused on a single purpose: to help people maintain and restore human independence. We manufacture paediatric buggies, manual wheelchairs, power chairs, walking frames. At our special seating site in Leeds we manufacture varying kinds of seating solutions to help the individual be supported and comfortable in their day to day activities. Should you wish to speak to a member of our team please visit us on stand 69/70.

Represented by: Simon Tempest, Mark Parry, Joanne McConnell, David Barton, Graeme Goody, Neeta Patel, Roland Fitch, John Uren and Matthew Sanders

PG Drives Technology Ltd

Stand: 19

10 Airspeed Road
Christchurch
Dorset
BH23 4HD
United Kingdom

Tel: +44 (0)1425 271 444
Fax: +44 (0)1425 272 655
Email: sales@pgdt.com
Website: www.pgdt.com

PG Drives Technology is the world's leading manufacturer of control systems for Mobility vehicles & is an established supplier of controllers for other specialised electric vehicles. PG has a design & manufacturing facility in the UK, with sales, support & repair facilities worldwide.

We are pleased to exhibit the new VSI, VR2 & R-Net systems at PMG NTE 2011. With this range of products we can offer the most compact drive-only integral unit, through to a modular rehab system catering for complex seating options, multiple driving devices, multiple outputs to drive environmental controls, communication aids & robotic aids, IR control of devices around the home & Bluetooth Mouse control. R-Net has also been designed such that it recognises new functions & modules automatically so the system evolves as technology advances, and both VR2 & R-Net have been designed so that key components are field serviceable to reduce cost & down time.

Represented by: Melanie Matthews (Sales Account Executive) and Nick Dermiland (Applications Support Technician)

Qbitus Products

Stand: 28

Springwood Cornmill
Rawroyds Road
Holywell Green
Halifax
West Yorkshire
HX4 9ED

Tel: 01422 377775
Fax: 01422 311750
Email: sales@qbitus.co.uk
Website: www.qbitus.co.uk

Qbitus Products is one of the UK's leading suppliers of both bespoke and standard specialised cushioning and harnessing.

Outstanding in quality price and service

Represented by: Glenn Smith and Neil Robson

Quantum Rehab

Stands: 39, 40, 41, 46, 47 and 48

32 Wedgewood Road,
Bicester,
Oxon,
OX26 4UL

Tel: 01869 324 600
Fax: 01869 323 070
Email: sales@pride-mobility.co.uk
Website: www.quantumrehab.co.uk

Over the last few years Pride Mobility has been developing its Quantum Rehab business in the UK. As a result of these changes, we are in the best position possible to offer you some exceptional powered mobility products at prices you may find hard to resist.

Our dedicated Product Specialists will be on hand during the show to take you through our products and pricing, so why not visit us at Stands 39, 40, 41, 46, 47 and 48. You never know, five minutes of your time during the conference could just save you countless amounts of time and money moving forwards.

Represented by: Jim Gaw, John Wrigley, Nick Allen, Simon Cook, Richard Sharman and Francis Stafford

R82 UK Ltd

Stands: 29 and 30

Unit D4A Coombswood Business Park
Coombswood Way
Halesowen
West Midlands
B62 8BH

Tel: 0121 561 2222
Fax: 0121 559 5437
Email: Uk.enquiries@r82.com
Website: www.r82.com

R82 manufacture a range of highly specified and multi functional mobility products designed to meet the needs of children with complex physical needs. A key design goal is to make these products easy to use and maintain. R82 support the assessment, prescription and set up of their products with expert product advisors who will attend clinic appointments and work together with occupational therapists and rehabilitation engineers to achieve the best results for the child in your care. After sales support and guidance on recycling and refurbishment are also offered. Training for stores and technical staff is provided free of charge. Come and talk to us today: we may have the solution you have been looking for.

Represented by: Kieron Slocombe (Managing Director), Jon Preater (Sales Manager), and Tony Griffiths (Mobility Product Advisor)

Radcliffe Rehabilitation Services Limited

Stand: 63

5 The Sidings
Top Station Road
Brackley
Northants
NN13 7UG

Tel: 01280 700256
Fax: 01280 703428
Email: enquiries@radclifferehab.co.uk
Website: www.radclifferehab.co.uk

Radcliffe Rehabilitation Services has been established since 1993, supplying mobility and rehabilitation products to hospitals, wheelchair services, specialist centres and private individuals throughout the UK.

We are a contracted supplier to the NHS and have been an active member of the British Healthcare Trade Association for many years. Our manufactured products include specialist wheelbases and postural control seating, positioning wheelchairs, pressure relief products, refurbishment and servicing. In recent years we have developed our portfolio to include specialist seating products for Social Services and the care home market.

The Radcliffe team includes management expertise and a wealth of knowledge of the NHS and Social Services markets, together with experienced seating assessors, trained engineers and support staff.

We believe in providing a professional, friendly and speedy service, with care and attention.

Represented by: Simon Thomas (Specialist Seating Advisor & Product Sales) and Annette Reed (General Manager)

Rainbow Mobility Ltd

Stand: 45

Oaktree Court
Mill Lane
Ness, Wirral
CH64 8TP.

Tel: 0151 353 1234
Fax: 0151 336 3652
Email: info@rainbowmobility.com
Website: www.rainbowmobility.com

Rainbow Mobility are exhibiting two wheelchairs new to the UK market.
Veldink manufacture made-to-measure children's chairs, and the Veldink policy is "No Limits" - the belief that almost no disability should exclude a child from using a Veldink wheelchair.

Dynaproducts.nl manufacture a unique new seating system that controls function without intrusive visible support. It is also highly pressure relieving, distributing weight over a large surface area.

We have been working on a Tilt in Space wheelchair that will grow with the user, can be used as a stand alone product or interfaced with an MSI or seating system. The difference being that this chair must fold for transport. We have our prototype on show and look forward to your comments.

Represented by: Brian Young

Remploy Healthcare Ltd

Stands: 3 and 4

Sheffield Road
Whittington Moor
Chesterfield
S41 8NJ

Tel: 0845 146 0600
Fax: 01246 453 881
Email: sales@remployhealthcare.com

Remploy has launched the exciting new Dash Series. We have the fastest growing chair in the NHS, which is the Dash Lite. The Dash Lite is the lightest standard, crash tested wheelchair available to the NHS. The new intelligently designed semi-modular Dash 4Life which, as well as being stylish, has a unique design that allows industry leading configuration. We have also added the ultra compact Dash Stowaway. The Dash series was designed by using expert advice from occupational therapists and bio-engineers.

As a British company, Remploy has been specialising in providing sustainable employment for disabled people for more than 50 years. We still manufacture products in the UK and pride ourselves on this. Remploy continues to offer the steel chairs as part of its range and these come with an industry leading 3 year warranty.

Represented by: Steve Jones (General Manager), Andrew McMillan (Springburn Factory Manager), and John Robertson (Business Development Manager)

RMS Limited

Stands: 71, 72, 73 and 74

Rehabilitation Manufacturing Services Limited
Medway House
277 Gillingham Road
Gillingham
Kent
ME7 4QX

Tel: 01634 578881
Fax: 01634 581456
Email: sales@rms-kent.co.uk
Website: www.ineedawheelchair.co.uk

RMS have been manufacturing and supplying an extensive range of products and services for over 40 years to the NHS and private markets. Our product range and services have grown over the years whilst maintaining our high level of service. We are able to offer seating and buggy assessments without any hidden charges.

We are showing some of our existing products which include paediatric buggies, wheelchair accessories and seating systems.

We are also launching two completely new products:-

- Invicta Paediatric powered wheelchair - a compact wheelchair that is fully adjustable for growth and has a wide range of accessories to meet most individual's needs
- Comfort Company range of positioning seat and backrest cushions; these are available from paediatric to bariatric sizes and come with a manufacturer's lifetime guarantee

We look forward to seeing you on stands 71, 72, 73 & 74

Represented by: Wayne Cotter, Mike Richardson, Darren Wilson and Simon Frayne

G&S Smirthwaite Ltd

Stand: 42

17 Wentworth Road
Heathfield
Newton Abbot
Devon
TQ12 6TL

Tel: 01626 835552
Fax: 01626 835428
Email: magdalenapokorska@smirthwaite.co.uk
Website: www.smirthwaite.co.uk

G&S Smirthwaite are celebrating 25 years of designing and manufacturing equipment for children and young people with special needs. Our extensive portfolio includes products to assist children in the areas of seating, standing, changing & showering, toileting & bathing, therapy as well as sensory integration.

For twenty-five years, our equipment has been used worldwide in a range of environments from home to school.

Please visit us on stand 42 to discover our highly popular Whirl as well as our new and exciting Juni – 'the clever little chair' - and Strato, a cool looking postural correction chair that children and teenagers just love!

Represented by: Brent Prince and Gina Joslin

Soft Options (Computer Systems) Ltd

Stand: 33

Amisfield House
Amisfield Road
Hipperholme
Halifax
West Yorkshire
HX3 8NE

Tel: 01422 204500
Fax: 01422 204501
Email: tina@softoptions.co.uk
Website: www.softoptions.co.uk

Demonstrating BEST (Bringing Equipment Services Together) Version 10 the complete disability services management system with modules covering Wheelchairs, Prosthetics, Orthotics, Environmental Equipment, Communication Aids, Joint or Community Equipment, Offline Assessments and Orbital Prosthetics.

Soft Options have been providing healthcare solutions since 1991 with a growing user base throughout the whole of the UK, using BEST to Manage Stock, Service Delivery, Finance & Budgeting, Clinical Assessments, Document Management, Contractor Compliance and new modules for 18 week Performance, Outcomes and Objectives and the new ‘Procurement Model’.

Many new features will be on show, with a warm welcome to both new and existing customers.

Represented by: Kevin Clegg and David Rolph

Southwest Seating & Rehab Ltd

Stands: 77 and 78

Email: sales@matrixseating-sws.co.uk
Website: www.matrixseating-sws.co.uk
Email: sales@neowheelbase.com
Website: www.neowheelbase.com

Southwest Seating invites you to our stand to meet our experienced team to discuss all issues concerning special seating. With over 25 years in the business we have considerable knowledge and experience. We understand the challenges which are present when seating the complex client. Our central products, the Matrix Seating System and the NEO Wheelbase are durable, adjustable and recyclable, important features for us all as the NHS looks for more cost effective and long lasting solutions.

Represented by: Stuart Morling, Clinton Davin, Paul Deacon and Joanna Morling

Specialised Orthotic Services Ltd

Stand: 60 and 61

Unit 127/8, Fauld Industrial Park,
Fauld Lane,
Tutbury
Staffordshire. DE13 9HS

Tel: 01283 520400
Fax: 01283 520401
Email: enquiries@specialorthotic.com
Website: www.specialisedorthoticservices.co.uk

Specialised Orthotic Services are one of the leading special seating providers in the UK offering a comprehensive service for a whole range of seating and mobility products.

With our expert team of seating specialists, SOS currently provide a complete service for the assessment and provision of special seating equipment to over 50 Wheelchair Services throughout the UK. With a comprehensive range of custom moulded and modular seating systems to the Mojo and Miko wheelbase systems, we have a comprehensive range of posture & mobility equipment aimed at solving problems related to postural management.

We constantly develop new products and continue to add to our wide range available to the disabled community. Researched and developed during 2010 we are showcasing new products including the Flexiseat and BB Plus which have been designed with the needs of a growing child in mind and the Miko buggy, a tilt in space buggy base for special seating equipment.

Represented by: Ross Andrews and Gordon McQuilton

STM Healthcare

Stands: 34 and 35

STM Healthcare
Azalea Close
Clover Nook Industrial Park
Alfreton
Derbyshire
DE55 4QX

Tel: 01773 830 426
Fax: 01773 830 427
Email: stmhealthcare@recticel.com
Website: www.stm-healthcare.co.uk

A DIVISION OF RECTICEL LIMITED

We are international manufacturers of renowned static pressure care products and solutions to the healthcare markets worldwide. The ‘Classics’ & ‘Neo’ cushion ranges promote effective pressure distribution whilst the ‘Salisbury’ range also encourages better postural management. Whether you need budget or bespoke products, we are confident that we have the products to suit your needs.

After listening to the demands of our customers, STM Healthcare have developed an innovative NEW range of comfort cushions. These clinically evaluated pressure distribution cushions have been designed to provide greatly improved patient comfort and posture.

