WELCOME FROM THE CONFERENCE CHAIR

Welcome to Leeds! It's great to be typing these words as it has been quite a journey getting here, and I am not just referring to the miles of roadworks on the M1 or the standstill traffic on the M6. I am referring to how much goes into the planning to make this event happen - so many meetings, so many telephone calls, and thousands of e mails! I am really grateful to the PMG Conference planning team, who are all so committed and give up so much of their own time, and I am proud to be the chair of such an important event. I must say at this point a massive thank you and well done to Olwen and Ffion who pull this whole show together, but also I want to thank my employers, Ottobock, who allow me to have the time to attend the many meetings that are involved with this role and which, over the year, can run into many days away from my real job.

I am impressed that we have found such a suitable North of England venue; the work involved in finding new venues is vast, as each new location brings different challenges, plus, of course, great new opportunities. I am looking forward to being back in a University setting this year, and sitting in the auditorium and lecture theatres listening to the fantastic range of speakers. I hope you will all feel inspired to go back to your work places with new ideas, and with greater knowledge about the demanding environment of posture and mobility. I hope you also go home with great memories of the fantastic nights out - like the curry night that will kick off the conference atmosphere and that is generously being sponsored by Leckey for the 3rd year running.

The delegate numbers for this year are the highest on record, and the exhibition space sold out almost totally in the first day, so we must be doing something right! However, if you feel we haven't quite got it right, then please tell us in the after event questionnaire. We need both delegates and exhibitors to feed back to us on all that's good, bad and what we can do differently, so that we can look at making any changes if required.

Make sure to find time to view the posters while you walk around the exhibition, and please take every opportunity to visit the stands, because without the exhibitors we would not have a conference. This year we have returned the drinks reception to the exhibition halls to provide extra exhibition time, and I would like to thank Quantum for so generously sponsoring the reception for the 2nd year running.

As always, the highlight has to be the Gala dinner, and we are looking forward to as much dancing as last year, which will take some beating! The wine and after party entertainment are kindly sponsored for the 2nd year running by Specialised Orthotic Services (SOS), and we are immensely grateful for their continuing generosity.

A big thank you too to those sponsors who are not linked to food and drink: Ottobock for sponsoring the plenary sessions; Soft Options for providing the delegate bags once again; Sumed sponsoring the conference book for the 2nd year running.

And finally, we must not forget all the companies who have so generously sponsored delegates to attend the conference; some NHS trusts are not able to fund many or any staff for training, so a massive thank you to you all: Sunrise Medical, Invacare, Ottobock, Quantum, RMS, RHealthcare, Leckey, SOS, Sumed, Active Design, Gel Ovations, Gerald Simonds, Handicare, Helping Hand and Soft Options.

All that now remains is for me to wish you a very enjoyable conference with great learning and networking opportunities, and the odd beer thrown in for good measure!

Joanne McConnell
Chair of PMG Conference Committee

Conference book compiled and edited by Olwen Ellis and Ffion Lane, and kindly sponsored by Sumed.
Front cover design by: The Practice for Sumed
www.the-practice.biz/

CONTENTS

IMPORTANT INFORMATION

UNIVERSITY OF LEEDS

PARKING: On-site parking is extremely limited, available on a first come, first served basis and chargeable at £5.00 per day in the University's visitor car park. Access to the car parks is available via the main University entrance on Woodhouse Lane (postcode LS2 9JT), and they are marked in light blue on the map. All other University vehicle entrances and car parks are limited to permit holders only.

The closest public car park is an NCP on Woodhouse Moor Multi-Storey which is open 24-hours a day and is approximately 15 minutes' walk from campus. For more information, pricing and alternative parking locations please visit www.parkopedia.co.uk.

ATTENDEE PACKS & CONFERENCE BAGS: Your name badge can be found in your attendee pack and your lanyard in your conference bag. **Please attach your name badge to your lanyard immediately after registration, and kindly wear it throughout the event – without it you will be refused entry to the exhibition and conference proceedings.**

Your attendee pack also contains an attendance certificate (conference delegates only) and your Gala Dinner ticket if you have booked one. **Please note: you will not be admitted to the Gala Dinner without a ticket.**

PMG MEMBERS: PMG members will also receive a £15.00 book token to use at the exhibition book stall (stand 24) and a voting card for use at the AGM within your attendee packs.

LEFT LUGGAGE & CLOAKROOM: This is located in the gallery of the Sports Hall, please ask a member of staff for more details if required.

ON-SITE ACCOMMODATION: The main PMG Conference accommodation block is **Storm Jameson Court** (map reference 9). Due to the high number of attendees some delegates will also be located in **Henry Price Building** (map reference 16). You will need to come to the PMG registration desk to find out which accommodation block you will be staying in, if you arrive whilst registration is closed please go straight to Storm Jameson Court and they will inform you of where you are staying and provide you with your keys.

Checking in: Check-in **starts at 14:00 on Monday 13th July** and is open **24-hours a day**. Those arriving before 14:00 will be able to leave luggage at the accommodation block in a secure place. Those with B&B for Tuesday 14th July only, can check-in at any time on Tuesday.

Checking out: You must check-out of your room by 10:00 on your day of departure.

WELCOME EVENING CURRY NIGHT: This year there will be a Welcome Evening Curry Night, kindly sponsored by Leckey, which will take place at the **Waterside Café** within the Roger Stevens Building (map reference 89) on **Monday 13th July, 19:00 – 22:00**. Tickets for this event will be available at the PMG registration desk on Monday. Ticket holders are entitled to a free meal and drink at the event. A bar, taking cash and card, will also be available for those wishing to have more than the one drink! If you want to continue the party, the Terrace Bar at the Student Union (map reference 6) will be open during and after the Curry Night, and will close at midnight.

BREAKFAST: Attendees staying in the on-site accommodation will receive breakfast vouchers on checking-in. Those not staying on-site, who wish to purchase breakfast, can do so. Breakfast will served in the **University Refectory** (map reference 6) **07:00 – 08:30 on Tuesday 14th July and Wednesday 15th July**.

EXHIBITION: The exhibition will take place in **Sports Halls 1 & 2** (map reference 12) **08:00 – 18:00 Tuesday 14th July** and **08:00 – 15:30 Wednesday 15th July**.

CONFERENCE PROCEEDINGS: Plenary Sessions and Free Papers will be presented in the **Conference Auditorium** (map reference 13) and most of the Parallel Sessions will run in lecture theatres within the **Roger Stevens Building** (map reference 11). Room allocations for all sessions are published in the conference programme. The programme and session abstracts are available to read in this book (see from page 29).

POSTER PRESENTATIONS: The conference posters are displayed within the exhibition (Hall 2) and the poster abstracts are published in this book (see page 55). The poster presenters will be available, by their posters, for Q&A sessions during the afternoon break on **Tuesday 14th July, 15:10 – 16:10.**

LUNCH & REFRESHMENTS: Lunch and refreshments will be **served within the exhibition during the break times** on Tuesday 14th July and Wednesday 15th July; catering points are clearly marked on our Exhibition Floor Plan (see page 9). At the end of proceedings on Wednesday 15th July light refreshments will be served in the Conference Auditorium lobby.

DRINKS RECEPTION: The Drinks Reception, kindly sponsored by Quantum, will take place on **Tuesday 14th July**, **17:00 – 18:00 in the exhibition**. Complimentary drinks and nibbles will be available at the **catering point between stands 28 and 29 in Hall 1**. The Drinks Reception is open to everyone who wishes to attend, however there will be a limited number of drinks and nibbles available, so please arrive early.

GALA DINNER: The Gala Dinner, kindly sponsored by Specialised Orthotic Services, will be hosted in the **University Refectory** (map reference 6) on the evening of **Tuesday 14th July from 19:30**. This will be followed by an after-party and disco in the Terrace Bar within Leeds University Union (adjacent to the Gala Dinner venue). **The Gala Dinner is available to ticket holders only**; you MUST bring your ticket with you and hand it in at the entrance. The dress code is smart casual and the Conference Committee kindly request that no jeans or trainers be worn.

WI-FI: Attendees will be **provided with a username and password** to access the university's Wi-Fi **at the PMG registration desk**. This can be used throughout the university campus, including the accommodation, and will enable you to access the Meet in Leeds network. Full instructions are issued with the usernames and passwords.

CAFÉS, SHOPS & BARS: The University of Leeds has 12 cafés on campus, each selling a wide range of snacks, sandwiches and drinks. The **Waterside Café** (map reference 11) is the most conveniently located to the PMG Conference venues, and is open **08:30 – 15:00** for the duration of the event.

Leeds University Union (map reference 6) additionally houses a number of shops, bars, eateries, a hairdresser, beauty salon and a mini-supermarket, called Essentials, which sells newspapers, magazines, stationary, drinks, sandwiches, snacks and confectionery items.

CASH POINTS: There are cash points located within the **Leeds University Union building** (map reference 6). Tesco Express on Calverley Street (just down the road from The Edge) also has a cash machine outside. There are also several major bank chains opposite the University's main entrance.

IMPORTANT CONTACT NUMBERS:
Venue Conference & Events Team: +44 (0) 113 343 3638
PMG Conference Team: + 44 (0) 7929 567730 *(please note: this mobile number is used during events only).*

In the event of any serious problems, or for emergencies, please contact University of Leeds Security on + 44 (0) 113 343 5494 (available 24 hours). For those attending from outside the UK please note that the emergency number for the fire service, ambulance or police is 999.

HEALTH & FIRST AID: If first aid is required on campus please contact a member of staff in the building, or for emergencies, call University of Leeds Security via an internal telephone on x32222 or externally on +44 (0) 113 343 2222 (available 24 hours).

HOSPITAL/PHARMACIES: The nearest Accident & Emergency department is at the Leeds General Infirmary, which is situated adjacent to the University; their contact number is +44 (0) 113 243 2799. Lloyds Pharmacy is situated on Woodhouse Lane across from the Parkinson Building (map reference 1).