Represented by: Paul Howes, Stuart Henderson, Leighton Mitchel and James Barratt

Sumed International UK (ltd)

Stands: 1 and 2

Integrity House
Units 1 and 2
Graphite Way
Hadfield
Glossop
SK13 1QH

Tel: 01457 890980
Fax: 01457 890990
Email: sales@sumed.co.uk

Sumed are delighted to be showcasing their full range of pressure relieving brands including Roho®, TempurMed®, Flowform® and Action®.

We will also be featuring two new exciting cushions, Flowform®Ultra 90 and Primenest®2 - both offering exceptional pressure relief and user comfort.

Throughout the show we will be conducting live interface pressure mapping sessions on the stand with the revolutionary X-Sensor® pressure mapping system and demonstrating how to make the most of this technology within your service.

We will also be demonstrating our updated, stylish range of Fortuna® heavy duty wheelchairs which can accomodate client weights up to 50 stones.

The friendly, knowlegeable Sumed team will be on hand throughout the show to answer any questions you may have and we will be running our popular “Win a hamper” competition - so come and see us on stands 1 and 2 in the Mead Gallery!

Represented by: Graham Collyer, Philip Charlton Smith, Diane Hargrove, Sue Bradley, Roger Gilson and Hannah Jackson

Sunrise Medical

Stands: 54, 55, 56, 57 and 58

High Street, Wollaston
Stourbridge
West Midlands
DY8 4PS

Tel: 01384 446666
Fax: 01384 446644
Email: enquiries@sunmed.co.uk
Website: www.sunrisemedical.com

Sunrise Medical will be exhibiting our full NHS manual and powered wheelchair and wheelchair seating ranges. This includes two new powered wheelchairs, three new manual wheelchairs and improvements to our award winning J3 back.

Represented by: All Area Sales Managers, Simon Collins and Chris Taylor (Product Specialists for Power and Manual Mobility), and Jim Barrat (VP Commercial Operations)

Tendercare Ltd

Stand: 53

PO Box 3091
Littlehampton
West Sussex
BN16 2WF

Tel: 01903 726161
Fax: 01903 734083
Email: info@tendercareltd.com
Website: www.tendercareltd.com

Tendercare are a leading manufacturer and supplier of special needs pushchairs and seating systems.

The popular Snappi & Swifty Pushchair ranges will be on show. We will be launching our new lightweight “Snazzi” tilt in space pushchair which will offer an incredible 10° - 50° of tilt in space with an easy to operate folding system. All our pushchairs and chairs combine an unrivalled level of features whilst retaining outstanding recreational looks. Tendercare continue to provide high quality products at affordable prices

Represented by: James Adams & Ian McNeil

Trulife Limited

Stand: 26

41 Amos Road
Meadowhall
Sheffield
S9 1BX

Tel: 0114 261 8100
Email: info@trulife.co.uk

Trulife is a global manufacturer of orthopaedic & physical rehabilitation products for orthopaedic, podiatric, orthotic and therapy professionals.

On display the 'Relax' wheelchair cushion range, designed for medium to high risk users. The range boasts 8 innovative styles including the Gel Cell & Gel Cell G2 cushions which utilise a combination of Air & Gel Technology, providing effective pressure relief and comfort to high risk users. The Deep Comfort & Duogel cushions utilise a Gel & Foam material in addition to the Trio cushion manufactured from a Viscoelastic Slow Recovery foam, specially designed to conform to the shape of the user.

Also on display will be our wide range of walking aids (manufactured and warehoused at our Sheffield site) along with FlexyFoot, a revolutionary ferrule which uses air-sprung technology to provide grip and shock absorbency on all terrains (including slippery and uneven surfaces).

Come visit us on Stand 26!

www.pmguk.co.uk

ABSTRACTS

OF

PRESENTATIONS

Registered charity number: 1098297

Thursday 14th April 2011
9.30am

Opening Plenary Session
PL1

Human Rights, the Disability & Equality Act 2010, and the Provision of Assistive Technology: do they fly in the face of health & safety/risk management?

Diego Soto-Miranda
Barrister at Law

Summary
A quadriplegic barrister's legal analysis of the titanic clash between Human Rights law and Health & Safety regulations, occasioning the conflict between the Clinician's professional/ethical vocation to improve the life quality and comfort of his/her client on the one hand, and the legislative constraints that inhibit the Clinician's otherwise innovative brilliance on the other hand.

Aim and Objectives
To offer a potential compromise aimed at reconciling the existing conflict between the Clinician's professional/ethical duty to their client, and the legislative apparatus inhibiting the Clinician's discharging of that duty; by re-"constructing" (interpreting) the true objective meaning of the legislative provisions. The "conciliatory" objective is the analytical result of a unique perspective offered from the vantage point of a service user and intended "beneficiary" of both, the Clinician's innovative brilliance and the legislative provisions' protection.

References
Consumer Protection Act 1987
Regs. 2.27.; 7.1.4.1.7.; 6.2.3.; and, 6.2.4.Safety Standards: ECE R44.04
Medical Devices Regulations 2002 (SI 2002 No 618)
Regulation 5(1); and, Annex I, paras. 1 to 6, Medical Devices Directive (93/42/EEC)
ss.20; s.21(1) and (2); s.149(1); s.150(1) and (3); and, s.150(5) Equality Act 2010
ss. 2; 3; and, 4 Human Rights Act 1998
Articles 3; 8; and, 14 European Convention on Human Rights
Re A Child (AP) [2008] UKHL 66
R v Secretary of State for the Home Department, ex parte Findlay [1985] AC 318.

Thursday 14th April 2011
from 10.15am

FREE PAPERS, FP1 – FP5

FREE PAPER 1
Provision of Buggies/Wheelchairs for Behavioural Control

Presenter: Krystyn Jarvis
Additional Authors: Jo Laybourne and Ben Hackett

Summary
Production of a joint document collaborating with Social Care Children Disabilities Team in Shropshire, addressing the need to evaluate our approach in the use of equipment for children with challenging behaviour who do not have restricted mobility problems. This resulted in establishing a new referral protocol and agreed risk assessment.

Aims and Objectives
Buggies issued to manage challenging behaviour can lead, inappropriately, to a lifetime in mobility devices where teenagers and adults may have an increased risk due to their strength, size, stability and general manageability. The Wheelchair & Posture Service is now trying to educate carers and professionals when requesting the service of the long-term implications and restraint issues when issuing a buggy, also exploring other avenues of behavioural management.

Background
Guidance from DoH (July 02) identifies the use of mobility equipment to restrain the mobility of an ambulant person, and the use of belts and harnesses, as 'restrictive intervention'. The document accepts there are circumstances when action is necessary, and the Wheelchair & Posture Service is dedicated to doing everything possible to improve/maintain the mobility and functionality of individuals and their families.
This guidance and others led to a meeting in 2008 to discuss these issues, aiming to establish best practice. Members of this meeting: *Shropshire Wheelchair and Posture Service Manager, Wheelchair Therapist, Clinical Governance and Audit, Named Nurse for Safeguarding, Caldicott Guardian.* Following this meeting, changes were made to current practice with Wheelchair & Posture Service individually assessing each referral for a buggy in clinic, enabling the team to discuss the long term implications of providing equipment in these circumstances with parents/carers. A Risk Assessment was developed and used in clinic assessments. A further meeting held on 21st April 2009 evaluated the Risk Assessment form and discussed other ways to improve practice, educate professionals/parents, and investigate ways to create a multi-disciplinary approach as laid out in current guidance. Attendees were: *Wheelchair Service Manager*, *Wheelchair Therapist*, *Rehabilitation Engineer, Parent of buggy user with behavioural needs*, *Occupational Therapist (Social Services)*, *Paediatric Physiotherapist (Community)*, *Clinical Psychologist.* Historic/current practice was discussed, and implications of providing wheelchairs following buggy use were highlighted by the Wheelchair & Posture Service, also clarifying that the aim is to improve/maintain mobility and functionality of individuals and their families, not to limit the provision of equipment.

Discussion points were:

- What support is available for family members?
- What is involved in behavioural management – are there common approaches nationally?
- How does equipment affect the management of behaviour?
- How much can we compromise the individual to improve general management by family/carers?

The Clinical Psychologist gave some background on his service, discussing the need to investigate the routes of behaviour, particularly motivational factors. The route of referral was discussed, and the current Common Assessment Framework (CAF) approach raised, as well as the 'Team around the Child' meeting (TAC) to bring separate services together for a holistic multi-disciplinary approach. All agreed the Wheelchair & Posture Service should be involved in these meetings to raise awareness of parents and professionals.
Follow-up meetings (9th June, 6th July) with Shropshire Social Care were held to further discuss issues raised with the *Team Manager Care Provision*, *Senior Social Worker, Wheelchair Service Manager*, *Service Development Officer.* It was agreed that behavioural programmes are key to the management of these children, and any issue of buggies/wheelchairs should not be agreed in isolation. Re-education/ awareness raising of all professionals involved with the children, and parents' needs to be addressed. In particular furnishing parents with behavioural programmes/techniques from an early age so that problems do not escalate as the child grows.
A briefing session was held with key professionals to cascade current thinking.
A draft care pathway was created, which has since been modified following ongoing assessment requests.

Discussion
The Clinical Psychologist advised that restraint can prevent learning/risk-associated developments by removing them from valuable situations. Also that some children feel secure when they use lap belts and harnesses and this can influence their behaviour positively. This confirmed the individualistic approach required in these circumstances.
Case studies to illustrate e.g. Social Worker studied her caseload of 24:
7 were children who needed a wheelchair for mobility;
Remaining 17 all had severe learning disability and were on the autistic spectrum;
6 were using major buggies – all were very able physically, two would walk with the buggy attached to them if left, with the brake on, and they did not want to remain there.
She asked the remaining families why they did not use major buggies, and they all said they had stopped when their child outgrew them, or they thought it was not age appropriate. None had received any help or support with this, and of the 6 who were still using them the children ranged in age from 5 to 16, and no one had ever discussed with them the long term implications of the continued use of a major buggy, or that it could lead to a wheelchair in future.
There is a requirement for a multi-disciplinary risk assessment including identification of the extreme circumstances necessitating provision of restrictive physical intervention, and the risk and benefits associated with the equipment requested.
Additional use of this document for lapbelt/harnessing for seating in wheelchairs.

References
Sharon Paley, BILD. (2008) Use of Mechanical Devices: restrictive physical intervention
DoH. (2002) Guidance for Restrictive Physical Interventions.
North Lincolnshire PCT. (Unknown) Restrictive Physical Intervention Risk assessment

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FREE PAPER 2
Development of a proportional, force platform based and cost effective foot operated control device for a powered wheelchair

Presenter: Lee Morris

Summary
This project involved the design and build of a prototype proportional foot operated control device for use with powered wheelchairs. The target user group is mainly those suffering from Motor Neurone Disease who retain more function in their legs than in their arms, but who still require powered mobility.

Aims and Objectives
To develop a cost effective, foot operated control device for a powered wheelchair that has the following features:

- Proportional speed and direction control
- Mode control
- Interfaces with existing wheelchair control electronics
- Ability to be manufactured on site as demand is likely to be low
- Suitable for indoor and outdoor use
- Can be used effectively whilst wearing shoes

Background
The aim of this project was to specify, design, build and test a prototype device that would allow a powered wheelchair to be controlled using the occupant's foot. There are devices on the market that fulfil this need but they were deemed too expensive by the local wheelchair service. Additionally, there are question marks over the ability of the target user group (TUG) to make effective use of the existing devices due to functional limitations. The primary TUG consists of a subset of patients diagnosed with Motor Neurone Disease (MND) who have lost useful function in their arms but retain use of at least one foot. Other groups may also benefit from this work.

Around 25 years ago the Nuffield Orthopaedic Centre developed a foot controlled feeding device, called the 'Magpie Feeder' which was aimed at a similar TUG. Using a mechanical system, it translated foot and leg movements into movements of a spoon at table top level. The majority of people who tried this system got on well with it and were able to successfully feed themselves. This being the case, a similar group of people might be able to control a wheelchair with their foot.

Method

The specification for the prototype device was developed in consultation with Occupational Therapists and Clinical Engineers who have clinical experience with the TUG. The existing foot operated wheelchair control solutions were evaluated, and a new method of user input developed.

The basic system comprises a simple, in-house manufactured, foot sized force platform for user input, and a microcontroller based interface system to interpret these inputs into control signals that the existing wheelchair control system can understand. Essentially, the system uses the force platform inputs, and manipulates these to emulate a standard analogue joystick. This is then connected to the existing wheelchair control system as an additional controller.

Result

The basic functionality of the system has been proven – it is possible to drive a wheelchair using the prototype system. Calibrating the system for the differing needs of users has not been undertaken at this stage and mode control has yet to be implemented.