SMOKING POLICY: All meeting rooms, lecture theatres, foyers, public areas, bars, doorways, entrances and bedrooms within the University of Leeds operate a no smoking policy; it against the law to smoke in all public indoor spaces.

PHOTOCOPYING & PRINTING: The **Media Services shop** is open **09:00 – 16:30** throughout the event on the ground floor of the **Roger Stevens building** (map reference 11) where there are photocopying facilities and other audio visual services available.

SPORTS FACILITIES: Attendees staying in the on-site accommodation benefit from free access to The Edge: the University's new pool, gym and fitness suite, for the duration of the conference. Please go to The Edge's reception desk for more details.

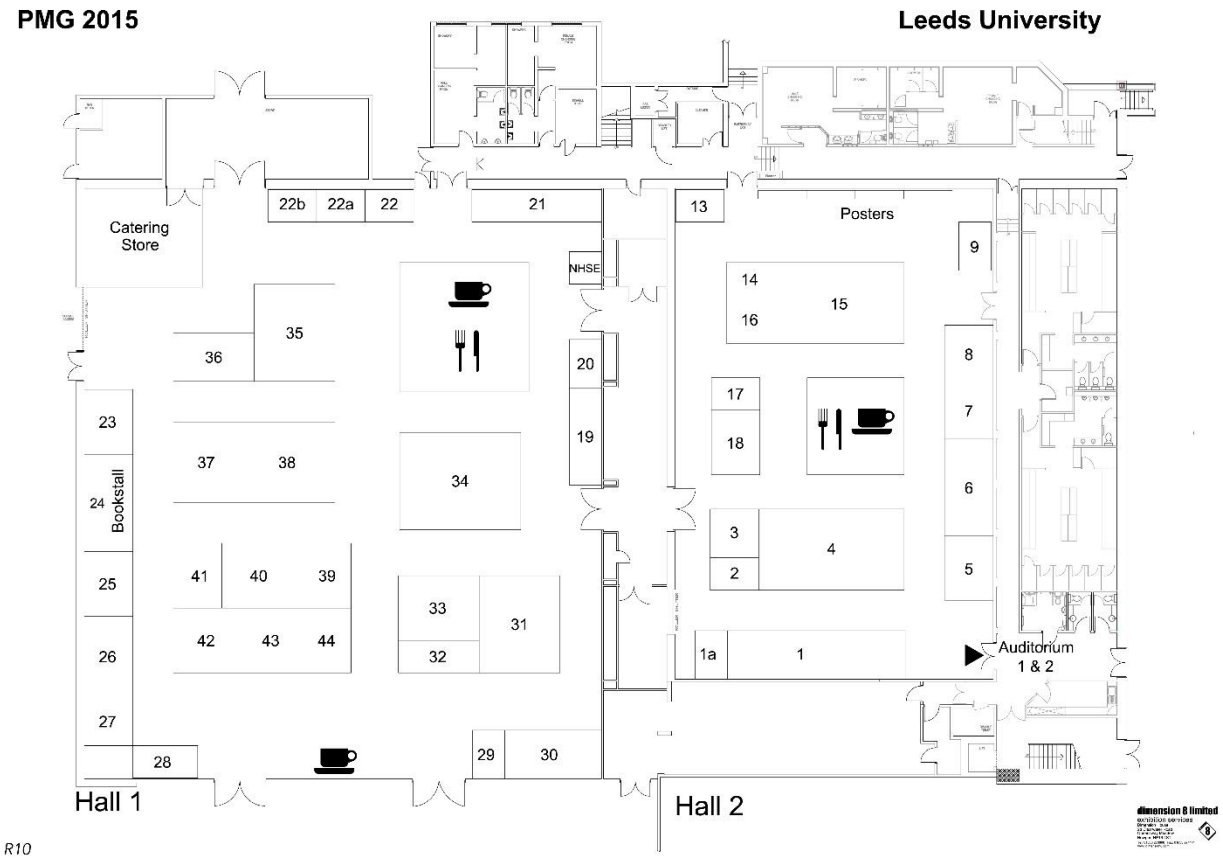
NO ALCOHOL POLICY: Only the venue is licenced to provide alcohol at this event. If any attendee is found consuming alcohol not provided by the venue, or providing alcoholic drinks for others at the event, they will be asked to leave immediately.

EXHIBITION CATALOGUE

EXHIBITION STAND ALLOCATIONS

STAND NO.	COMPANY NAME
1	Sunrise Medical
1a	Ad Alta Consulting
2	Matrix Seating Ltd
3	Karomed
4	Specialised Orthotic Services Ltd (S.O.S.)
5	Soft Options (Systems) Ltd
6	Qbitus Products Ltd
7 & 8	Gel Ovations Europe
9	Etac
N/A	Posters
13	RMS Limited
14, 15 & 16	Ottobock
17	R82 UK Ltd
18	Consolor Ltd
19	Gerald Simonds Healthcare Ltd
20	Bartrams
N/A	NHS England (NHSE)
21	Radcliffe Rehabilitation Solutions Ltd
22	C&S Seating Ltd
22a	Dan Medica South Limited
22b	The Mobility Aids Centre
23	Chunc Posture and Mobility
24	Blackwell's Bookshop (Bookstall)
25	Southwest Seating & Rehab Ltd
26	RHealthcare
27	Karma Mobility
28	G & S Smirthwaite Ltd
29	Greencare Mobility Ltd
30	RMS Limited
31	Quantum
32	Pro Medicare S.R.L.
33	Invacare Ltd
34	Leckey
35	Sumed (International) UK Ltd
36	Tendercare Ltd
37	BES Rehab Ltd
38	Blatchford Clinical Services
39 & 40	V-Trak – ISM Ltd
41	Qimova UK Ltd
42	The Helping Hand Company
43	Ortho Europe Ltd
44	Active Design Ltd

EXHIBITION FLOOR PLAN



EXHIBITING COMPANIES

ACTIVE DESIGN LTD

STAND 44

68K Wyrley Road
Witton
Birmingham
B6 7BN

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

Evidence based, good design and excellent engineering.

Active Design are one of the most established companies providing postural management equipment in the market. We will be exhibiting the Bugzi early years powered wheelchair along with multi-adjustable headrests, hybrid Lynx seating systems and dynamic seating solutions that really work!

AD ALTA CONSULTING

STAND 1A

Tel: 07957 344 188
Email: Michael.seymour@adaltaconsulting.co.uk
Website: www.adaltaconsulting.co.uk

We deliver innovative and sustainable change for healthcare providers; working with senior executives, service managers and front-line staff. We combine hands-on operational transformation support, with bespoke tools and deep service expertise, to transform healthcare services. We have a proven track record in wheelchair service transformation, a unique approach, and receive excellent client feedback.

BARTRAMS

STAND 20

Lancaster Way Business Park
Ely
Cambridgeshire
CB6 3NW

Tel: 01353 665 616
Email: sales@bartrams.net
Website: www.bartrams.net

Manufacturer and supplier of bespoke cushions for over 20 years. The Gem Stone range can be made in any size to accommodate most weights and the whole range has been clinically proven.

BES REHAB LTD

STAND 37

131 South Liberty Lane
Ashton Vale
Bristol
BS3 2SZ

Tel: 01179 666 761
Email: info@besrehab.net
Website: www.besrehab.net

BES Rehab offers market-leading services and assistive technology for specialists, such as wheelchair services, to improve quality of life for carers and individuals with medical conditions. With over 20 years of bringing innovative solutions to the UK and Irish market, we would like to share our knowledge and expertise with you, and continue to provide better solutions to cater to your clients. Visit stand 37 to find out more about our solutions.

BLACKWELL'S BOOKSHOP

STAND 24

21 Blenheim Terrace
Woodhouse Lane
Leeds
LS2 9HJ

Tel: 0113 243 2446
Email: leeds@blackwell.co.uk
Website: www.blackwell.co.uk

Blackwell's have been supplying academic texts, professional books and specialist publications to individuals and organisations for over 100 years. We pride ourselves on our knowledge and our friendly, efficient customer service. If you buy for a private or public sector organisation, get in touch with us about our account services.

BLATCHFORD CLINICAL SERVICES

STAND 38

11 Atlas Way
Atlas North
Sheffield
S4 7QQ

Tel: 0114 263 7900
Email: sales@blatchford.co.uk
Website: www.blatchford.co.uk

Blatchford Clinical Services provides specialist seating to both the NHS and private patients at centres across the UK. Carved foam, KATO, moulded and hybrid seats provide support and comfort for accurate seating solutions. Visit stand 38 to view the Nimbus seat, the latest design from Blatchford.

C&S SEATING LTD

STAND 22

22 Theaklen Drive
Ponswood Industrial Estate
Hastings
TN34 3LL

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

C&S Seating Ltd continues to respond to requests from clients, parents and therapists to meet their postural needs and wants where possible. We are delighted to have a range of fabrics and colours now available and in our catalogue. For further details see our website www.cands-seating.co.uk or email us on info@cands-seating.co.uk.

CHUNC POSTURE AND MOBILITY

STAND 23

Unit 416, Tarsmill Court
Rotherwas
Hereford
HR2 6JZ

Tel: 01432 377 512
Email: sales@chunc.co.uk
Website: www.chunc.com

UK manufacturer and direct seller of paediatric and young adults' seating and mobility: attendant controlled wheelchairs, Hilo bases for school and home seating and Chunc SIT seating system which can be fitted to a number of manual and powered wheelchair bases. Octo Back is a specialist back to help manage complex disabilities.

CONSOLOR LTD

STAND 18

188-194 Spring Road
Bournemouth
BH1 4PX

Tel: 01202 827 650
Email: admin@consolor.co.uk
Website: www.consolor.co.uk

Consolor, one of the UK's leading experts in custom seating, is dedicated to improving posture, comfort and quality of life. Our clinicians provide seating and mobility assessments to private clients and NHS wheelchair services across the UK, offering a range of products and services tailored to each client's individual needs.