Further work for this project includes implementing a calibration and tuning routine to adapt the system to the needs of different users, and trialling the system with those users.

Discussion

The core functionality of the system has been proven, i.e. a wheelchair can be driven with one foot using the force plate based system developed during this project. The component costs are suitably low, and the ability for the device to be manufactured in-house on an as-needed basis should help to minimise production costs.

Not all of the design criteria have been met at this stage, but their implementation has been considered in the choice of components thus far used. Adding these features involves extending the current system's hardware, and altering the microcontroller programming. The microcontroller was chosen to ensure that it had sufficient connections to add a second force platform and some form of digital display. It currently appears that a separate system would have to be built to allow for wheelchair mode selection controls, but integration with the current system may be possible with further work.

Further work is required and includes:

- Risk assessment and safety testing
- Ability to calibrate and tune the system to individual users' needs
- Investigating the force platform performance over time, especially with regard to sensor drift
- Weather proofing the system to enable outdoor use

References
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Scope Website. [online] Available from: http://www.scope.org.uk/ (Accessed 11 July 2009).
Attali, Xavier and Pelisse, Francois (2001) *Looking back on the evolution of electric wheelchairs.* Medical Engineering & Physics, 23, pp. 735-743.
Nisbet, P (1996) Integrating *assistive technologies: current practices and future possibilities*. Medical Engineering & Physics, 18(3), pp. 193-202.
Felzer, Torsten and Freisleben, Bernd (2002) *HaWCoS: The "Hands-free" Wheelchair Control System."* ASSETS 2002 - Proceedings of the Fifth International ACM SIGCAPH Conference on Assistive Technologies, pp. 127-134.
Qin Baoquan, Wang Ningsheng and Yi Jianwen (2004) Foot *control direction wheeled chair.*

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FREE PAPER 3
Development of a fully mobile, strain gauged seating system for the assessment of forces imparted on the Mygo ™ seating system by children with special needs through daily activity

Presenter: Katika Samaneein
Additional authors: Dr Phillip Riches and Dr Peter Greene

Summary
Restrained extensor spasms may lead to a child having high contact forces with a wheelchair, causing pain and injury to the child. We have developed a fully mobile data acquisition system to measure the forces imparted on such wheelchairs during daily activity to quantify these forces.

Aims and Objectives
Using a Mygo ™ seating system from Leckey Ltd as a base, we have developed a mobile strain gauge data acquisition system that captures the forces and moments in specific wheelchair components during activities of daily living. In particular, the system aims to capture the peak loading associated with extensor spasms. The development has focussed on maximising force information, whilst reducing the size and weight of the data acquisition system.

Background
Cerebral palsy (CP) is a form of disability caused by damage to the developing brain of a baby either in the womb or after birth. Children with CP often have stiff, jerky movements and extensor spasms where their joints fully extend for a period of seconds before relaxing. Three-quarters of severe CP children need wheelchairs to aid their mobility. However, the high muscular forces that are exerted during an

extensor spasm may lead to the child having high contact forces with the wheelchair, causing pain and injury to the child. The design of such seating systems is therefore critical for the best care of these children. To improve that, a pre-requisite is to know the forces imposed on the seating system by the child during activities of daily living, and especially during an extensor spasm.

Very little quantitative research has been done to investigate the loads imparted on a wheelchair by such a population. That which has been done has used pressure pads, which do not convey any direction information, and have been laboratory-based [2-3]. Moreover, in both these studies the extensor spasms have been artificially stimulated. This paper is part of a larger research project in which the biomechanics of seated children with cerebral palsy and the forces imparted by them on their seating is investigated in real-life scenarios.

The current experimental design requires an innovative way of carrying out the strain gauge measurements. Around 100 strain gauges have been arranged on the chair's components which will determine forces and moments in all 3 dimensions in key components. The measurements include the passive properties of backrest, head support and footrest. Each gauge is sensitive to deformation in a certain direction, producing an output signal that is collected via a 40 channel data acquisition system including amplification. The data is continuously streamed to an ultra-mobile PC for permanent storage. Lithium-ion batteries, which are one third of the weight of a sealed lead acid equivalent, are connected to ensure full mobility and these provide power for data collection to occur for a period of up to 6 hours. There are six degrees of freedom of interest in this investigation, including shear forces, axial load, bending moments and torsion. Component calibration, using a biaxial (linear-torsion) Instron ElectroForce10000 materials testing machine, has been employed, together with geometrical information, to convert component strain into component stress. This calibration procedure has minimised crosstalk effects. An existing mathematical model of the seating system will then be used to reverse engineer in order to determine the loads applied by the body to generate these forces in the components.

The strain gauged chair will be used to continuously collect data for up to 6 hours of a typical day for participants with CP. The child will be observed from a distance, and their activity will be simultaneously logged in a diary to correlate the recorded data with the observed activity.

Discussion

We have shown that it is possible to develop a fully mobile data acquisition system that can record the strains experienced by a Mygo™ wheelchair during daily activities. The modified wheelchair has not been hindered in mobility, and is only increased in weight by 2.5 kg. We have overcome problems associated with miniturisation by the utilization of appropriate technology. A thorough calibration procedure has been able to convert surface strains into local stresses to understand the forces imparted on the wheelchair in key components.

The development of the wheelchair is the first step to answering our overall research question. We have simultaneously obtained ethical permission to use this wheelchair with the intended population. In this study, The West of Scotland Mobility and Rehabilitation Service (Westmarc), will identify current users of the Mygo™ chair, who will then be offered the opportunity to take part in this research. Upon volunteering, the participants will then decide the day which they wish to be monitored and, for that day, they will be given the strain-gauged seating system. An activity diary will be maintained during the monitored day, providing the important link between the activity and the forces experienced by the wheelchair.

References
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Brown, D., A. Zelwanger, and G. Bertoci, *Quantification of Forces associated with Episodic full body extenxor spasticity in children.* RESNA, 2001: p. 358-60.

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FREE PAPER 4

Wheelchair stability: development of a portable easy to use test system

Presenter: Dr Stephanie Wentworth
Additional authors: Rebecca Hughes and Dr Peter Theobald

Summary
Wheelchair instability incidents continue to be reported to the MHRA. Static stability testing of a wheelchair, seating system and occupant is easily achieved in the clinical area, but becomes more challenging when working in the field. This abstract reports the ongoing development of a truly portable wheelchair stability test system.

Aims and Objectives
Excellent systems already exist for testing wheelchair static stability outside of the clinical environment. Such systems tend not to be easily portable however; thus, they may present manual handling risks, and require prolonged periods for setup/dismantling. The aim of this work is to develop and validate a novel wheelchair static stability testing device for quick and efficient use by a sole professional, whilst working outside the clinical environment.

Background
Wheelchairs tipping in use continues to be a cause of incidents reported to the MHRA. Wheelchair stability is of primary importance, and to an active user it is a key to independence. Static stability testing regimes are described in ISO 7176-1:1999 Wheelchairs Part 1, although it should be remembered that this is a manufacturing standard. Existing static stability testing methods for wheelchairs are based either on the manufacturing standard, or the physics of force measurements.
Existing methods based on ISO 7176-1 require a tilt table to test the static stability of a wheelchair. The steel tilt test table is approximately one metre square, hence it presents considerable manual handling risks to the engineer or therapist if required to perform the test outside of the clinical environment. In such instances this table must be transported, sometimes being carried over relatively long distances, and then positioned, often in limited available space.
The wheelchair, seating system, and user are manoeuvred onto the tilt table and the angle of incline increased until the wheelchair system starts to tip or agreed limits have been reached. The wheelchair is positioned in its least stable configuration for

each test orientation. The static stability test done in this way can be frightening for the wheelchair user; however, it must be noted that some wheelchair users enjoy it! Other methods to assess stability using force sensors produce excellent results, but are complex to set up and dismantle, with limited portability.
This project is based on preliminary work presented at the IPEM Wheelchair Stability meeting in June 2008 on a truly portable wheelchair static stability testing system. Collaboration with Cardiff School of Engineering (Cardiff University) has generated a focussed design specification that will ensure the developed apparatus will meet the performance requirements of today's Clinical Engineer.
A predictive algorithm has been developed to determine the tip angle in the forward and reverse plane. Successful validation has already been achieved against a basic transit wheelchair and a Hybrid II anthropometric test mannequin. Current work involves the development of an accompanying 4-sensor force system, which it is hoped will eventually allow the engineer to use an expanded version of the algorithm to also assess static stability in a sideways direction.

Discussion
Preliminary work was presented at the IPEM Wheelchair Stability meeting in York in June 2008. This showed the need for, and feasibility of, a simple wheelchair stability testing system. It also clarified the advantages of such a system: greatly reduced manual handling risks, a safer and less stressful test regime for the wheelchair user, and simplicity of use.
This work has been taken further, and the device for wheelchair static stability testing developed so far is producing promising results with a basic transit wheelchair and Hybrid II anthropometric test mannequin. Further work will include side to side testing, and the use of more complex wheelchairs and seating systems with the Hybrid II anthropometric test mannequin.

References
MHRA, 2004.DB2004(2) guidance on the stability of wheelchairs.
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FREE PAPER 5

Propulsion efficiency and upper extremity longevity – a review of handrim options and related research

Presenter: Julianna Arva

Summary
Ever increasing varieties of handrim options offer reduction in upper extremity pain and increased efficiency. Scientific evidence suggests that their informed use will indeed make a difference. This presentation reviews available options, their benefits and disadvantages, and the applicable research.

Aims and Objectives
The aim of this session is to help the delegates familiarize themselves with the variety of handrim options available on the market today. We will review the benefits and disadvantages of these handrims, both from the clinical experience, as well as from a scientifically proven perspective. The importance of handrim selection will be emphasized, as well as visiting the long term consequences of using inappropriate propulsion interfaces.

Background
This session does not present research of its own, rather reviews currently available scientific literature related to handrims, propulsion efficiency, and upper extremity injuries of wheelchair users as it relates to their propulsion.
Many studies throughout the years have shown that active manual wheelchair users are likely to develop injuries, and/or experience pain in their upper extremities; in their shoulders, elbows and wrists. Some typical such secondary injuries are Carpal Tunnel syndrome, Rotator Cuff injuries, tennis elbow, etc. Studies estimate as many as two-thirds of manual wheelchair users may be affected. When pain in the upper extremities sets in, users experience complications in many areas of life: difficulty transferring in and out of the wheelchair, pain during overhead reach, etc. In more severe cases, surgery is needed, which of course means further pain, time out of work and everyday activities, potential need to transfer to power wheelchair, etc.
To help reduce the occurrence of upper extremity pain and injuries, manufacturers and research laboratories have developed and investigated a variety of interfaces. These interfaces can be grouped into several categories, depending on their chosen method to achieve the aim:

- Reduce the number of strokes needed (pushrim activated power assisted wheels)
- Reduce strength needed to achieve the same travel (geared hubs, power assisted wheels)
- Change the pattern of exertion of the upper extremities (lever type devices)
- Improve grip efficiency (coated handrims, thumb grips, etc.)

The benefits of many of the above options are backed by a number of studies investigating specific percentage of improvement in propulsion efficiency. Most experimental studies look at increased travel or velocity achieved by the same force applied to the rims, or reduced force needed to achieve the same travel and velocity. Many user opinions also testify to their advantageous nature, some in survey study format.
These devices are of course not without their trade-offs. Some are heavy, others might be difficult to assemble and disassemble. They are naturally more costly than

standard devices. Their maintenance might be more involved, requiring different types of expertise and tooling. When something goes wrong, more parts may need to be changed, making the repair costly.
The prescribing practitioner therefore ought to visit the need from a variety of angles. For one, reviewing the physical needs warranting the use of alternative propulsion interface (in which joint the problem occurs, or is it just a preventive measure, grip efficiency, etc.). There also needs to be a thorough review of environmental and maintenance concerns (how is the wheelchair being transported, is it taken apart by the user, etc).
Lastly, proper fit will be the primary concern. Whatever the handrim solution, it will only be of benefit if the axle position and the rest of the wheelchair are properly fitted to the client. With a generally well fitted wheelchair, such alternative propulsion solutions can indeed reduce the risk of upper extremity injuries to many users.

Discussion
When used and configured properly, alternative propulsion methods and hand grips on manual wheelchairs can significantly reduce the strength needed to propel the wheelchair.
Selection of such devices needs to consider their tradeoffs as well, such as possibly higher weight, disassembly, maintenance requirements and other similar concerns.
Such devices will only be truly beneficial if the wheelchair is properly configured, and the wheel is in the optimal position in relation to the user's upper extremity.
Several research studies testify to the need as well as to the benefit of alternative pushrim solutions.