DAN MEDICA SOUTH LIMITED

STAND 22A

28 Downsview Avenue
Storrington
West Sussex
RH20 4PS

Tel: 0208 133 2851
Email: dmsltd@yahoo.co.uk
Website: www.danmedicasouth.co.uk

With 30 years of experience in special seating, we now bring new technology into the industry with our clinically proven Treat-Eezi Overlay Bed Pad and the latest Air Fibre Treat-Lite cushion range, available in different sizes. DebbonAir, now in its 15th year, will also be on show.

ETAC

STAND 9

R82 UK Ltd
Unit D4A, Coombswood Business Park East
Coombswood Way
Halesowen
West Midlands
B62 8BH

Tel: 0121 561 2222
Email: enquiries@etac.uk.r82.com
Website: www.etac.com/etac-uk

Etac develops well-designed and innovative health care products that help enhance the lives of people with disabilities and their carers. With over forty years of experience, we offer a wide range of solutions including manual wheelchairs; toileting, bathing and daily living; Molift hoists and slings and Immedia manual transfer.

G & S SMIRTHWAITE LTD

STAND 28

17 Wentworth Road
Heathfield Industrial Estate
Newton Abbot
TQ12 6TL

Tel: 01626 831 829
Email: info@smirthwaite.co.uk
Website: www.smirthwaite.co.uk

We are market leaders in the manufacturing and design of equipment for children and young people with special needs. Our extensive range incorporates products to assist those from 8 months to 18 years old in the areas of seating, standing, toileting, bathing, changing and showering. We also have ranges dedicated to therapy and sensory integration.

GEL OVATIONS EUROPE

STANDS 7 & 8

Mobility House
2 Stover Road
Yate
Bristol
BS37 5JN

Tel: 01454 285 071
Email: info@gelovationseurope.com
Website: www.gelovationseurope.com

Gel Ovations Europe will be presenting our growing range of gel wheelchair and seating accessories. Highlights for 2015 will be our new Dezign Gel and a new range of versatile Sta Rite Elbow Stops. Any engineers attending the show will also be interested in our new Sta Rite Accessory Clamps.

GERALD SIMONDS HEALTHCARE LTD

STAND 19

9 March Place
Gatehouse Way
Aylesbury
Bucks
HP19 8UA

Tel: 01296 380 200
Email: info@gerald-simonds.co.uk
Website: www.gerald-simonds.co.uk

Gerald Simonds is the leading national supplier of wheelchairs, wheelchair seating and pressure relieving products in the UK. Our added value service begins with impartial advice on the right solution for individual needs, backed by expert assessments and no-obligation demonstrations. We then provide long term after sale and customer support.

GREENCARE MOBILITY LTD

STAND 29

Simcox Court
Riverside Park Road
Middlesbrough
TS2 1UU

Tel: 01642 353 492
Email: info@greencaremobility.com
Website: www.greencaremobility.com

Greencare supply wheelchairs that facilitate delivery to the client at time of first assessment. The exploitation by services of Greencare's total modularity reduces client waiting times, and significantly reduces services' costs. Try it, it's true! Greencare's lightest ever bariatric chair is 23kg, and only £699 (NHS), for a 200kg occupant.

THE HELPING HAND COMPANY

STAND 42

Bromyard Road
Ledbury
Herefordshire
HR8 1NS

Tel: 01531 635 678
Email: lisabishop@helpinghand.co.uk
Website: www.lowzone.co.uk

Integrated approach to the management and prevention of pressure ulcers in seating, combining posture, pressure and micro-climate management to deliver day long comfort, stability and function. Cutting edge technology, CPD accredited training and 100% British – accept no imitations.

INVACARE LTD

STAND 33

Unit 4, Pencoed Technology Park
Bridgend
CF35 5AQ

Tel: 01656 776 200
Email: uk@invacare.com
Website: www.invacare.co.uk

Showcasing on the Invacare stand will be a number of new and innovative products that offer cost effective mobility solutions, including the new Pronto M41, now with Invacare's unique Modulite seating system, new Küschall Attract active chair, and our highly popular Rea Dahlia passive chair, with 45 degree seat tilt.

KARMA MOBILITY

STAND 27

Unit 6, Target Park
Shawbank Road
Redditch
B98 8YN

Tel: 0845 630 3436
Email: mark@karmamobility.co.uk
Website: www.karmamobility.co.uk

Karma is a leading manufacturer of lightweight aluminium wheelchairs and has an extensive range of models to suit a wide variety of users. Their power chair range is also increasing, together with the accessories for them.

KAROMED

STAND 3

Millfield Industrial Estate
Chard
Somerset
TA20 2BB

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

Karomed continue to be one of the most flexible companies supplying wheelchair services. Delivery is free of charge and there is no extra cost for any bespoke size. Additionally, with the expansion of our factory to accommodate the increase in demand, deliveries are made within the week or consignment stock is offered.

LECKEY

STAND 34

19C Ballinderry Road
Lisburn
Co Antrim
BT28 2SA

Tel: 028 9260 0750
Email: info@leceky.com
Website: www.leckey.com

Leckey is a globally recognised pioneer in the research, design and development of clinically focused, posturally supportive products.

MATRIX SEATING LTD

STAND 2

35 Breach Lane
Shaftesbury
Dorset
SP7 8LD

Tel: 0844 251 2575
Email: orders@matrixseating.com
Website: www.matrixseating.com

Matrix Seating continues to improve and evolve the Matrix concept. Matrix systems are now available in the original fully customisable form or, an alternative, ready shaped, and ready to go 'back' at competitive prices. Customised seating just got easier!

THE MOBILITY AIDS CENTRE

STAND 22B

88 South Street
Stanground
Peterborough
PE2 8EZ

Tel: 01733 342 242
Email: enquiries@mobaids.co.uk
Website: www.themobilityaidscentre.co.uk

Exclusive importers of the Convaid range of buggies for over 30 years. The Mobility Aids Centre are suppliers to the NHS, schools, hospitals and the public. See the new Convaid Trekker and Mewa buggies on our stand, together with product updates for our existing models.

NHS ENGLAND (NHSE)

HALL 1

NHSE staff will be holding drop-in sessions for conference attendees to discuss the current changes taking place within the NHS wheelchair services in England. Their programme is as follows:

TUESDAY, 14TH JULY

- NHSE Wheelchairs Programme – where we are at (Christine Budd & Sarah Pudney)
  10:00 – 10:30; 13:30 – 14:00; 15:10 – 15:40
- Data Collection (Jonathan Briggs & Philip Wilcock)
  10:30 – 11:00; 13:00 – 13:30; 15:40 – 16:10

WEDNESDAY, 15TH JULY

- NHSE Wheelchairs Programme – where we are at (Christine Budd & Sarah Pudney)
  10:30 – 11:00; 13:30 – 14:00
- Data Collection (Jonathan Briggs & Philip Wilcock)
  11:00 – 11:30; 13:00 – 13:30

ORTHO EUROPE LTD

STAND 43

Ability House
Nuffield Way
Abingdon
Oxfordshire
OX14 1RL

Tel: 01235 552 895
Email: info@ortho-europe.com
Website: www.ortho-europe.com

Ortho Europe, operating to CECOPS and accredited with the ISO Standard 13485 Medical Devices Quality Management System, are leaders in the provision of custom-made solutions. With 20 years' experience using CAD-CAM, we utilise our 7 axes robot and highly-skilled, experienced technicians for our custom carved seating and moulded seat inserts.

OTTOBOCK

STANDS 14, 15 & 16

Otto Bock Healthcare PLC
32 Parsonage Road
Egham
Surrey
TW20 0LD

Tel: 01784 744 900
Email: bockuk@ottobock.com
Website: www.ottobock.co.uk

Ottobock's 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 and our seating site provide custom seating units.

POSTERS

HALL 2

This year nine posters will be on display within the exhibition. The poster presentation Q&A sessions will take place during the afternoon break on Tuesday 14th July.

PRO MEDICARE S.R.L.

STAND 32

Via Antonio Montagna – Z.I.
72023 Mesagne (BR)
Italy

Tel: 0039-0831-777840
Email: info@promedicare.it
Websites: www.promedicare.eu
www.versainserto.com

Pro Medicare s.r.l. is an Italian manufacturing company operating in the rehabilitation field. Taking advantage of 20 years' experience in research, we are involved in the development and production of seating systems and modular aluminium frames. In our portfolio of products: the Adacta-Versa, the Adacta Klim and the Inserto seating solution.

QBITUS PRODUCTS LTD

STAND 6

Springwood Cornmill
Rawroyds
Holywell Green
Halifax
HX4 9ED

Tel: 01422 377 775
Email: sales@qbitus.co.uk
Website: www.qbitus.co.uk

The name Qbitus is well known to all professionals active in the healthcare sector. A leading supplier to the NHS for more than 30 years you can be sure of the very best care, credibility, comfort, reliability, performance and cost. Our field representatives and technical staff are available to you 24/7.

QIMOVA UK LTD

STAND 41

Seabourne Leisure
Court Meadow
Kempsey
Worcestershire
WR5 3JL

Tel: 01905 821 407
Email: info@qimova.com or
ashley@qimova.com
Website: www.qimova.com

Qimova UK are a Danish manufacturer of high quality comfort and corrective postural management wheelchairs. Our range of products carry a huge amount of adjustment and function as standard, to evolve with the client for many years, as their condition changes. We specialise in making the impossible “possible” and never say no!

QUANTUM

STAND 31

32 Wedgwood Road
Bicester
Oxon
OX26 4UL

Tel: 01869 324 600
Email: sales@quantumrehab.co.uk
Website: www.quantumrehab.co.uk

The Quantum power chair range offers the very best in the design and development of powered technology, from the ultimate in comfort seating to market leading powered positioning systems, offering the user the chance to re-discover their freedom and independence.

R82 UK LTD

STAND 17

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

Tel: 0121 561 2222
Email: r82uk@r82.com
Website: www.r82.com

R82 UK present a world beating range of seating, bathing, standing and walking equipment. Come and meet the team of experienced and expert product advisors. Whether you are looking for research information, product demonstration, problem solving or trouble shooting advice we are looking forward to meeting you

RADCLIFFE REHABILITATION SOLUTIONS LTD

STAND 21

5 The Sidings
Top Station Road
Brackley
Northamptonshire
NN13 7UG

Tel: 01280 700 256
Email: enquiries@radclifferehab.co.uk
Website: www.radclifferehab.co.uk

Radcliffe Rehab was established in 1993. At this time the company's main focus within the mobility sector was the Shadow Tilt in Space Wheelbase range for specialist seating. This product continues to be sold to the NHS throughout the UK. The company went on to introduce the Netti range of positioning wheelchairs, as well as pressure relieving cushions, paediatric buggies and specialist seating systems.

RHEALTHCARE

STAND 26

Building 2, Philips Campus
Wellhall Road
Hamilton
ML3 9BZ

Tel: 0845 1460 600
Email: sales@rhealthcare.co.uk
Website: www.rhealthcare.co.uk

RHealthcare supplies a range of steel and aluminium manual wheelchairs to the NHS. The Dash range now includes the Dash Lite 2, with improved footrest, and the Dash Life, with a maximum carrying capacity of 190kg.

RMS LIMITED

STANDS 13 & 30

Thompson House
Unit 10, Styles Close
Sittingbourne
Kent
ME10 3BF

Tel: 01795 477 280
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ABSTRACTS

TUESDAY 14TH JULY 2015

OPENING PLENARY (PL1)

MY O.T. JOURNEY: FROM CLIENT TO PROVIDER

Dave Calver
Health Services for Community Living, Vancouver

Approximately 11 years ago I had a spinal cord injury while mountain biking in Kamloops, British Columbia. Previous to this I was a guide in the adventure tourism industry, guiding on rivers all over the world and trekking trips in the Himalaya.

My accident resulted in a L3 ASIA A spinal cord injury and my use of a manual wheelchair. Initially, I believed my injury and resultant wheelchair use meant a loss of opportunity and mobility. My injury and rehabilitation experiences caused me to pursue a master's degree in Occupational Therapy. Since then, I have worked in acute care spinal cord rehabilitation, Home & Community Care, spinal cord rehabilitation education, and international wheelchair development projects with Motivation UK and, currently, as the clinical co-ordinator for United Cerebral Palsy (UCP) Wheels for Humanity.

I have guided river trips in British Columbia, The United States and Latin America, and been involved with programs to help other individuals with disabilities participate in adventure based activities and to access wilderness environments. I no longer believe there have been any limitations in my opportunities or mobility…but I am still testing that theory!

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FP1

INVESTIGATING THE EFFECT OF RAMPED CUSHIONS ON FEMORAL ORIENTATION AND PRESSURE DISTRIBUTION

Presenter: Caroline Newe

Summary
Ramped cushions are often prescribed for individuals who are unable to maintain a stable and safe seated position. In this project, motion capture and pressure mapping were used to investigate the effect of ramp angle on femoral orientation in an attempt to identify an optimal angle for safe, effective sitting.

Aims & Objectives
The main goals of cushion provision are comfort, support and pressure relief. The aim of this work was to investigate the effect of ramp angle on femoral position and pressure over the seated area. Establishing a relationship between ramp angle, femoral orientation and pressure would in turn allow an optimised cushion - that is one in which the femur is approximately horizontal with no areas of excessive pressure - to be identified.

Background
Posture is influenced by a number of interconnected factors including muscle tone, height, weight, and health status. It is essentially the relationship between comfort, stability and function and a balance must be struck between the three to achieve and maintain an appropriate posture for a particular task (Wright, 2011). Consequences of poor posture include tissue trauma, increased pain and discomfort, and it can have a negative impact on internal processes such as breathing, digestion and circulation. An individual with postural instability will have to use energy to maintain their position and keep their balance. This can have an adverse impact on their functional ability, causing them to fatigue quickly and have less energy available to expend on other tasks. When prescribed correctly, seating will help the user to achieve their optimal postural position which, in turn, will aid in maintaining and enhancing their functional ability.

Ramped cushions are often used to provide pelvic stabilisation. A commonly referenced ramp angle is one of 15° which is thought to maintain the femur in a horizontal position, assist in keeping the hips and knees at 90°, promote even weight distribution, and decrease the tendency to sacral sit (Green and Nelham, 1991). The use of appropriate ramping encourages the bottom to stay at the back of the seat and the spine to maintain a more upright posture. This seated position reduces pressure on the sacrum and coccyx, in turn reducing the potential for the development of pressure ulcers. This project is concerned with quantifying the effect of a range of ramp angles on the orientation of the femur. A relationship between femoral position and ramp angle will enable identification of the angle necessary to achieve a horizontal femur to be identified.

An initial series of tests was conducted on three cushions with varying ramp angle. Standard 2” thick, 2” ramped (9.46°) and 3” ramped (14.04°) cushions were investigated. The depth of the cushion was selected based on the seat depth measurement of an able bodied volunteer. A Vicon 612 Clinical System motion capture system was used to accurately locate the volunteer’s femur and pelvis when seated on each cushion. The pressure over the volunteer’s seated area was measured using a Tekscan CONFORMMat pressure mat. During each test the cushion was positioned on a manual wheelchair with the pressure mat on top. Eight markers were used to define the volunteer’s pelvis and femurs, allowing their 3D coordinates to be captured. The tests were carried out initially with

the footboard in place and height adjusted for each cushion, then repeated with the footboard removed. Each test was repeated three times. The Peak Pressure Index (PPI) and average pressure over the thighs and bottom were found for each test. Analysis of the initial dataset suggests that the 2" ramped cushion performs most favourably, resulting in an approximately horizontal femur, the lowest PPI and most even pressure distribution of the three cushions. Comparable results were obtained with and without the footboard in position.

Discussion

An ideal cushion will maximise the patient's comfort, reduce the potential for development of pressure ulcers, and enhance their ability to maintain a safe and stable seated position. On initial positioning in the seat, a flat cushion surface will typically result in a neutral pelvis with the femurs orientated in downward direction, i.e. the knees are below the hips. If the user lacks control over their seated position, they will tend to slide forward in the seat over time due to the downward slope of their thighs and the weight of their legs. This leads to posterior pelvic tilt and sacral sitting which results in excessive pressure on the sacrum. It is widely recognised that the use of a ramped cushion maintains the femurs in an approximately horizontal position, helping to limit forward sliding and promote a more even pressure distribution.

What is unclear however is the ramp angle necessary for optimal femoral position and pressure distribution. Of the three cushions assessed in this study, the 2" ramped cushion (9.46°) performed most favourably in terms of positioning and pressure distribution. This is contrary to the value of 15° quoted in the literature. The ramp angle tested which was closest to 15° was the 3" ramped cushion (14.04°) which performed less favourably, generating higher pressures and inclined femurs. This study marks a starting point in the identification of an optimal ramp angle for safe and effective seating.

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FP2

INVESTIGATION OF THE ADEQUACY OF SPECIAL SEATING SERVICE PROVISION IN IRELAND

Presenter: John Tiernan

Summary
A research project was undertaken to investigate the adequacy and equity of special seating service provision. Nationally, it was found that services are provided to approximately two-thirds of those identified as needing them, but significant inter-regional variation occurred, with areas closer to Dublin receiving better services than those further away. Variations in service delivery related to, amongst other things, quantum and quality of service provision. Recommendations are made with respect to future service developments in line with international thinking on the topic.

Aims & Objectives
The objectives of this study were to ascertain the level of need for wheelchairs and seating assistive technology (WSAT) in Ireland, to estimate the level of supply of same, and to assess the perceived adequacy and equity of special seating service provision across the country.

Background
Background: A lack of research into the adequacy of special seating services in Ireland makes effective planning for the future sustainability of such services virtually impossible. This research constitutes the first attempt at characterising special seating services in Ireland.

Technique: A review of the published literature established the critical importance of appropriate WSAT provision, and considered the rights of people who need to access it (Gowran 2012). Estimates of need for WSAT in Ireland were generated, and these were found to be close to comparative international findings.

A self-completion questionnaire was e-mailed to a convenience sample of professionals with experience in the area of WSAT prescription and provision. This generated quantitative and qualitative feedback on various aspects of service provision including need, supply, aspects of services offered, and the perceived adequacy of service provision.

Results: An estimated 40,000 people in Ireland use wheelchairs and up to 27,000 people require additional special seating supports. The survey found that seating services are provided to a national figure of 66% of those identified as needing them. However this figure varied across Health Services Executive (HSE) areas, being highest in HSE areas closer to Dublin (95%), and lowest in the HSE South area (33%). The overall perceived adequacy of service provision was found to be 57%, and it varied in a similar way, from 67% (close to Dublin) to 43% (in the HSE South area). These variations were found to correlate closely to the variations in HSE regional spending on new WSAT.

Discussion
This research found that the identified need for special seating services in Ireland is not being adequately met at present. This does not bode well for the future, as the demand for such services is anticipated to grow.

The research findings indicate regional variations in the level of service delivery across HSE areas. Interregional variations were identified in relation to:

- funding
- access to services
- service providers
- aspects of service offered by services
- expertise offered by services

Several themes emerged from analysis of the qualitative feedback from a survey undertaken in the course of this research. These include:

- waiting times
- funding
- location of services
- specialist training for service provision
- standards of service

An analysis of the research findings and relevant published literature has led the author to conclude that regional special seating services, comprising highly-skilled interdisciplinary teams, working in dedicated centres, should be established to deliver quality services in locations convenient to service users.