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Thursday, 14th April 2011
from 2.15pm

Parallel Sessions

(PLEASE REFER TO YOUR CONFERENCE PROGRAMME FOR ROOM NAME/CODE FOR THE PARALLEL SESSIONS)

Parallel Session 1

NB: this is a 2 hour session and continues after tea break

Best Practice Guidelines: Transportation of people seated in wheelchairs

Presenter: John Tiernan

Additional Authors

Appleyard B, Technical Advisor, Unwin Safety Systems, England
Arva J, Ti-Lite Manager of Sales and Education, Europe
Bingham R, Rehabilitation Engineer, Royal Perth Hospital, Shenton Park Campus, Australia
Manary M, Senior Engineering Research Associate, University of Michigan Transportation Research Institute, USA
Simms CK, Center for Bioengineering, Department of Mechanical & Manufacturing Engineering, Trinity College Dublin, Ireland
Wretstrand A, Department of Technology and Society, Lund University, Sweden

Summary

This Best Practice Guideline (BPG) is the result of an international effort to collate elements of standards and guidelines together into one document in a manner that makes it clinically relevant and accessible to the lay person. The final draft of the document will be presented, and feedback invited from the floor.

Aims and Objectives

The aims and objectives are to provide guidelines with respect to safe transportation of wheelchair users who must remain seated in their wheelchair while being transported in a vehicle. The scope has been limited to road transport scenarios, and addresses issues under the categories of Roles and Responsibilities, Wheelchairs, Seating, WTORS and Vehicles. The objective of the workshop is to arrive at a mutually agreeable final wording for the document.

Background

In recent years PMG identified a need for evidence to justify the necessity for various seating and mobility interventions. Research and other levels of evidence, including expert opinion, exist to justify the clinical and practical appropriateness of these interventions. A working group of PMG members are putting together Best Practice clinical Guidelines (BPG), in a number of areas, based on available evidence. The *Transportation of People Seated in Wheelchairs* BPG have been under development since August 2009. This is the 4th draft version, the 2nd draft having been presented at the International Seating and Mobility Conference in Glasgow in June 2010.

Historically, the primary functions of a wheelchair have been based on an occupant's clinical need: general mobility, comfort, and postural support. To act as a seat in a motor vehicle is an additional consideration to be addressed by wheelchair manufacturers and equipment prescribers since safe transport for wheelchair users is a key element in an individual's ability to access medical facilities as well as participation in education, work and social interaction.

While it is the objective of each stakeholder to seek reasonable levels of safety for wheelchair seated passengers, variances are bound to exist. Wheelchair users will frequently have reduced skeletal strength due to injury or disability, and may have contractures or physical deformities that will lead to reduced injury tolerance. Such characteristics may also create difficulties with the accommodation and application of Occupant Restraint systems. Careful selection of the wheelchair and seating system by prescribers will play an important role in reducing risks to acceptable levels. At

times, however, the relevant recommendations and available equipment for safe transport may contradict the individual's seating and positioning needs. In such cases a Risk/Benefit Analysis will play an important part in the decision making process, as well as careful documentation thereof.
The purpose of this document is to summarise aspects of relevant standards and regulations, as well as to describe commonly accepted solutions to maximize safety and minimize risk levels pertaining to passengers transported in wheelchairs as vehicle seats during road transport.
The committee instrumental in the production of the document comprised the following individuals:

- Bob Appleyard, Technical Advisor, Unwin Safety Systems, England
- Juliana Arva, Ti-Lite Manager of Sales and Education, Europe
- Robert Bingham, Rehabilitation Engineer, Royal Perth Hospital, Shenton Park Campus, Australia
- Miriam Manary, Senior Engineering Research Associate, University of Michigan Transportation Research Institute, USA
- Ciaran Simms, Department of Mechanical & Manufacturing Engineering, Trinity College Dublin, Ireland
- John Tiernan, Senior Clinical Engineer, Enable Ireland SeatTech, Ireland
- Anders Wretstrand, Department of Technology and Society, Lund University, Sweden

The BPG was compiled on the basis of international standards, legislation and best practice from in and around the participating countries, together with feedback obtained from face-to-face group consultation as well as e-mail consultations. It is expected that the document will be reviewed and revised at regular intervals over the coming year in order to reflect research findings in the area, and changing technologies & practices.

Discussion
It is expected that those attending the workshop will have read the document **http://www.pmguk.co.uk/2011/abstracts/additional%20doc%20ps1.pdf** and be fully familiar with its content, and will have prepared feedback in advance of the workshop. The workshop will take the following format:

- Overview of document
- List of suggested amendments
- Grouping of amendment suggestions
- Prioritising of amendment suggestion groups
- Voting on amendment suggestions
- Decision on amendment suggestions
- Identification of any outstanding issues to be brought back to the BPG committee – hopefully there will be none!
- Plan for review of document

40 People attended the Glasgow workshop, and it is hoped that a similar number will be in attendance at this workshop to assist in the completion of this important work. It is anticipated this document will become the reference across the industry, and it's important therefore to have group consensus across as broad a base as possible.

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Parallel Session 2

Service provision – positioning beyond the wheelchair

Presenters: Lisa Ledger & Gail Russell

Summary
With the current challenges faced within health and social care provision, it is timely to begin to consider new ways of working. The authors intend to consider future models of provision for wheelchair services and others, particularly in relation to posture management, through participation in an interactive seminar.

Aims and Objectives
The broad aim of this seminar is to outline some of the major challenges facing service providers, in light of the changes to future commissioning of services and budgetary cuts and to discuss strategies/potential solutions. The focus will be discussion around the delivery of services for the more complex service users who present with posture, positioning and wheelchair needs, through an interactive forum.

Background
With the introduction of the White Paper 'Equality and excellence: Liberating the NHS' (2010) which amongst other things, gives GPs responsibility over the future commissioning of services, together with the current Department of Health review of wheelchair services, there are both opportunities and threats to be had for providers of services.
Within the seminar, the authors wish to consider the main policies and drivers in health and social care that impact on wheelchair services, and how these may be used positively to bring about change and innovation.
The focus will be around issues in relation to management of the more complex service user, with specific reference to posture management and related aspects, such as tissue viability and how these needs can perhaps be met in a more integrated and holistic manner.
One of the authors will describe key results and evidence gathered from a previous post held, in relation to posture management and future considerations for services in light of these results. In addition, the authors will outline the 24 hour posture management approach and its application within the field of complex disability, together with related tissue viability guidelines that impact on provision.
The seminar will be interactive and thought provoking with the aim of both participants and presenters offering potential solutions for future delivery from their own experiences.

Discussion
Currently within services, provision for posture management and related aspects is largely disjointed and often misunderstood. In the current political climate, with a national focus on wheelchair services and major changes to the way that services will be commissioned, there are opportunities for different ways of working. It is crucial that clinicians consider more innovative ways of working, and that commissioners of services understand the nature of complex, long term management for individuals, so that appropriate budgets can be pooled, and new ways of working modelled. The authors will offer an interactive and thought provoking seminar to address the key issues faced, and offer potential strategies and solutions for use, based on personal experience and current best practice.

References
Equality and excellence: Liberating the NHS' White Paper DOH (2010)

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Parallel Session 3

ADVANCED CONTROL SYSTEMS (PART ONE)
2.15pm

Access to Special Controls for Powerchairs

Presenter: Jim Lucas

An overview of the options for patients requiring special controls, based on accessing chair functions, driving inputs and environmental controls.

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Practical Aspects of Bespoke Switching for Powered Mobility

Presenter: Geoff Harbach

Summary
This presentation will introduce the background knowledge that anyone attempting to create custom switching solutions for powered wheelchairs should know before beginning. It will go on to demonstrate some practical elements of manufacturing techniques and component selection.

Aims and Objectives
The aim of this session is to impart to the audience a sense of what knowledge they should have before they embark on creating a novel switching solution for their clients.
The objective of this session is to give confidence to those embarking on custom solutions that the materials and techniques they might be using are safe and reliable.

Background
The manufacture of bespoke powered mobility switching is not something to be taken on without prior knowledge and understanding of the regulatory landscape, knowledge of high reliability electrical and mechanical engineering techniques, properties of materials, and small scale manufacturing methods. Providing the wrong solution for a client can have long term adverse postural consequences. Providing an unreliable system will be frustrating for all concerned and ultimately more costly than necessary. Providing an unsafe system could quite literally cause the death of the client. I have always been mindful of what I might have to say to a judge in a court of law if such an adverse incident should take place concerning equipment I had designed, specified, or manufactured. By using high quality materials, increasing the ease of use, and designing out potential risks to failure, you can increase your confidence in the system you are providing to your client, and reduce the likelihood of having to defend yourself and your actions in court.

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ADVANCED CONTROL SYSTEMS (PART TWO)
4pm

Special input devices and environmental control systems

Presenters: Florian Jaekel and Mark Parry

Summary
Presentation of the Enable 50 system with various drive inputs and environmental control possibilities. Integration of communication devices with infrared and blue tooth systems.

Aims and Objectives
To communicate the possible solutions of the Enable 50 system to the clinical teams, and enhance their choices working in NHS centres. To offer a complete solutions approach from the basic entry level controls to the more complex conditions associated with assistive technologies.

Background
The Enable 50 control systems are individually adaptable to meet very different needs. The controls can be modified at any time and are combined with most of the Otto Bock Healthcare power chair range. The control system uses an LCD display that can be structured and customized as you like it. The enhanced colour screen ensures you are always in control of your own actions with the additional value of personalisation.
Infrared and blue tooth offer you the possibility to control your environment from the chair with any of our switched inputs. These features enable you to control both your home or work area from the freedom of your chair.

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Advanced Powered Wheelchair Control Systems – an overview

Presenter: Melanie Matthews

An overview from PG Drives Technology detailing the capabilities of the R-Net control system, bringing the audience up to date with the possibilities our high end rehab control system has to offer.

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Parallel Session 4

Exhibition viewing

An additional opportunity to focus on equipment and to develop relationships with suppliers

Parallel Session 5

NB: this is a 2 hour session and continues after tea break

Fundamentals of Research

Presenters: David Porter and Marie Kelly

Summary

This workshop aims to enhance understanding of the research process and the different methodologies that are typically used in health care settings. It will explore the development of research questions and the choice of methodology. It will also consider some of the ethical and practical issues that can arise.

Learning Outcomes

By the end of the workshop the participant will be able to:

- Describe the research process
- Describe different research methodologies typically used in health care research
- Practice developing research questions and selecting appropriate methodologies and methods to answer these questions

Introduction

The workshop is designed for those who have an interest in research practice and who would like to learn more about the different steps involved in the research process.

Evidence based practice is an inherent part of current health care delivery. Clinical decision making regarding choice of treatments or prescription of equipment should be based on the best available research evidence, clinical expertise and individual patient choice. The workshop aims to explore one element of this practice i.e. the nature of research evidence. It aims to enhance understanding of the research process to enable participants to begin critically reviewing the research literature, but also to consider design issues when planning potential areas for research. The workshop will give an overview of the research methodologies that are typically used in health care settings and explore the link between the nature of the research question and choice of methodology. It will also explore ethical issues that can arise in research design.

Workshop Plan:

1. *Introduction*
   Learning outcomes for research workshop.

2. *Research process*
   Overview of research process steps.
   Development of a research question (PICO).
   Overview of research methodologies used in health care practice.
   Examples of research questions to illustrate different methodologies.

3. *Formulating research questions*
   Small group work activity:
   Practice formulating research questions and identifying suitable methodologies to answer the questions.

4. *Basic concepts in research design*
   Small group work activity:
   Develop a research question and methodology for a clinical scenario and discuss key design issues such as nature of sample, sampling method, sample size, data collection tools, and data analysis.

5. *Other steps in the research process*
   Brief consideration of other issues including ethical considerations, funding and dissemination.

6. *Summary, Discussion & Conclusion*

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Parallel Session 6

NB: this is a 2 hour session and continues after tea break

What does lying mean for sitting and how can I help?

Presenters: Dave Long and Claire Finch
Author: Pat Postill

Summary
The importance of 24 hour posture management, as part of a physical management programme, is gaining recognition. This presentation will explore the relationship of a person's habitual sleeping position(s) in relation to their seated posture, including that which is adopted in their wheelchair. A practical session involving supported lying posture will be demonstrated.