It should be possible to elevate WSAT service provision to a more acceptable and consistent level throughout the country. International thinking on the subject indicates that this would be best achieved through a number of regional specialist services, with multi-disciplinary teams working to common standards of practice, and having adequate infrastructure at their disposal to undertake bespoke equipment design, manufacture and modification (NHS Commissioning Board, 2012; Nichols, 2011). Such specialist services would provide local support to primary care teams and primary care networks in line with current government health and primary care strategies.

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PARALLEL SESSIONS

PS1

MANIPULATING WEIGHT-MAXIMIZING EFFICIENCY: IMPROVING FUNCTION WITH MANUAL WHEELCHAIRS

Presenter: Jane Fontein

Summary
Clinical practice guidelines recommend adjustable wheelchairs of the "lightest material available" for manually propelling individuals for maximum function and safety. A study found the primary reason for wheelchair non-use is weight (Cowan, 2009). Attendees will learn how to select, accessorise and set up a manual wheelchair to minimise weight and maximise efficiency.

Aims & Objectives
Attendees will learn through a review of the research and clinical practice guidelines how to select, accessorise and set up a manual wheelchair to minimise weight and maximise efficiency. Overall weight is important but will depend on the accessories, as the frame itself weighs only 20% of the total. If set up poorly, a lightweight chair could be less efficient than a well set up heavier wheelchair.

Background
This is not a research paper but rather a clinical/practical presentation.

Discussion
Decisions you make when ordering and setting up wheelchairs will impact wheelchair weight and efficiency and can have a significant effect on function, independence and safety. Common problems including wheelchairs that are difficult to propel, injuries to the upper extremities and even wheelchair abandonment, can be avoided or minimised by following some simple evidence-based recommendations. Knowing and understanding these evidence-based recommendations regarding wheelchair weight, configuration and set-up is essential to anyone using, prescribing or selling wheelchairs.

Wheelchair manufacturers often promote having the lightest wheelchairs made of the lightest materials. Does this matter and, if so, how much? There is research evidence that suggests that a lighter wheelchair will be easier to propel (Beekman et all, 1999). Clinical practice guidelines support the use of the lightest adjustable wheelchair available for upper limb function preservation (RESNA, 2012). There is also evidence indicating that wheelchair non-use among older adults is linked to wheelchair weight (Mann et al, 2002). Wheelchair weight will impact the user or caregiver who must lift the wheelchair in and out of the car. Even an ultra-lightweight wheelchair can be difficult to propel if it's not set up properly. This workshop will examine how choice of frame style, frame materials and components will affect the overall weight of the wheelchair, and the evidence regarding wheelchair weight and propulsion efficiency will be presented and discussed. Attendees will be encouraged to share their own strategies.

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PS2/1

REVIEW OF MOTOR NEURONE DISEASE (MND) REFERRALS: EXPECTED OUTCOME V ACTUAL OUTCOME

Presenter: Alison Johnston
Additional author: Kirstie Bloom

Summary
An audit of referrals made over a five year period of clients with MND referred for wheelchairs.
Was what was requested issued?
What was the impact on the service?
Was it appropriate for clients' current and future needs?

Aims & Objectives
1. To evaluate initial referral care pathway against the actual care pathway delivered for clients with MND.
2. To ensure that a "right first time" approach is delivered irrespective of the information received.

Background
Clients referred to the wheelchair service (WCS) with a diagnosis of MND have a rapidly deteriorating condition which is prioritised by the service. Initial referrals are received from clinical nurse specialists, consultants, GPs and therapists. The WCS has noted that in some instances the care pathway suggested by the referral differs from the care pathway provided by the WCS. This could have resulted in unnecessary clinical intervention and distress prior to provision of the appropriate care pathway.

There are currently no guidelines from the National Institute for Health and Care Excellence (NICE) for people with MND. The National Wheelchair Managers Forum has agreed that clients with MND should be prioritised. In most cases MND is a rapidly deteriorating condition, and provision of mobility and supportive seating equipment can be difficult to provide in a timely manner. Many patients diagnosed with MND are still in the grieving stages of the condition when referred to the WCS for the first time. Many will not want to consider that in a very short time they may require a wheelchair with more support, or powered mobility.

This audit is to evaluate need and provision whilst considering forward thinking to provide appropriate mobility and seating equipment first time.

Paper and electronic records of the 33 clients referred to the WCS in the five year period were analysed for number of referrals and what the referral was for (powered or manual wheelchair, cushions or seating). This was looked at for trends as to whether they were seen by a member of the WCS team and whether they were issued the equipment requested in the referral, for both initial and subsequent referrals. Results showed there was a longer period of time between referrals for those who had a visit from a clinician originally, and also that only 78% were issued the equipment requested on the original referral compared with 100% of those who did not have a visit.

Discussion
By visiting all clients referred with a diagnosis of MND there is a chance to improve quality and build a relationship with families over what is likely to be a very short period of time (average 9 months

from referral to death). Assessment for appropriate equipment can increase the length of time between referrals (from 4.27 to 9.00 months) and ensure the WCS is not a "faceless" service, which makes approaching the service in times of change much easier.

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WEEKLY DROP-IN CLINIC: A SIX-MONTH PILOT AT CAMDEN & ISLINGTON WHEELCHAIR SERVICE

Presenter: Rebecca Dunkerley
Additional authors: Siana Duder and Natasha Hack

Summary
Camden & Islington wheelchair service (WCS) decided to carry out a 6-month pilot of a weekly drop-in clinic to help provide clients with a different way to access the WCS. The pilot has been successful and there are plans to continue providing and developing the service.

Aims & Objectives
The aim was to provide a different type of approach to the standard pre-booked clinics and to offer clients an alternative way to access the WCS. It was also to see whether or not this positively impacted the waiting list.

Background
Historically, the WCS offered pre-booked clinic appointments to clients, compared to some other healthcare services which are able to be more dynamic with the provision of clinics, such as NHS walk-in centres, sexual health clinics and dentistry. Sometimes, when screening referrals, if the therapists in our service felt that an intervention could be provided promptly, then the issue with the equipment could be resolved, and the issue going from being an 'acute' problem to a 'chronic' one could be avoided. These types of interventions were perceived to be less time consuming when provided in a timely manner. It was felt that if a drop-in service could be provided for clients, then some issues could be resolved on the day. Other issues may be resolved by first seeing a client at a drop-in clinic and then the client being sent the equipment or parts directly by post or via the approved repairer.

In addition, the drop-in service should help clients with urgent requests or needs by being able to access the service quickly without having to pre-book.

The pilot was formed by holding a meeting with the service staff to identify the pros and cons. The team thought about any problems which might occur and, where possible, how to avoid these from happening. Jobs were given to different team members; these included drafting a screening form, feedback form, inclusion criteria and information leaflet to distribute for promotion; looking at stock levels for basic parts, such as footplates, backrests, backposts; and other basic accessories and writing up processes so that everyone would know what to do, what to expect and how to run the clinic on the day.
It was important to ensure that people who were on the waiting list the longest were told about the new service first. Once the first week had gone by, a therapist went through the waiting list again to remind clients about the new service. That week, the duty therapist started to let clients know about the drop-in clinic and the administrative team started to inform clients and referrers about the new clinic. All referring community services were notified of the new clinic via their service leads, from the third week.

The pilot ended on the 11th March 2015 and, at the time this piece was submitted, we had on average seen just under the number of clients we would have scheduled in for a normal clinic day. We have had 98% positive feedback from clients and our commissioners were very happy with the

new service. We are moving forward with the project by reviewing the clinic to establish how we may improve upon it to keep on providing a drop-in service in the future.

Discussion

Our team's main concern was that we would have more clients attend than we could have coped with. To date, we have not turned anyone away; however, a handful of clients who arrived chose not to stay and there have been a handful of inappropriate attendees to the drop-in clinic.

Previously when clinics were pre-booked, the service was able to see up to six clients per day. To date, we average five per day and the maximum being 10. We measure our success based on seeing five clients or more per day, as well as the number of clients removed from the waiting list and the number of discharges due to the resolution of our clients' issues. In addition, we have no DNAs, as appointments are not pre-booked and this relieves our administrative team of booking appointments.

Examples of the types of services which we have provided at the drop-in clinic are: clients being weighed using wheelchair-accessible scales, pressure-mapping, training on the use of equipment, re-measuring, growing children's equipment, and general reviews.

Drawbacks of this type of clinic are that it is not suitable for all clients, e.g. clients with more complex input required, clients unable to wait in the waiting area, and clients unable to get themselves to the clinic.

An audit is currently under way to analyse the data and feedback gained from the drop-in clinic which will be presented at the parallel session. We have plans to increase attendance each Wednesday and to look at making the service more accessible in other ways. Further discussions are under way as a team, to see how the model should evolve.

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PS2/3

PILOT RESEARCH STUDY INTO THE EFFECTS OF SLEEP SYSTEMS ON QUALITY OF SLEEP, PAIN AND JOINT RANGE

Presenters: Nicola Aburto and Sarah Brown

Summary
In 2013 Hounslow wheelchair service (WCS) won a *Dragons' Den* style competition within Hounslow Community Healthcare (HRCH) Trust. The bid was for funding for a pilot study researching sleep systems as part of a twenty four hour postural management programme. Consideration of twenty four hour postural management and provision of sleep systems was patchy within the trust. The pilot study consisted of four participants over a period of six months. Evidence for joint range, quality of sleep, quality of life, pain, and goal attainment scaling (GAS) outcomes, were gathered at baseline, with data then being collected at monthly intervals. The outcomes have been positive, with sleep quality having improved, quality of life for both parents and participants having improved, and GAS outcomes having been met and exceeded.

Aims & Objectives
We found that there is little research evidence for clinicians to support provision and funding of sleep systems. Our aim was to obtain evidence of the clinical and quality of life effects of sleep systems for service users and carers. Also to ascertain any associated cost savings that had been made in our participants' overall care. Our objective was to expand the remit of Hounslow WCS and establish a Twenty Four Hour Postural Management Service. The information gathered from the pilot study would inform us how to deliver the service, budget requirements, and assist with building a business case to present to commissioners.

Background
The aim was to build on the evidence that has already been collected through previous research by building on their methods. A Mac Keith multidisciplinary meeting formulated a consensus statement concerning postural management for children with cerebral palsy: 'Children in GMFCS groups 4-5 should start twenty four postural management programmes in lying as soon as appropriate after birth, in sitting from 6 months and in standing from 12 months.' Both Terry Pountney (Pountney et al, 2009) and Ginny Humphreys (Humphreys, 2010) have conducted research which also supports the use of sleep systems.

Materials and Methods: In January 2014 we began a pilot study to measure the effect of the sleep systems. The four participants were aged between 3 and 21. We used the Chailey sleep questionnaire for the assessments and for the ongoing reviews to record changes in sleep quality, posture and use of the system. Sleep quality was also recorded using the Chailey sleep diaries. To assess quality of life for the family and the participant we used GAS. Pain levels were measured using the paediatric pain profile; postural assessment using the Oxford Centre for Enablement forms, and the neutral zero method was used to record joint range.

Having reviewed the sleep systems available we chose the Symmetrisleep system. This had a wide variety of options, could be used on any bed and could be transported with ease as many of our service users travelled abroad. The ideal was to use one system to limit variability in the results but, where this could not meet the participants' needs, alternatives would be considered.

Results: The study is still ongoing although preliminary results are positive. One participant was waking every 40 minutes to 2 hours and he is now only waking once during the night. The sleep system is now managing his posture at night and his tone has reduced. Another participant was waking regularly throughout the night as she would extend and scissor her legs which would cause discomfort. Her posture is now maintained and she is sleeping through the night. Her parents have also noted that her arms, which used to be held in flexion, are more relaxed and extended. Both parents have reported that they are feeling more refreshed as they have uninterrupted sleep. In one case the whole family sleep in one room and so this has improved all their sleep. All have reported that their GAS outcome measures have been met or exceeded. All participants' joint ranges have been maintained, and their pain has not increased, even, in some cases, decreased.

Discussion

The Chailey sleep questionnaire and sleep diaries have been invaluable in recording the level of detail required for prescription.

The borough has a very diverse population. Clear pictorial user guidelines have been critical, as some of the participants have English as their second language. The clear guidelines have meant the systems have been used correctly and consistently.

Another crucial aspect is that we have given the families close support. Two weeks after provision, a visit is made to assist the families and then once a month. In some cases we have been there for emotional support; some families have been, and still are, struggling, and we are there to help ease some of their carer burden. By visiting regularly this has also enabled us to react quickly where improvements need to be made, and we have been able to see how rapidly changes in sleep quality have occurred. In rolling out the project we will need to ensure that we have the staffing to enable us to give our families support to ensure the success of the systems.

The study has helped us to establish service delivery and budget requirements. Our trust is supporting us in funding this for another year. We are writing a business case which is being presented to our commissioners to become a Twenty Four Hour Postural Management Service. In recognition of our work our trust nominated us for a Health Service Journal award in the Compassion in Care category; we were then shortlisted as finalists.

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A PRACTICAL EXPLORATION OF SHAPE CAPTURE TECHNIQUES FOR CUSTOM CONTOURED SEATING USING VACUUM FORMED BEAD BAGS

Presenters: Paul Dryer, Dave Long and Helen Nelson

Summary
This parallel session will explore the casting methods employed to capture body shape through vacuum consolidation with the aim of sharing practice and ideas. It is aimed at a beginner/intermediate level. Note that seating materials and manufacturing methods will NOT be discussed.

Aims & Objectives
There are numerous techniques for capturing body shape using casting bags. It is the aim of this session to share practice across clinical staff, technical staff and manufacturers. There is no "gold standard" for casting and so the aim is NOT to identify a singular method, but to explore how approaches vary between organisations.

Background, Technique, Standards, Clinical Detail, Results & Testing
Custom contoured seating is provided routinely in wheelchair services across the country and, in a small number of cases, for static seating. It is a complex, highly skilled field of work, the clinician/engineer needing to have a sound understanding of postural management, coupled with the ability to think in three dimensions, in order to develop appropriate shaped supports to closely fit the human form. Manufacturers of seating, both commercial and NHS, do not generally share their practices as regards shape capture, not so much because of commercial sensitivities, but more because there is no platform so to do. Two books have been published in recent years which discuss custom contoured seating (Pope, 2007 and Taktak et al, 2014) but they do not expressly discuss the various techniques for shape capture. This session will facilitate the sharing of practice with the aim of improving outcomes for the patient. Please note that the framing method, used exclusively with the manufacture of (some) matrix seating systems, will not be covered as this is an entirely different technique.

The session will first introduce the subject area and briefly describe the reasons for using/not using custom contoured seating. This will be followed by a number of practical demonstrations using volunteers from the audience to demonstrate a variety of techniques. These will be facilitated by a selection of typical postures such as pelvic obliquity, rotation and tilt, extended hips, ab/adducted hips, flexed knees and kyphoscoliosis. It is intended that the session will be interactive, with the presenters acting as facilitators to discussion and the sharing of techniques, tips and ideas. The session will conclude with the presenters summarising the main learning points identified through the hour.

Discussion
It is hoped that the session will develop clinicians', engineers' and manufacturers' breadth of skills in capturing body shape for the purposes of manufacturing custom contoured seating.

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PS5/1

MEASURING WHEELCHAIR RELIABILITY

Presenter and additional author: John Colvin
Author: Colin Mair

Summary
Wheelchair reliability is an important consideration for wheelchair users and wheelchair services alike. Wheelchair reliability affects user safety, user satisfaction, maintenance costs and efficiency of a maintenance service. WestMARC have developed a means of quantifying wheelchair reliability. This presentation outlines the method and provides examples of applications.

Aims & Objectives

- To describe the method used to measure wheelchair reliability
- To present an analysis of the findings, including the identification of risk factors
- To describe applications of the findings
- To describe the limitations of the method

Background
It became apparent at WestMARC that there was no objective means of collating data relating to the reliability of the wheelchair after issue. It was identified that this information would be useful and would supplement the established laboratory testing outlined in ISO7176. WestMARC's wheelchair database of 44,000 active wheelchair users was used as a source of information.

Method
The technique was based on a literature review of the areas of reliability, engineering and risk management. Tools that are well established in these fields were assessed based on their suitability for the application. The method considers three factors of the wheelchair's reliability:

- the survival function of the wheelchair
- the rate of occurrence of failure of the wheelchair
- the severity of failure

The wheelchair's reliability was therefore a function of these factors and can be expressed as a financial value in GBP. The method was validated against an independent sample.

Results and Testing
The expected annual maintenance cost of 10 of the wheelchair models commonly provided by WestMARC was quantified (including powered, manual, paediatric and energy efficient wheelchairs). The reliability of commonly specified wheelchair models was compared.
User characteristics were identified that have significant impact on the wheelchair's reliability performance. User characteristics that did not have significant impact on the wheelchair's reliability performance were also identified.

Discussion
This method has applications in the areas of planned preventative maintenance, wheelchair refurbishment, inventory management, clinical provision, and cost-benefit analysis. Most notably, we are applying this work in the development of a risk based planned preventative maintenance

strategy. Limitations of the method include susceptibility to errors introduced by data mining, and limitations of available data on the database.

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PS5/2

£3000 SAVING WITH BATTERY TESTING (BORING BATTERIES?)

Presenter: Jack Reffell

Summary
Deep cycle batteries, commonly known as GEL, need to be reliable, particularly when used in powered wheelchairs by someone with a disability. It is imperative that the remaining life of the battery is known in order to reduce the amount of unexpected failures.
Within NHS wheelchair and special seating services, it is also important to ensure that, irrespective of a battery's age, it is not unnecessarily replaced simply because it appears outwardly to be past its best.

The amount of deep cycle batteries sent for disposal or recycling can amount to many thousands of pounds' worth in a very short period. Testing or checking these batteries accurately can often be time consuming, and sometimes requires repeating when irregularities arise. A more efficient, accurate, reliable and repeatable method, with quality record keeping, was therefore needed.

Dorset NHS wheelchair service undertook a rapid, combined trial and study exercise during normal working practice, so as to eliminate/minimise any disruption to service provision.
The result of this trial and study saved £3000 in just 4 weeks.

Aims & Objectives
The need to test batteries became apparent in late April/early May 2014, when the amount being placed for disposal/recycling was of great concern. At this same time, it was noted that some appeared to be relatively new, as well as some being old. With the cooperation of the repairs engineers' team, an investigation of sorts started. The rehab engineers and the repairs team worked together with their current skills and general knowledge of regular lead acid batteries to establish a better method of testing. The absolute need was that of ensuring our clients were in receipt of batteries of at least an industry accepted standard, whether new or previously used. They had to be fit for purpose.

A suspected faulty battery can also disguise a real fault elsewhere in the equipment. If unnecessarily changed, other issues perhaps relating to the charger, charging regime, controller leads, motor and brake solenoid faults, can be easily missed. These can result in repeated visits to a client, wasting time and money, and trying everyone's patience.
In addition to all of this was the very important act of budget control, i.e. *SPENDING WISELY!*

Background
Both the repairs team and rehabilitation engineers reviewed the existing method of battery testing and record keeping. There was no formal method of recording tested battery results.
There was no standard operating procedure (SOP) for testing batteries. The existing test methods were two-fold.