Aims and Objectives
Aims: Explore the consequences of not assessing and supporting the posture of a person with complex disability in lying, and how that impacts on seated posture.
Objectives: Identify the likelihood of deterioration of body shape and joint ranges as a consequence of an individual's unsupported sleeping posture. Identify the likely impact of the deterioration on the seated posture. Provide information to enable clinicians to make recommendations related to supported lying, using low tech materials.

Background
The relationship of presenting posture in lying to presenting posture in sitting, restriction of joint ranges, and evident skeletal asymmetry is recognised and reported by experts in the field of posture management. The Specialist Disability Service receives referrals countrywide for assessment and recommendations related to posture management as part of a physical management care pathway for those people with complex disability. Clinical experience shows that it is necessary to carry out an in-depth assessment in order to make appropriate recommendations for 24 hour posture management.
Analysis of presenting postures for clients referred appears to demonstrate a link between their lying and sitting postures. The effect of appropriate postural management for lying and sitting will be shown through individual case studies. The outcomes for introducing a posture management programme is related to solving problems/issues that the individual client presents with, e.g. pain, comfort and function.

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Parallel Session 7

Normal Movement Development and Neuroplasticity

Presenters: Marion May and Peter Lane

Summary
We will be looking at and discussing normal movement development from foetal reflex to functional movement development. Highlighting the potential windows of opportunity for therapeutic intervention to access neuroplasticity in the central nervous system.

Aims
This session aims to allow seating practitioners to revisit primitive reflex patterns and the progression of normal functional movement development - from emergence to maturation of the central nervous systems. We will investigate how normal movement and postural alignment can be combined as a treatment medium, using positional systems. Course participants will look at how movement influences neuroplasticity.

Background
Clients presenting at wheelchair services for assessment are becoming more complex in their clinical and postural presentations, therefore awareness of abnormal postural patterns, and methods of controlling them through alignment of posture, are becoming prerequisites for daily clinical practice. Updating and revisiting the evidence base for this knowledge allows us to promote and best apply postural solutions.

This workshop will focus on using the theories of neurodevelopment, neuroplasticity and normal movement to achieve the potential for best practice.

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Registered charity number: 1098297

Friday 15th April 2011
8.30a.m. – 9.15a.m.

Wake-up Sessions

(PLEASE REFER TO YOUR CONFERENCE PROGRAMME FOR ROOM NAME/CODE FOR THE WAKE-UP SESSIONS)

WS1 - BES Rehab Ltd: *SmartWheel*
Optimizing Self-propelled Manual Wheelchair Prescription and Set-up for Improved Patient Outcomes

Summary
Most users of self-propelled manual wheelchairs suffer from high levels of pain due to carpal-tunnel and rotator-cuff damage. The wheelchair prescribed and its set-up, together with problem-solving training, can reduce the risk of negative affects on the user. The SmartWheel is an ideal assessment tool to achieve these ends.

Aims and Objectives
This presentation introduces the use of a SmartWheel to show the forces, frequency, and velocity used to propel a wheelchair, and the objective feedback this provides to optimize the prescription and set up of a chair for the user, and to train the user for most efficient use. Data gathered from an individual are compared with a global 'cloud' of data to place a perspective on that person's capabilities.

Background
A manual wheelchair user averages 2000-3000 pushes a day. 75% of users experience pain, 65% have some type of shoulder injury, and up to 70% have carpal tunnel syndrome. These figures indicate a major problem exists. Published data indicated that the pain and injury are linked to how an individual propels a chair: the result was the publication of a set of Clinical Practice Guidelines in the USA.
Data collected from initially 125 individuals has been published and provides the basis of standardised targets for Speed, Push Force, Push Length, and Push Frequency, all of which can be measured by the SmartWheel. An expanded database from 900 individuals is being released in early summer 2011. This has been collected from 1280 trials around the world, including contributions from the UK. Users are tested on a straight run for 10 seconds on ideally both a tiled surface and on a carpeted surface, the latter representing a more challenging workload. In the complete range of protocols, the user will also be measured going up a standard slope, and carrying out a figure of 8 manoeuvre on a tiled surface. The data represent the first three strokes of the acceleration phase, and then the steady state phase. The cloud database represents 345 datasets from a tiled surface, 258 on a carpet, 261 on a ramp, and the remainder from a figure of 8.
The outcomes of each test are represented graphically being shown against a cloud of average data, and in tabular form against the database average and the database top 25%.
During the presentation, attendees will see data from the Craig Rehab Hospital in Denver, Colorado, which show the improvements using the SmartWheel achieved from

- Adjusting push style
- Moving the rear wheel axle position

- Adjusting push force
- Adjusting force direction
- Adjusting frequency of push
- Adjusting back support angle
- Adjusting back support height
- Firm vs sling back
- Cushion selection

Clinicians after using the SmartWheel reported:

- Much improved compliance
- Significant propulsion improvements even after one session
- Use within the first week of wheelchair delivery prevents bad habits forming

Discussion

The fact that 70% of the top-ranked US rehab hospitals have SmartWheels indicates the widespread benefits being enjoyed in the USA from this technology. In the UK most wheelchair services and Spinal Injury centres have pressure mapping systems, in recognition of the benefits of the technology employed to show the distribution of forces over the seating surface that cannot be visualised by other means. The SmartWheel does the same for visualising the forces that are involved in wheelchair propulsion. Properly employed, the SmartWheel can do even more for the prevention of injury and pain than a pressure mapping system, and thereby provide a better set of both clinical and social outcomes.

By getting it right the first time, the therapist and engineer save their services the costs of replacement equipment, and save the wider health service the costs of treatment. The country benefits in that the wheelchair user can be in employment and contribute to paying taxes. And not least, the user benefits because of the ability to live an active life with less pain or injury.

In conclusion: the SmartWheel, like an interface pressure mapping system, is an assessment tool which validates what you know, and tells you what you don't.

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Correspondence Address

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131 South Liberty Lane
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Bristol, BS3 2SZ

Email: barend@besbiz.eu.com

WS2 - Consolor Ltd: *Anatomic Sitt Seating System*

Fully dynamic and adjustable, anatomically contoured, modular seating system for children to young adults

Company Information
Consolor is an established and dynamic company, which yields a wealth of experience. We can cater for all types of seating, from off the shelf to bespoke and hybrid systems. As a company we pride ourselves on providing tailor made solutions to meet the individual's needs.

Product Details
The Anatomic Sitt dynamic seating system works with the client to absorb extension spasticity. It features a unique ischial shelf depth adjustment, giving greater control when positioning and maintaining the pelvis. Fully adjustable to allow for leg length discrepancies, adduction, abduction, together with wind sweeping.

Correspondence details
Consolor Ltd
Unit 6a, The Forelle Centre
Black Moor Road
Verwood
Dorset
BH31 6BB

Email: russ@consolor.co.uk

WS3 - Matrix Seating Ltd: *Heads First*

Low cost customizable head support – release date June 2011

Company Information
Matrix Seating is a company that focuses on new and innovative products particularly customizable head supports and specialist wheelchair seating

Product Details
Heads First is a head support which is customisable at a cost effective price. There are many options from 'ready-to-fit' to 'build-your-own' in both adult and child sizes. With patented modularity, rapid shaping, ear clearance and a low profile, this head support can meet every need.

Correspondence details
Matrix Seating Ltd
28 Greville Park Avenue
Ashtead
Surrey
KT21 2QS

Email: sylvia@matrixseating.com

Wake-up Session 4

8.30a.m. – 8.45a.m.

A. Sunrise Medical: *New Tilt in Space Powerchair*

Company Information
Sunrise Medical is a manufacturer of mobility products committed to the development of clinically effective products that offer clinicians, rehabilitation engineers, and end users the best choice, value and benefits. Through a range of innovative, highly adjustable, clinically effective products, we aim to reduce complexity in wheelchair prescription, reduce whole life costs to ensure effective fleet management whilst maintaining clinical effectiveness.

Product Details: *Quickie Tango*; release date June 1st 2011
With NHS budget reductions, but ongoing demand to provide tilt in space with powerchairs, Sunrise Medical are proud to have developed a multi adjustable, tilt in space powerchair that will be offered at the lowest price on the market. Clinically effective, cost effective and multi adjustable, our aim is to enable NHS budget holders to make substantial cost reductions without impacting on wheelchair provision.

Correspondence details
Sunrise Medical
High Street
Wollaston
Stourbridge, DY8 4PS

Email: jane.elsworth@sunmed.co.uk

8.45a.m. – 9.00a.m.

B. Otto Bock Healthcare: *B400 with seating interface & 45 deg power tilt*

Product description and details
Multi functional powered wheel chair with a range of seating and control solutions from basic to bespoke, foam, msi options. Available from a basic joy stick operation to environmental controls with buttons. 140kilo user weight. The B400, with its compact, stable design offers an outer measurement of only 58cm allowing easy access through the narrowest of doors. A low seat height of 43cm enables the user under tables and desks without any difficulty. Also available with 45 deg power tilt in space and recline.

Company Information
Otto Bock Healthcare PLC has been established in the UK since 1976 and is part of a 100% family-owned group of companies that employs more than 4,200 people world-wide. We are renowned as a major supplier of innovative high-quality products in the areas of Mobility and Special Seating Solutions.

Correspondence details
Otto Bock Healthcare Plc
32 Parsonage Road
Englefield Green
Egham
Surrey, TW20 0LD

Email: helen.obrien@ottobock.com

9.00a.m. – 9.15a.m.

C. Quantum Rehab (Pride Mobility): *The Quantum Difference*

Company Information
The Quantum Rehab Team will be on hand to take you through how Quantum Rehab is making a difference within the NHS. They will also be introducing you to several new products, so why not come along and find out how Quantum Rehab can make a difference for you.

Product Details
1) What have you come to expect from a supplier? Is there something missing?
2) Pricing products is important in tough financial times, but products and services cost money. How are we improving value?
3) Come and have a sneak peak at several new products and see how they fit into your plans!

Correspondence details
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Friday 15th April 2011
9.30a.m.

FREE PAPERS, FP6 – FP9

FREE PAPER 6
What aspects do wheelchair users want to be involved in when choosing their wheelchair?

Presenter: Alejandra Cano
Additional Authors: Sheila Kitchen and Ruth Mayagoitia-Hill

Summary
Involving AT users in the selection of their AT is very important. However the impact of this shared decision-making approach on wheelchair users' satisfaction with their wheelchair remains an unexplored field. This project examines users' preferences when choosing their wheelchair and how they want to participate in this decision-making process.

Aims and Objectives
To describe and analyse the user's perceived decisional role and information sharing.
To examine the user's satisfaction with the perceived decision-making process.
To determine and clarify the user's preference for decisional autonomy and information sharing.
To examine the satisfaction with and use of the wheelchair.
To examine the reasons for (dis)satisfaction with how the decision was made.

Background
Difficulties with mobility are one of the most common problems for older people and those with disabilities. Wheelchairs are widely used and are one of the most visible pieces of AT to keep or improve independence and make it easier for people to participate in society. However, we know AT is not always used to its full potential and items are sometimes abandoned. While involving users in the selection of a new piece of AT is considered vital, reports and anecdotal evidence suggest that there is little user involvement when the final decision is made, and this could influence the use of the device (Wessels, Dijcks et al., 2003). Providing users with a wheelchair they are not happy with and might not use is not only a waste of money, but it can also have a negative impact on the user's health, quality of life and independence. Involving patients in decision-making in the selection of a wheelchair is currently being promoted as the preferred approach to encourage patients to take control of and manage their long-term condition (Coulter, 2006). However, it is not known whether or to what extent this approach is occurring when choosing a wheelchair.

Methodology
Over a nine months period, a questionnaire is being distributed to wheelchair users from the vast majority of wheelchair services in South East England and London. Users fill in this validated tool following their assessment for a new wheelchair to explore their involvement while the wheelchair selection takes place. Those completing the questionnaire will be invited to take part in a follow-up telephone interview conducted approximately four months after the new wheelchair has been issued, to investigate the user's satisfaction with and use of the wheelchair. The study will also examine any relationship between the way in which a decision was reached and the user's satisfaction with the wheelchair and its use.

The recruitment of participants is currently taking place. Preliminary results from the pilot phase are expected to be made available within the next 5-6 months, and final outcomes of the study by the end of 2011. The results will provide further guidance for clinicians involved in wheelchair assessment procedures, and therefore to improve current practice.

References

Coulter, A. (2006). Engaging patients in their healthcare. How is the UK doing relative to other countries? Oxford, Picker Institute Europe.
Wessels, R., B. Dijcks, et al. (2003). *Non-use of provided assistive technology devices, a literature overview*. Technology and Disability 15(4): 231-238.