The first method was the simple load test as one might do with a car battery, using a Clarke CVT1 battery tester. Whilst this method gives a rapid, almost instant, report on battery condition, it gives its report as a measure of cold crank amperage (CCA) and as being simply good, fair or bad.
This instant report is related to the actual CCA value of the battery which, of course, GEL batteries used in powered wheelchairs are not measured in. They tend to be measured in amp hours (Ahr or

AH). In addition, the CVT1 method subjects the battery to a heavy load. This generates heat, can be allegedly dangerous with some batteries in a particular state, and reduces the life of a battery. Although the report given with this method is not conducive with Ahr/GEL batteries, it can be undertaken “on the road” when an engineer is faced with a suspect battery.

The second method would happen only in the repairs workshop, using a rather old but still functional Emrol BATTEST 10-20-4. This method involves fully charging two batteries in series, using the regular power wheelchair’s 24VDC charger for a period of 8 hours. The charged batteries are then connected to the Emrol and subjected to a constant 20Amp discharge test. Depending on the battery size and condition, the discharge can take many hours to perform with each battery singularly. The machine and method is reported to be accurate to 1% (although the machine itself had not been tested/calibrated for many years). In the event that the end of the test had been incorrectly completed (by human error), or there were to be an irregular result, the whole procedure would need to start again. The battery would need to receive another full charge over 8 hours.

Discussion
Firstly, we understood the need to be able to identify each battery.
Using our existing stock control system, we ensured each and every battery that moved within our repairs workshop received a stock code and asset number. The asset number is now the definitive identifier.

Every battery, when tested using the revised method, would now have its test results recorded against its asset number.

Every battery would now have a label attached showing its test result, dated and signed (initialled).

These three points became the basis of our SOP for battery testing.

The testing began…..

All the batteries stacked up for collection by the recycling agent were stopped from leaving the premises. Each battery was tested using the ACT GoldPlus following our newly written SOP.

In that first testing session of just four weeks, batteries to the estimated purchase value of £3,000.00 were prevented from being taken away by the recycling agent - he wasn’t happy!

Manufacturers of GEL batteries have varying recommendations for when they should be changed. Some say 60% of rating, others say 65%. We have decided that any battery that has a remaining current capacity of 70% or more will continue to be used.

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http://batteryuniversity.com/
Battery Stuff
http://www.batterystuff.com/
MK Battery
http://www.mkbattery.com/
Exide Technologies
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BENEFITS OF NATURAL MATERIALS IN CONTROLLING SKIN MICROCLIMATE

Presenter: Barend ter Haar

Summary
Natural products, such as wool or cotton, are better than synthetic materials in many areas of importance for skin integrity. This presentation looks at pressure redistribution, shear strain reduction, relative humidity, and temperature regulation properties of wool as compared with synthetic materials.

Aims & Objectives
This presentation looks at the scientific evidence supporting the choice of natural materials over synthetic materials in the design of seating products. Reference is also made to how materials can absorb shear strain in preference to the individual's skin tissues.

Background
Sheepskins used to be used routinely for pressure care until concerns about infection prevention surfaced, and there were problems of washing them at high enough temperatures. Artificial sheepskins were developed that could be washed at high temperatures to kill bacterial contamination, but these were made from synthetic materials and with low density of fibre, which meant they had minimal tissue integrity value.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia developed new tanning standards (AS4480.1) in the 1990s that allowed sheepskins to be produced which could be washed at least 30 times at 60C or 80C, thereby allowing medical sheepskins back into the market: these have been shown in clinical trials to be effective in reducing the incidence of pressure ulcers (McGowan et al, 2000; Jolley et al, 2004; Mistiaen et al, 2010). New production techniques have permitted the knitting of wool into greater densities than sheep can achieve in the skins, and allow washing at 100C, improving on the properties of medical sheepskins.

Testing to ISO standards such as 16840-2 shows that these new wool materials have equal or better physical properties than natural sheepskin in protecting skin integrity in relation to microclimate, shear reduction, and pressure redistribution qualities (Call et al, 2010).

Discussion
The effects on the integrity of our skin of the materials that we sit on needs to be a major consideration in our choice of cushions, back supports, and secondary supports. Natural materials are much better for skin integrity than man-made fibres. Wool is hydrophilic and will take up to a third of its weight in water vapour (Speakman and Cooper, 1936), while man-made materials are hydrophobic, allowing liquid build up. The structure of natural fibres allows air entrapment which gives better temperature regulation. Natural fibres have a structure which encourages them to return to their original shape, providing better resilience. Natural fibres' abilities to slide over each other provide better frictional and shear properties than synthetic materials. There is better biocompatibility. This presentation covers all these aspects with the scientific evidence behind them.

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SOLVING THE MYSTERY OF WHY A WHEELCHAIR SEAT IS COMFORTABLE IN CLINIC, BUT NOT AT HOME!

Presenter: Kim Chaney

Summary
Drawing on clinical and ergonomics research, this paper explores the concept of seated discomfort, asking "can comfort be objectively evaluated?" A multifactorial model for wheelchair seated discomfort is presented enabling us to consider comfort in more objective terms. Possible methods for assessing wheelchair seated discomfort are also explored.

Aims & Objectives
1. Define comfort in objective terms
2. Explore seated discomfort as a clinical problem
3. From published research…
a) Identify the key factors influencing seated discomfort
b) Propose a modified model of seated discomfort
c) Explore best practice for assessing wheelchair seated discomfort

Background
Wheelchair users often sit for more than 8 hours (Maeda et al, 2003), often with a restricted ability to change positions. This makes seated comfort a critical issue that directly influences well-being, sitting tolerance and performance (Watanabe et al, 2014). However, comfort remains difficult to define or quantify, creating the perception that it is purely subjective experience. As a result sourcing the funding to address issues relating to wheelchair seated discomfort is often difficult (Watanabe et al, 2014).

Conversely, there is an abundance of ergonomics research into seated discomfort, which is considered a key factor in vehicle seat design. Can examining this research help us to better understand the multiple factors contributing to wheelchair seated discomfort, and thus guide us towards a more evidence-based best practice?

The Oxford Online English Dictionary defines comfort as "a state of physical ease and freedom from pain or constraint", while the Collins Online English Dictionary describes it as a "state of ease or well-being". These definitions, however, reinforce the perception that comfort is a subjective experience. Mansfield (2005) proposes that comfort is more objectively viewed in terms of the resulting behaviour. We could therefore consider comfort as –

- a situation where an individual, given the opportunity, would choose not to move in order to reduce pain or other unwanted sensations.
- the link between increased voluntary movement and seated discomfort is supported by research by Cascioli et al. (2011).

However, the above definitions do not provide us with a clear understanding of the contributory factors which cause the seated discomfort. Ebe and Griffin (2000) conducted research into vehicular comfort proposing a model for seated discomfort which describes the role of both static and dynamic factors, highlighting the role of shock and vibration on seated comfort when a seat is in motion. These dynamic factors are also critical to wheelchair seating, as wheelchairs are subject to shock and vibration which can be higher in magnitude than those experienced by car drivers.

Mansfield et al (2004) continued this research, suggesting a modified model to explain the influence of temporal factors, where discomfort accrues with time.

Discussion

Existing models of seated discomfort are useful in understanding the influence of vibration and shock on seated discomfort. They also help to explain why one seat can be considered more comfortable than another when stationary, but less comfortable when compared in motion. However, they do not describe all the contributory factors in enough detail to form the basis of objective seated comfort evaluations.

In this paper these factors are broken down further, examining the role of pressure, micro climate, postural stability, and other factors in the role of wheelchair seated discomfort based on a mix of research and clinical experience. This examination is combined with the earlier models, and a multifactorial model of wheelchair seated discomfort is proposed. This more detailed model enables us to examine comfort more objectively.

A visual analogue scale developed for assessing vehicular seated discomfort is presented (Gyi and Porter, 1999). The author then asks "can this approach better empower us with the clinical evidence we need to proactively tackle wheelchair seated discomfort issues?".

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PS6/3

PRESCRIBING WHEELCHAIR BACK SUPPORTS – TENSION ADJUSTABLE UPHOLSTERY (TAU) VERSUS SOLID MANUFACTURED

Presenter: Matthew Eveleigh

Summary
Little research exists on wheelchair back supports to aid prescription of tension adjustable upholstery or solid manufactured (Macauley, 2011). The benefits and limitations of each are examined in relation to common postural abnormalities. A flow chart is presented which can help determine the specific features required to meet common back support goals.

Aims & Objectives
Identify and list three common postural presentations which require the provision of either a TAU or solid back support to meet client back support goals
Identify and list at least two clinical benefits and limitations of both tension adjustable and solid back supports
Describe a clinical reasoned process for the use of both tension adjustable and solid manufactured back supports

Background
No clinical guidelines or standards exist to aid the prescription of back supports for wheelchair users. The use of conventional TAU and solid manufactured back supports for common client presentations are analysed with case study pictures to highlight specific features required to meet common postural problems. Specifically, the benefits and limitations of each back support type are examined in relation to common flexible and fixed spinal deformities such as kyphosis and scoliosis.

Discussion
Following analysis of each postural presentation, a generic set of back support goals are identified. These commonly include reduce back/neck pain, improve comfort and sitting tolerance, improving trunk stability and functional ability, and correcting or accommodating postural deformities (Stone, 1996). To address these goals, specific features are required which may be provided by either TAU or manufactured back support. Case studies are presented to help demonstrate how the flowchart may be used to identify the specific back support features required, and ultimately guide non brand specific product selection.

The implication for practice focuses on clarifying the common goals associated with different postural problems, and then enabling prescribers to use the flowchart as an aid to clearly match the back support type to the user's needs. This will lead to improved clinical outcomes and reduce the cost to the wheelchair service or equipment provider.

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POSTERS

Q&A
Tuesday, 14th July 2014
15.10 to 16.10

P1

THE IMPACT OF POWERED EXOSKELETON TECHNOLOGY ON POSTURE AND RESPIRATORY FUNCTION IN SPINAL CORD INJURED INDIVIDUALS

Presenter: Matthew White
Additional Authors: Hollie White and Jacob Mitchell

Summary
Our original research investigated the impact of powered exoskeleton technology on posture and respiratory function in spinal cord injured (SCI) individuals. We found notable trends suggesting that respiratory function was improved following, but not during, exoskeleton use; however posture related findings were less clear and require further investigation.