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FREE PAPER 7
Planning wheelchair service provision in MND: implications for service delivery and Commissioning

Presenter: Jenny Rolfe

Summary

This study reviewed the average time from diagnosis of MND to provision of wheelchairs and death. The site of onset of disease and ALSFRS were identified at the time of provision and these indicated that they could be useful in predicting the type of wheelchair required throughout the disease process.

Aims and Objectives

To identify the average time in months from diagnosis of MND to the provision of different wheelchair types and to the time of death.
To map ALSFRS (ALS Functional Rating Score) against the type of wheelchair provided, and the site of onset of disease in order to identify any predictive patterns.
To identify recommendations for service delivery and commissioning.

Background

As Motor Neuron Disease (MND) is a rapidly progressive disease, services face particular challenges in keeping up with the changing needs of clients. One such challenge is in the provision of wheelchairs. In 2007, funding from the Motor Neurone Disease Association was used to set up a wheelchair service for people seen at the Oxford MND Care Centre. The Care Centre records clinical information on a database which can be used for audit and research purposes. Each client gives their consent for information to be used in this way. The site of onset of disease is routinely recorded on the database as is the ALSFRS score. This is an outcome measure of function that is regularly used to monitor the change in functional abilities which enables the Care Centre to plan for future interventions.

Method
The database was searched to identify everyone who had received a wheelchair from the Care Centre between January 2007 and August 2010 (with the wheelchair service operating for 2.5 days a week). The study population included anyone who had received a wheelchair from the Care Centre. The data base was used to identify date of diagnosis, site of onset of MND, date when a wheelchair was provided, type of wheelchair provided, the ALSFRS score when wheelchair was provided and date of death. The average time scale in months between diagnosis and issue of the wheelchair was mapped for the different types of chairs; Action 2000, Spectra Plus and Rea Azalea (or similar types of chairs).

Results
In this timeframe, the total sample size was 62, of which 42 had limb onset, 18 had bulbar onset, and 2 had respiratory onset. A total of 38 Action 2000, 38 Spectra Plus and 24 Rea Azalea wheelchairs were provided. The average time in months between diagnosis and provision of Action 2000 was 14, for Spectra Plus 22, and for Rea Azalea 26. The average time between provision of Action 2000 and Spectra Plus was 8 months, and from Spectra Plus to Rea Azalea 7 months. The average time between provision of Action 2000 and death was 18 months, Spectra Plus and death 8 months and Rea Azalea and death 5 months. Higher ALSFRS scores were associated with a higher likelihood of using an Action 2000 or similar. As the score reduces people are more likely to use a powered chair and the lowest scores indicate that someone is more likely to use a Rea Azalea. Clients with bulbar onset MND require all three types of wheelchairs to be provided more rapidly than any other types of onset, in keeping with the more rapid progression of disease.

Discussion
The data shows that the type of onset of MND can be predictive of the rate of progression of the disease and this may be helpful for clinicians to be aware of when planning wheelchair provision for people living with MND. The time line from diagnosis to provision of each type of wheelchair to death can also provide some guidance to clinicians about when it is appropriate to provide different types of wheelchair, and how often they may need to review cases. Being more aware of the likely needs of this client group can help services predict the types of wheelchairs they are likely to need and therefore this can be used to help secure funding from commissioners.
The data collected represents a relatively small number of cases from one clinic, so is not necessarily generalisable to all people with MND. However, the data from this study gives some indication that the ALSFRS score could be used by clinicians to help identify the appropriate wheelchair for people with MND. Further research is required to explore the correlation between the ALSFRS score and wheelchair provision and to confirm its clinical value.

References
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FREE PAPER 8
Correlation of Interface Pressure Mapping measures using clinical data

Presenter: Susan Hillman
Additional author: James Hollington

Summary
Correlations were computed from clinical Interface Pressure Mapping data for contact area, coefficient of variation(CoV), dispersion index(DI) and peak pressure index(PPI). This study shows a generally good correlation between CoV, DI and PPI hinting they could effectively be equivalent in their ability to evaluate pressure distribution properties of wheelchair cushions.

Aims and Objectives
Several different measures have been proposed for evaluating seat cushion pressure relief characteristics. The existence of these alternatives however presents potential for confusion if measures disagree. This study aims to assist with this by investigating the linear relationships between measures. This technique may identify those measures best able to discriminate the critical features of clinically hazardous pressure distributions, and those which incorporate redundant information and can be safely discarded.

Background
A variety of measures has been described which seeks to summarise a cushion's ability to manage seat interface pressures to optimise tissue integrity. These measures are also under consideration for inclusion in the relevant ISO standards. Inspection of the definitions of the measures shows that they each comprise information relating to peak pressure at the interface, the distribution of load across the support surface, or are some combination of both. The existence of several different measures however, is a potential source of confusion since, in a given clinical scenario, different measures may conflict with one another. This study constitutes part of a project which seeks to assist clinicians in the interpretation of these measures, and the first stages of this are to examine the strength of the linear relationships between the different measures. Measures which are unrelated will contain different information about the pressure distribution at the seat interface and the clinical significance of this will need to be established. Strong correlations however may indicate redundancy amongst the measures.
Interface Pressure Mapping (IPM) data collected from four patients attending the wheelchair special seating clinic was analysed. Data was collected using an FSA pressure mapping system comprising 16 x 16 sensing elements. For three of the patients data was collected under seven different conditions of cushion and posture, and for one patient data was collected under five conditions. Cushions used in testing included Jay 2, Jay 2 Deep Contour, Flotech Contour, Vicair Twin 10, Vicair Adjuster 6, Roho single manifold and Roho dual manifold. Testing conditions were different for each patient as required by the clinical situation. For each condition the following measures from the draft standard were computed as the average of between 11 and 50 frames of data visually judged as steady state: contact area, Coefficient of Variation(CoV), Dispersion Index(DI) and Peak Pressure Index(PPI). Each pair of measures were plotted against one another for each data set to facilitate visual inspection of the relationships between measures, and Pearson and Spearman correlation coefficients were also calculated for each pairing of measures for each set of patient data.

Pearson correlation coefficients were as follows. (* indicates significant at $p<0.05$ with Bonferroni correction)

	n=7	n=7	n=5	n=7
Contact area vs PPI:	-0.86,	-0.53,	-0.14,	-0.04
CoV vs Contact area:	-0.99*,	-0.84,	-0.33,	-0.79
CoV vs PPI:	0.89,	0.79,	0.95,	0.60
DI vs Contact area:	-0.94*,	-0.57,	-0.54,	-0.26
DI vs PPI:	0.96*,	0.95*,	0.74,	0.73
DI vs CoV:	0.97*,	0.88,	0.90,	0.71

The correlations of DI with CoV, and DI with PPI were strongest with all correlation coefficients being greater than 0.71. Correlations involving contact area were less consistent being strong for some data sets but weak or negligible with others. Spearman correlations showed that cushions were ranked in the same order by CoV and PPI for one data set only. All other correlations showed some degree of disagreement in ranking. Where relationships could be identified by visual inspection of plots however, they appeared well modelled by a linear relationship.

Discussion

Stronger Pearson correlations were more consistently observed between DI, PPI and CoV than between contact area and any of the other measures. This may be because the former consider peak pressures or the dispersion of measured values; whereas contact area does not consider pressure values at all. Such strong correlations however may still be considered surprising given the differences between those measures. PPI, for example, considers only peak values, whilst DI expresses the pressure values in the IT and sacral coccygeal region in relation to pressure across the entire surface.

Further work is therefore needed to discover whether these correlations are a consequence of the pressure distributions used in this study, and whether these are typical. It is interesting to note that the Pearson correlations observed between contact area and all other measures varied across a large range from uncorrelated (r=-0.04) to very strong (r=-0.99). This result may arise because the contact area is a poor indicator of a cushion's potential to distribute pressure, or because it gives alternative information which may be clinically useful.

Even though some measures show reasonable Pearson correlation, it is of great clinical importance that this is not translated into an agreement on ranking. Ultimately, these IPM measures do not appear to be sensitive to more subtle differences between cushions. Further work is therefore required to investigate whether there is a preferred IPM measure for clinical cushion evaluation and, if so, whether this choice depends on other factors such as weight, posture or pathology.

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FREE PAPER 9
You've given me wheels, now pimp my ride:
A qualitative study of wheelchair users' functional and identity needs

Presenter: David Porter
Additional Author: Julian Verkaaik

Summary
A qualitative study involving focus groups and interviews with wheelchair users was carried out. Services and equipment seem to be better at meeting basic needs related to mobility and independence rather than addressing needs related to esteem and identity. A simple esteem needs framework will be discussed.

Aims and Objectives
The primary aim was to gain a better insight into the functional and identity needs of end users and how this might influence their attitudes, preferences and choices.
The secondary aim was to improve understanding of the decision making processes including the influence of the referrer and the system.

Background
The powered wheelchair sector is evolving to become much more customer and innovation focussed. In order to help inform the development process a small qualitative study was carried out to gain a better insight into what is relevant and important in the end user's world.

The study included in-depth interviews and focus group discussions. There were three focus groups of which two were with powered wheelchair users and one with non-powered wheelchair users. Also in-depth interviews were carried out with four individual wheelchair users and four referring therapists. Users' age ranged from 20 to 50 years. The focus groups were conducted at a central facility and interviews were carried out at the user's home or work in/around Christchurch, New Zealand in 2008. A thematic analysis was carried out.
Both users and therapists thought the way people were assessed had improved over the last decade with a more holistic approach being established. Therapists often found themselves "between a rock and a hard place" trying to balance the client relationship with the provider relationship. The attitudes and experience of the therapist were seen as important. Therapists could feel jaded by the environment and a high attrition rate was reported. They sometimes felt overwhelmed by workload, lack of resources, uncertain supply, complex situations, and paperwork. The process of assembling an appropriate prescription was sometimes seen as daunting due to the number of options, combinations and compatibility issues.
Therapists and users agreed that the system sometimes works well in assessing the overall needs of the client (physical and emotional). Often it is possible to find the best solution within the bounds of what the system allows. However, the system seems to be primarily designed to meet basic needs related to mobility and independence, and often does not address other needs related to esteem and identity.
The chair selection process can be tiring and frustrating particularly for first time users. The tendency is to start at the most basic and work up. In order to improve the chair solution it is important that both the user and referrer remain engaged.
Users tend to see their chair as a tool and often keep their expectations low, reducing the level of engagement and excitement. Referrers also report often not feeling empowered, excited or engaged. They sometimes admit finding it easier to work with lower expectations than high ones. The net effect of all this is often a reduction in excitement, engagement, expectation and empowerment.

At its most basic level, users see their chair as a mobility/independence device. It enables physical movement which facilitates social and personal interaction, and also helps to avoid isolation and disengagement.
Beyond this it can also be a means to meeting a personality aspiration. "How does it allow me to be myself?" "How does it help me to manage and interact with my world?" "How does it adapt to changes in my frame of mind?" These needs are more related to "esteem" and "identity."

Discussion
There are various ways of classifying users based on clinical diagnosis and physical needs. However there is little information available on how identity and emotive needs might be used as a predictor of attitude, preference, choice and engagement. It could be helpful to look at the personality of the user, and then the disability, and consider how one affects the other.
A simple esteem needs framework will be discussed. This is based on Maslow's hierarchy of needs and Jung's personality archetypes. At the centre of the framework is the need for confidence to participate in life. There are two dimensions around this central idea: extrovert/introvert (direct energy outward or inward) and affiliation/individual (the need to stand out or fit in).
It is suggested that physical and emotive selves are affected by disability, which may activate a change in how we express ourselves. People can compensate and become more outgoing (to avoid isolation or pity) or become more introverted (to avoid judgement and interaction where possible). Four personality groups will be considered in the context of how an individual might relate to their wheelchair equipment. It is believed that this framework will be useful when considering the development of services and products.

References
Jung, C. G. (1971). Psychological types (Collected works of C. G. Jung, volume 6)
Maslov, A.H. (1954) Motivation and Personality, Third Edition, Harper and Row Publishers
Schurek, A. (2006) How to cope with international marketing in market research. www.tns-infratest.com/presse/pdf/autorenbeitraege/200609_Artikel_PuA_Andreas_Schurek.pdf

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Friday, 15th April 2011

The Aldersea Lecture

Rosalind Ham

"The chapters so far……"

Through one person's working life, changes affecting the workplace can be observed. Others will have been through them too, but reflecting on the journey can help younger members realise how fast life moves, the changes that occur, and I hope this makes them 'grab' every opportunity that comes their way.

My aim is to take the participants on a global journey through the latter part of the 20th century to the present day, studying aspects of geography, politics, cultures, British colonial life and a life as a health professional.
The objectives are to widen participants' knowledge and horizons, help them to widen their own 'chapters' in the future through project opportunities, education, job opportunities, and being with likeminded people.

Early chapters
I will swiftly travel through my early chapters of being a typical post-war colonial child with a childhood spent 'on the move' in Tanganyika/Tanzania, the Gilbert & Ellice Islands, Zambia and boarding school, miles from home either in Africa or in the UK, and hours spent travelling with BOAC nannies! This was a good start to being used to change and observing things.

Physiotherapy
After A levels and IB at Atlantic College, I did not gain the place I wanted to study Agricultural Botany so, reading "What to do with biology", I changed direction completely to physiotherapy at The London Hospital, as there was an April 1972 place still available! A great move and something I have never regretted.
Following junior posts, I moved into amputee rehabilitation, and then applied for the three year Research Physiotherapist post at King's College Hospital, London.

Prosthetics, Rehabilitation, Research and Education
During 10 happy years at King's College on various research grants, both in the Physiotherapy and Biomedical engineering (BME) departments, or awards (Action Research Bioengineering Training Fellowship 1985-87), I learnt practical research skills, writing for publication, presenting, computing, academic activities, going back to study (FCSP, MSc & Cert Ed), and also about the media. Initially working in amputee rehabilitation and prosthetics, training surgeons, starting a prosthetics satellite centre from Roehampton, the department gradually moved into other rehabilitation areas, including wheelchair and special seating research and provision as government policies changed and services were devolved from the ALACs. A King's Diploma in Amputee Rehabilitation was started, and this was followed by the courses in wheelchair rehabilitation through University of Greenwich (with Aldersea and White). Gradually the rehabilitation section of BME enlarged and many PMG members (past and present) also have their 'beginnings' in this department. I was awarded a WHO/EU Travelling Fellowship in 1988 to Denmark and Sweden looking at prosthetics, wheelchairs and seating and rehabilitation, and was also fortunate to

be invited to join the ISPO lecture team to Slovenia, and then to travel with the WHO/EU to teach about prosthetics and wheelchairs in Croatia and Serbia during the conflict.

Wheelchair services

After 10 years, I decided to return to the NHS, into wheelchair services, working and managing services, and also had the unique opportunity of working with a charity at Whizz-Kidz, gaining a DMS in 2003.

Reports, reviews, governments, emphasis, continue to pour out and change, but the work and need continue. Bosses, colleagues and the patients made the jobs memorable, but it was the friendships, laughter and socials that made the pace bearable!

Dorset

Following personal changes, a move to Dorset and, with no vacant wheelchair jobs, a change to employment rehabilitation and the Condition Management Programme gave me a valuable insight into another government organisation, the professionalism of the JCP staff, the important role of the DEA, and the importance of work in our lives.

'**Retirement'** from the NHS came early in November 2009, but 'another chapter' has started as an observer of NHS services!

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Friday 15th April 2011
2.30pm
Final Plenary Session, PL2

1. The impacts of core stability exercise (Pilates) on posture, pain, function and quality of life in wheelchair users with Multiple Sclerosis, and other MS Society sponsored research

Presenter: Jane Petty
Additional Author: Angela Davies Smith

Summary
This pilot study investigated the effects of 12 weeks of one hourly Pilates classes (18 sessions) on sitting stability, posture, pain, fatigue, function and quality of life on people with MS who use a wheelchair.

Aims and Objectives
The aim of the session is to present this pilot study to investigate initial trends in sitting ability as measured by functional reach, posture and COP displacement, and to generate information on the variability in these primary and secondary outcome measures as a result of a structured Pilates programme.

Background
The first aim was to investigate initial trends in sitting ability as measured by functional reach, posture and COP displacement, and to generate information on the variability in these primary and secondary outcome measures as a result of a structured Pilates programme. The secondary aim is to investigate whether the Pilates programme shows evidence of improving respiratory function, decreasing pain in the neck, arms and shoulders and back, decreasing fatigue, increasing daily function, and increasing quality of life. The third aim is to qualitatively explore the impacts of a Pilates programme on the lives of participants.

This project aimed to investigate the impacts of a 12-week structured programme of core (trunk) stability exercises (Pilates) on sitting stability, breathing, pain, function, fatigue and quality of life. A second aim was to explore group and individual experiences of this programme and its impacts, using so-called focus groups, where these experiences were discussed.

The aims of Pilates focus on improving core stability, which should improve sitting stability and posture while sitting in a wheelchair. Theoretically, a better sitting posture should improve breathing, arm function, comfort and could decrease back, neck or shoulder pain. It is likely that these changes would improve quality of life for people who have MS and use wheelchairs.
The results of this study will be discussed in three parts:
A - The feasibility of the Pilates programme for people with MS who use a wheelchair
B - The results of measurements taken at the start of the study, after 6 weeks, after 12 weeks and after 24 weeks, which is approximately 3 months after the last class of Pilates programme
C - The group and individual experiences and its impacts, using focus groups.

Discussion
Using the effect sizes from this study, future studies should be adequately powered to detect statistically significant differences between the groups. To increase the sensitivity and reliability of the measurement of posture and sitting stability in future studies, more sophisticated measures such as 3D motion analysis and force plate analysis may be required. Future studies should also aim to investigate those outcomes which capture the small benefits people discussed in the focus groups and investigate why some people seem to benefit more than others from Pilates exercises.

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2. MS intention tremor: the development of a measurement system

Presenters: Rosie Jones and Angela Davies Smith

Summary
3-D multi-sensor data obtained during upper limb movement in people who have MS and upper limb tremor and ataxia was used to evaluate the characteristics of movement dysfunction and to design and test an upper limb orthotic device fitted with a damper in an attempt to suppress tremor.

Aims and Objectives
The aim of these studies was to initiate the establishment of a clinically useful measurement workstation to analyse upper limb movement and to use recorded data to design, build and test a tremor control orthotic device to help restore useful purposeful movement in groups of people severely disabled by a complex and currently untreatable movement disorder.

Background, methods and results.
The term “tremor” is often shorthand for complex movement disorders that include upper limb weakness and ataxia interrupting the smooth trajectory of movement towards a target and tremor (3 to 8Hz) oscillations of the hand. Seen in MS, and after some strokes and head injury, it affects movements like reaching out to pick up a cup or using a key pad. Thalamic surgery or stimulation can help, but effective treatment is lacking (NICE Guidelines on the treatment of MS 2003 and NSF for long term neurological conditions.2005). Tremor is usually assessed by observation which can provide clinical grading but does not give quantifiable measurement of movement.
An upper limb movement recording and analysis system (Ketteringham 2011) was developed using 5 sensors (x-Bus Xsens). Each sensor records acceleration, gyroscopic and magnetic field data, and is coupled to in-house data logging and analysis software. Sensors on the sternum, shoulder, upper arm, lower arm and hand enable data capture during whole arm movement during tasks like reach–retrieve “finger to nose” tests (Feys et al. 2003).
Preliminary analysis of movement data representing arm position, tremor and sudden ataxic movement, combined with EMG data recorded from biceps and triceps allowed calculation of the torque developed at the elbow during arm flexion and

extension. The data also provided key information used to build and test the first iteration tremor control orthotic device using an off-the-shelf orthosis (ROM Elbow Deluxe DJO UK Ltd.) modified by fitting a rotary damper at the elbow.
A set of Euler angles (describing 3 dimensional rotations) was calculated for each arm joint with and without damping. On-screen real time movement display and recorded elbow angles were extracted from the Euler angle sets for each arm segment. Filtering, using a high-pass Butterworth filter, with a cut-off frequency of 2 Hz, allowed the tremor during movement to be separated from the intentional and ataxic joint rotations.

Results obtained during 3 test repeats show close correlation between Fahn scores (Hooper et al 1998) and recorded tremor. The root mean squares (RMS) of the high frequency elbow angles were calculated for the time periods where the elbow was extended, flexing, flexed and extending during movement (finger to nose test). Using these data the following comments can be made:

- Tremor in distal arm joints precedes those occurring in proximal joints
- Frequency data can be used to separate gross movement (including ataxic movements) from low amplitude tremor
- Damping significantly reduces tremor in people with a wide range of movement dysfunction.

Discussion
Further studies are needed to improve orthotic design and to test the impact of different damping torques and sites. A close fitting orthosis is required to prevent rotational movement of the forearm in relation to the orthosis and to reduce residual tremor. Early results suggest reduced tremor and improved movement also observed by participants. Further development of a clinical workstation to measure tremor during the performance of functional tasks will allow quantifiable assessment of treatment strategies.

References
Ketteringham, L.P., Neild, S.A., Hyde, R.A., Jones, R.J.S. and Davies Smith, A.M., Measuring Intention Tremor in Multiple Sclerosis Using Inertial Measurement Unit (IMU) Devices. Biodevices 2011, part of BIOSTEC 2011 (the 4th International Joint Conference on Biomedical Engineering Systems and Technologies), Rome, Italy, 2011.
Feys P, Davies Smith, A, Jones R, Romberg A, Ruutiainen J, Helsen W, Ketelaer, P. Intention tremor rated according to different finger-to-nose test protocols: a survey. Arch Phys Med Rehabil. Vol 84, January 2003 79-82.
Hooper J, Taylor R, Pentland B, Whittle IR.; Rater reliability of Fahn's tremor rating scale in patients with multiple sclerosis Arch Phys Med Rehabil 1998 Sep;79(9):1076-9.

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POSTERS

The posters will be displayed in the Lower Foyer of Warwick Arts Centre throughout Thursday and Friday.

Q&A session with the presenters is during the Thursday afternoon tea break:

THURSDAY April 14TH 2011

3.15PM TO 4PM

Further Development of a System to Measure Wheelchair Stability and Improve Wheelchair Performance

Presenter: Simon Fielden

Additional Authors: Dimitar Stefanov, Professor Andree Woodcock, Louise Moody, Cynthia Chichi, Mike Heelis

Summary

Wheel-SAS, a three year collaborative project funded by the National Institute for Health Research, will use user led design principles to develop a system for measuring the stability of wheelchairs and improving their performance. Early work focused on understanding user needs, and developing models of stability will be presented, alongside broader project aims and findings.

Aims and Objectives

To develop a load cell system for measuring wheelchair stability, to pre-commercialisation. User, carer and prescriber requirements and experiences will be investigated, to both inform the design and ensure product relevance. The design will offer measures of static and dynamic stability, based on a portable, compact, user friendly product. Prescribers will be able to tune individual wheelchairs using expert support captured throughout the project and embedded in the user interface.

Background

A prescriber must balance wheelchair performance against stability (ease of tipping). Account is taken of the user's competence, the environment, user characteristics and wheelchair accessories. The MHRA reported 16 fatalities and numerous injuries over the period 2005 to 2007 directly related to wheelchair stability. Canadian research suggests 12% of wheelchair users experience a tip pa, suggesting 144,000 incidents pa in England (1.2m users).

Conversely, many wheelchairs have unnecessarily high levels of stability, leading to suboptimal equipment which in turn causes propulsion difficulties and low levels of traction on powered wheelchairs.

Previously the standard stability test has been a static inclined ramp. This test is still in widespread use across the UK when special seats are fitted to a wheelchair. The test ignores dynamic situations, gives no indication of the position of the centre of gravity (used for product tuning) and presents a handling risk to the user and tester.

The second method that has been used is a ramp that can be inclined from the horizontal. This offers advantages over the fixed incline ramp as it measures the actual angles of tipping, and the handling risks are reduced. In other respects it has the same drawbacks as the fixed incline ramp. A handful of services in the UK use this method.

The third method calculates the position of the centre of gravity using load cells under each wheel. This system has none of the disadvantages listed above. Three prototype systems have been developed in NHS services and demonstrate the potential for this technique. The three NHS service heads that developed prototype systems are partners in wheel-SAS.
Initial work has focussed on

- Verifying the national picture on the use of stability test equipment, via a sample audit
- the development of mathematical models predicting static and dynamic stability
- establishing user needs.

Early work on developing the mathematical models to predict static and dynamic stability has focussed on verifying the work to date undertaken by Wawrzinek (1987) and Fielden (2000) relating to rear wheel drive wheelchairs. Models for static and dynamic stability of user user-wheelchair systems to predict wheelchair stability were developed by Stefanov and Bojadjiev (1989). In addition further work has been undertaken to explore models that can be used for 3 or 4 wheeled scooters, mid-wheel drive and front wheel drive wheelchairs.
User needs will focus on drawing up a user requirements specification for the primary user, the prescriber. It will involve users of the existing prototype systems, ramp based systems and situations where no system is used. Semi-structured interviews will consider clinical and technical indicators used for stability or product tuning, current methods used to assess stability and product tuning, levels of use, and the nature of incidents relating to stability and product tuning. It will also involve an ergonomic evaluation of current rig use, and consider usability issues associated with the controls and displays, loading and portability.

Discussion
The following will be presented:

- The methods used and outcome of developing the user requirements specification
- The methods used and results of the sample audit to verify the national picture relating to the use of stability test equipment
- progress to date on the development of the mathematical models

The effects of how these outcomes, and work to date, will be discussed.

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Off-Loading Pressure and Relieving Back Pain Using 50^0 Tilt
A Case Study

Presenter: James Hollington
Additional author: Jennifer Walsh

Summary
This poster details the use of 50 degrees of tilt to offload pressure and relieve back pain while still allowing the user to maintain her high level of function.

Aims and Objectives
The aim of this case study is to demonstrate the effectiveness of using 50 degree tilt to offload pressure and relieve back pain. Mrs T suffered from constant reoccurring sitting acquired pressure ulcers and severe back pain. The aim of providing this degree of tilt provide was to enable the transfer of damaging forces acting on her base to positive forces acting to support her spine.

Background

A 38year old female, Mrs T, a double amputee with Spina Bifida was assessed at the seating clinic at the SMART Centre, Edinburgh. She stated that she suffered from constant back pain. Mrs T was taking Oxynorm and Ketamine for pain relief. Mrs T had an anterior tilting pelvis resulting in a hyperlordosis and a left pelvic obliquity. Mrs T sat flexed forward, leaning on her armrests, as this was the most comfortable position for her.
Due to her posture and pain Mrs T could not sleep in a bed, instead, she slept sitting in her wheelchair and lent forward with her head on her bed supported by pillows. As a result of her constantly sitting in her powered wheelchair, Mrs T had constant reoccurring pressure ulcers. Based on her presentation in clinic three aims of the equipment provision were established:

1. Support the curvature of Mrs T's spine and enable her to offload the compressive forces of gravity acting on her hyper-lordosis and hence reduce her back pain
2. Enable Mrs T to off-load her seating interface pressures
3. Continue to allow Mrs T to function independently and perform functions such as driving, meal preparation etc.

The RESNA position paper on tilt for wheelchairs cites various studies showing tilt, or a combination or tilt and recline, having a positive effect on reducing seating interface pressure.

Mrs T's anterior tilting pelvis caused her centre of gravity to be in a further forward position to someone with a neutral pelvis. Therefore, in order to transfer the gravitational forces acting on her base to her back, it was decided that a powered wheelchair with tilt greater than 45^o would be required.

The Invacare TDX special, a Vicair Academy Positioner 10 cushion and a backrest made up of 2 supporting V-trak Axxis segments, independently mounted to accommodate her spinal curvature, were provided. Mrs T decided the Vicair didn't functionally work for her so she opted on using a Propad. Interface pressure mapping was carried out on the base and backrest at different tilt levels. Mrs T also completed a questionnaire created to assess the impact of the additional tilt on her quality of life.
The peak pressure area under the left ischial tuberosity was calculated (this being the most susceptible area to tissue breakdown) from the mean of four sensors at

various increments of tilt. This showed a 40% reduction in pressure at 47.5° tilt as opposed to a 24% reduction in pressure at 30° tilt.
Mrs T stated that pain relief started at about 25 degrees and at full tilt her back pain was reduced by 90%. There was an associated 1.5hrs of pain relief for ½ hr of full tilt. As a result Mrs T was able to reduce her pain relief medication significantly, no longer taking any Ketamine and reducing her Oxynorm from 8 times daily to 6. Additionally, Mrs T no longer has any redness on her skin at the end of the day.

Discussion
The additional tilt prescribed had a significant impact on reducing Mrs T's pressure and pain problems. The standard maximum angle of tilt for the majority of commercially available powered wheelchairs would not have had such a significant positive impact on Mrs T's life.
The cost of the TDX special with 50degrees tilt was only £1024 more expensive than the closest best fit 'on contract' powered wheelchair with 30degrees tilt (excluding the cost of additional specials requested). This cost seems insignificant compared to the benefits that the additional tilt provides both in terms of hugely improved quality of life and reduction in pain relief and pressure ulcer treatment costs.
It is interesting to note that 55degree is available as standard on a range of powered wheelchairs in the US, this includes the TDX.
Mrs T's concluding statement regarding her powered wheelchair with 50degrees tilt:

"It has given me my life back, especially with my children.
I am no longer in so much pain.
I am now happier in myself and can do more with my children
whereas before the pain was too much".

References
RESNA Position on the Application of Tilt, Recline, and Elevating Legrests for Wheelchairs, 2008

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Powered Wheelchairs - Front-Wheel vs Rear-Wheel vs Mid-Wheel Drives
Presenters: Joyjit Sarkar (RE), Nickey Hardy (OT)

Electrically-powered indoor/outdoor wheelchair provision within the NHS has historically been dominated by the supply of rear-wheel drive models. This has been influenced by cost, custom design/features and available technologies. Recent developments in assistive technologies however have allowed for some shortfalls to be addressed and to an extent cost in front-wheel drive and mid-wheel drive wheelchairs to be engineered and manufactured. Nonetheless, provision varies significantly internationally.

A scarce amount of peer-reviewed research is available on the three types of drive wheel configuration. Koontz et al (2010) undertook case series of 100 powered wheelchair users in mocked up environments performing certain tasks. A key finding was that mid-wheel drive wheelchairs required less space to turn 360 degrees than front-wheel drive and rear-wheel drive wheelchairs.

The Regional Posture & Mobility Services, in collaboration with the West Midlands Wheelchair Service Managers Group and Coventry University (HDTI) hosted a 'practical-based' study day for clinicians and rehabilitation engineers at the West Midlands Rehabilitation Centre. Following a review summary of the three drive wheel configurations, delegates completed four practical tracks - two indoor and two outdoor. Each delegate completed a ranked performance checklist for each of the drive wheel configurations on specific tasks. A discussion session then followed which was aimed at challenging pre-conceived ideas and opinion about drive wheel configuration and performance.

In conclusion, it was identified that the mid-wheel drive wheelchairs ranked higher in performance in both indoor and outdoor environments. The rear-wheel drive wheelchairs had the added advantage of kerb-climbing. It was clear that there were differences in wheelchair products/models in terms of drive performance for each of the drive wheel configurations. Delegates thus requested a follow-up study day(s) to evaluate the drive performance of different manufacturers' products.

References
Koontz, A.M., Brindle, E.D., Kankipati, P, Feathers, D, Cooper, R.A., 2010. Design Features That Affect the Manoeuvrability of Wheelchairs and Scooters. Arch Phs Med Rehabil, 91, pp.759-64.

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Wii Fit for Wheelchairs

Presenter: Joe Searchfield
Additional Author: Kathryn Mills

Summary
The development of interactive computer interfaces within the virtual reality gaming population in recent years has seen the introduction of many handheld devices that enable users to interact and participate from the comfort of their own living room with games and activities that would otherwise be constrained to the outdoors. Games like football, aerobics, and even skiing are possible with the development of the balance board for use with the Nintendo Wii. Up until now these activities have been largely restricted to the ambulant population and have excluded the wheelchair user.

Aims and Objectives
The aim of the original project was to find inclusive, exciting and alternative activities for wheelchair users for the annual Children's Fun Day based at Bowley Close Rehabilitation Centre in London.
The Rehabilitation Centre's physiotherapy department has used the Nintendo Wii fit balance board for some time as a rehabilitation tool during work with clients who are prosthetic limb users. This sparked the idea of modifying or manufacturing an additional platform to allow a wheelchair user to use the Nintendo Wii Fit balance board.

Background
Joe Searchfield has worked as Rehabilitation Engineer for over ten years for Kings College Hospital, and specialises in paediatrics and special seating at Bowley Close Rehabilitation Centre in London.
When the project was originally conceived in early 2010, it was felt that it would be a good idea to look at the performance components that show the benefit of using the device from a clinical perspective. Working with a clinical specialist (Kathryn Mills) who has extensive experience of working within a Spinal Injuries Centre helped in confirming that this was a useful and worthwhile project to undertake.

Design process
I initially looked at altering the actual balance board by re-designing the Wii fit balance board itself. However this was not a viable option due to the budget and time scale. The next thought was to attach a ply board to the balance board, but it soon became apparent that it would fall off and was, to be frank, dangerous! It needed stabilizer feet that would prevent it from tipping over whilst allowing for the balance board load cells to displace. Springs were trialled but these proved too bouncy. Conical rubber stoppers that also provide a level of damping proved to be the best choice. Getting the wheelchair on and off safely was the next challenge. For this purpose a simple hinged ramp was attached. This enabled the ramp to rise and fall during use without affecting the balance board's performance. Edging strip and additional wheelchair tie down points were used to prevent the chair from coming off during extreme Wii fit activity based games.

Testing
It is important to note that the testing carried out was to test function rather than to collect clinical data.
Initially it was down to the Rehabilitation Engineer to test the unit for safety and usability. With no major incidents, we then let it loose on our clients. Specific clients were selected based on their ability to feedback, their age and their level of disability.

Feedback was very encouraging. Adults felt it would be a fun and good way to exercise within the wheelchair. They felt that even in the short space of time that they had used it (nominally 10 minutes) they were working muscles they would not normally use within the wheelchair. Physiotherapists who trialled it suggested that it could, with some clients, have the potential to improve core stability and strength. Parents thought it was great as it would keep the kids entertained and could sneak in some well needed exercise at the same time. Some parents were so convinced that it was a good idea that they decided to purchase Nintendo Wii fit and make a similar platform, based on the basic design, for themselves. From the kids' point of view they loved it and it was hard to prise them off it during the Children's Fun Day, which was a great success.

Discussion

Interactive gaming for rehabilitation purposes is becoming more and more documented and the Wii for wheelchairs concept is gaining momentum. At the time of putting this poster together the author is aware of a similar product to this design that is being launched in Canada. The importance of exercise and stimulation specifically for wheelchair users is well acknowledged and as more and more of us are living longer the wheelchair population is set to increase. Obesity is an increasing major health problem affecting wheelchair users. Gaming and more importantly active gaming for wheelchair users is in its infancy. Further clinical long term trials with a device like the Wii Fit for wheelchairs need to be carried out in order to prove clinical benefits. However the benefits of engaging in a stimulating and fun medium whilst getting some exercise are clear. It may not be long before a large scale manufacturer realises the commercial potential and develops dedicated games and products for wheelchair users.

This small project demonstrates the value of allowing an idea to develop from activities that are not always postural seating based and do not specifically focus on outcome measures and proven clinical evidence. Joint working and support from fund holders is key in allowing ideas to flow, and ultimately unleashes the potential for thinking outside of the box within rehabilitation engineering.

References

Occupational Therapy News, June 2010, To Wii or not to Wii
www.Nintendo.com

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Assistive Partners

Presenter: Julian Cobbledick

Product Name: UNIQUS software systems for managing services.

Brief description of Product:
UNIQUS is a proven, web based software application used to improve efficiency and cut costs wherever healthcare equipment is used.

Company Information
Assistive Partner is an experienced developer of computer software systems. The company began trading in 2007 and has specialised on creating web based software applications for use in managing healthcare equipment and services.
Our software is used by wheelchair services, community equipment services, continence services and many more.

Product Details
The UNIQUS software provides online, real-time stock catalogues, specials catalogues, equipment track & trace, logistics management and track & trace and much more.
UNIQUS streamlines processes and improves efficiency. Clinic management, call logging, task & events management and referral triaging facilities are part of the core software, so all service aspects are managed within one solution.

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Xbus-plus measurement system designed to record upper limb intention tremor in individuals with MS

(refer to abstract for Final Plenary Session PL2/ 2)

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Helping Hand Case Study

Presenter: Lara Bryant

38 year old Nicole Ionescu was born with a total spinal cord injury (paraplegia) and dislocated left hip, as a result of a traumatic birth.

As a consequence of her injuries, she has always been a full time wheelchair user. Nicole's sitting tolerance has been limited to two hours per day, due to persistent pressure damage over her left ischial tuberosities. When not sitting, Nicole spends the time lying prone on a wheeled board, which she uses to access the different rooms of her flat in Bucharest.

This case study describes the process which culminated in the prescription of the Starlock single valve air cushion to allow her longer periods of activity using her wheelchair.

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Otto Bock Healthcare: Delegate Pads

Quantum Rehab (Pride Mobility): Delegate Bags

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