Aims & Objectives
We conducted novel research into the field of posture, respiratory function and SCI using cutting edge powered exoskeleton technology. Our specific objectives were to: compare lumbothoracic, cervicocranial and upper limb postural measures and peak expiratory flow (PEF) in wheelchair users before, during and after therapeutic intervention using the ReWalkTM.
For this research we used preliminary data collection techniques to establish proof of therapeutic concept for further research and clinical work.

Background
Following SCI the most commonly acknowledged impairment is paralysis and loss of upright function resulting in wheelchair use. Many sequelae exist alongside long-term wheelchair use, including impaired postural and respiratory function. Indeed, serious posture related chronic health problems often affect individuals with mid-thoracic SCI (Rodgers et al, 2000). A possible reason for such health problems in SCI is compensatory posture mechanisms at the pelvis and thoracolumbar spine (Alm et al, 2003). Clinical therapeutic intervention has often focused upon correcting patient compensations; however recent novel technological innovations have made powered exoskeletons available for SCI users allowing a range of previously impractical functional exercise to be considered.
Six wheelchair users (5 male, 1 female, injury site C3 –T12, age=43 ± 8.2 years) diagnosed with complete (American Spinal Injury Association (ASIA) classification A; n=3) and incomplete (ASIA B-C; n=3) SCI volunteered to undergo postural analysis and peak expiratory flow (PEF) testing, before during and after therapeutic intervention using the ReWalkTM powered exoskeleton. Safe and effective procedures were followed for ReWalkTM use with a qualified experienced trainer.

Postural analysis was assessed using sagittal plane photography following the procedures of van Niekerk et al (van Niekerk et al, 2008). Sagittal head angle (SHA), cervical angle (CA), protraction/retraction angle (PRA), arm angle (AA), and thoracic angle (TA) were calculated using passive soft markers. PEF was assessed with a Mini-Wright Peak Flow Meter using the open circuit method, participants were allowed three practice and three recorded maximal efforts from which the mean score was calculated. Initial measurements of posture and PEF were completed with the participant sitting in their wheelchair (sit1), followed immediately by standing in the powered exoskeleton (stand), and finally again sitting in their wheelchair after powered exoskeleton use (sit2). Paired sample t-tests were used to analyse significant difference in postural measures and PEF between Sit1 and Sit2, and Sit1 and Stand. Statistical significance was set at $p \leq 0.05$ and Cohen's

effect size (r) was also calculated to discover whether any witnessed changes could have clinical relevance.

No significant differences were reported between Sit1 and Sit2 for any of the five posture measures (SHA = 2.0 ± 6.6˚, p = 0.54, r = 0.32; CA = 3.6 ± 4.8˚, p = 0.17, r = 0.64; AA = -4.2 ± 10.35˚, p = 0.42, r = 0.41; TA = 1.2 ± 5.0˚, p = 0.62, r = 0.26); however there was notable improvement in PRA (13.2 ± 13.7˚, p = 0.09, r = 0.73)). No significant differences were reported between Sit1 and Sit2 PEF (12.2 ± 18.6 L/min, p = 0.17, r = 0.58); however a trend towards improvement was noted. A significant difference was reported between Sit1 and Stand PRA (36.2 ± 17.0˚, p = 0.009, r = 0.92; however there were no other notable changes in posture measures. There was no significant difference between Sit1 and Stand PEF, PEF decreased in standing (-20.0 ± 44.8 L/min, p = 0.32, r = 0.44).

Discussion

It was apparent that therapeutic intervention using novel powered exoskeleton technology had an uncertain effect upon the parameters we measured. The trend for improved PEF at sit2 was a novel finding representing initial proof of concept that may suggest that standing and walking in an exoskeleton can positively affect respiratory function, perhaps through improved diaphragmatic and intercostal efficiency. More specifically, when this finding is considered alongside the more retracted PRA, it could be postulated that apical breathing was enhanced, accounting for the 12.22 L/min (2.85%) increase in PEF which had a large effect size. Another possibility is that simple exercise improved this parameter and further research should seek to compare therapeutic exoskeleton use with other forms of exercise.

A possible explanation for the lack of significant findings in this study was the high degree of variability noted in the sample across all measured parameters. This was probably due to participant differences in injury level, severity, and time since injury. For example, one participant was diagnosed as C3 incomplete (ASIA C), whereas another was T5 complete (ASIA A). These two participants had dramatically different levels of innervation of the internal intercostal muscles and abdominals which could undoubtedly affect PEF and posture baseline measurements, as well as the expected response to the therapeutic intervention. Future research should seek to control for variability through use of a large sample size and narrow inclusion criteria, particularly with regard to level and severity of SCI.

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P2

A QUANTITATIVE OUTCOME MEASURE FOR SEATED POSTURE INTERVENTIONS

Presenter: Susan Hillman
Additional Author: James Hollington

Summary
This poster describes a practicable method for measuring seated posture which facilitates quantitative comparison of different postures within the same individual. It is intended for use as an outcome measure for seating and postural interventions, to be used even when a balanced symmetrical seating posture is not a realistic goal.

Aims & Objectives
The purpose of this work is to develop and validate a quantitative outcome measure for posture which can be used for any wheelchair seating intervention.

Background & Method
The development of a quantitative outcome measure for posture is faced with two main challenges. Firstly, instrumented measurement of standard postural parameters such as joint angles or body segment orientations is practically difficult in many types of seat because the seat itself obscures access for anatomical landmark palpation and goniometry etc. Secondly, custom made wheelchair seating is frequently provided for individuals with musculoskeletal deformity, and this means that custom seating must sometimes accommodate the wheelchair occupant in an asymmetrical and unbalanced posture. The desired goal for all individuals cannot therefore be described in terms of a single set of optimum parameters.

This method aims to overcome the first difficulty by using the following anatomical landmarks, which will always be accessible in any seated posture: left and right anterior superior iliac spine (ASIS), clavicular notch, left and right shoulder, head (midpoint of glabella), left and right knees (midpoints of patellae). The position of each landmark is measured in 3-dimensional space using any appropriate technology which, in our testing, was the MicroScribe articulated arm co-ordinate measuring machine. The resulting array of points are then transformed onto a standardised orthogonal reference axis system in which the y-axis corresponds to the line through the two ASISs, and the z-axis passes through the midpoint of this line (origin) and the plane of the clavicular notch. This transformation thus enables comparison of corresponding anatomical points measured in different postures. Euclidean distances between corresponding pairs of points from two postures is computed and examined to determine where the two postures differ. The distances may also be summed to give an overall score of the degree to which postures differ.

The proposed method may be used for clinical outcome if measurements are made before intervention, for example in the wheelchair occupant's original seat; during clinical assessment of the occupant, for example with the occupant manually supported on a plinth - the desired posture; and in their new seat. Comparison of postures in this way would allow clinicians to determine whether the new seat has resulted in a posture closer to the desired posture than that achieved in the old one.

The method has been tested on 11 unimpaired individuals. Each participant was measured three times when sitting in a symmetrical balanced ('good') posture and also when sitting in the following four perturbed postures: posterior pelvic tilt increased by 26º, pelvic obliquity raised on left by

50mm, pelvic rotation of 14º forward on right, and abduction of the thighs with knees separated by 400mm between medial condyles. These perturbations to posture were standardised by using suitably shaped firm foam blocks to displace the pelvis and thighs as required. A least significant difference (LSD) for the sum of the distances of 167 mm was established from the good postures and used to evaluate the perturbed postures. Using this method, all of the perturbed postures evaluated as significantly different from 'good', apart from pelvic rotation for one participant.

Discussion

This preliminary work suggests that this method is sensitive enough to detect differences between postures, even when postural perturbations are visually subtle, such as with the pelvic tilt and rotation. It must be understood however, that this method is limited in the amount of detail it can provide about how one posture may differ from another. In particular, examination of the distances between corresponding anatomical points in two postures can identify the location of specific postural displacements, but not the direction of these displacements. This means, for example, that this method could disclose a significant displacement of the knee, but could not distinguish whether this arose from increased adduction/abduction or from altered hip flexion or extension. Furthermore, the method cannot distinguish between different body orientations in space because measurements are referenced to the pelvis and trunk itself. This may be an advantage however, because measurements will not be sensitive to variation arising from different settings in a tilt-in-space wheel base. It is also likely that the sensitivity of the method will depend on both the skill of the clinician palpating the anatomical land marks, and the measurement method used. A final limitation is that the method is also only valid when comparing different postures for the same individual.

Nonetheless, this approach may provide the basis for a quantitative method of evaluating how closely two postures correspond, and hence may be a useful contribution to the development of an outcome measure for seating interventions.

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P3

SUCCESSFUL INTER-DISCIPLINARY MANAGEMENT OF COMPLEX PHYSICAL PRESENTATIONS AFTER SEVERE BRAIN INJURY

Presenter: Siobhan Fuller
Additional Authors: Katy Swann and Boni Warambwa

Summary
Patients with severe brain injury present with complex needs, including severe spasticity, complex positioning requirements, and significant cognitive and communicative impairments. It can be difficult to quantify outcomes for these patients and there is a lack of evidence of the impact and importance of specialist postural management in this client group.

Aims & Objectives
Using a collection of case studies this presentation aims to illustrate the physical management of complex patients to demonstrate positive outcomes and highlight best practice.

Background
Four patients with severe brain injury were admitted to a specialist in-patient neurological rehabilitation unit. The patients received intense postural management including 24-hour positioning and splinting programmes, customised seating, and spasticity management. The management programme led to reduced complications, reduced discomfort, reduced load of care, and optimised opportunity to demonstrate signs of awareness and communicate.

Discussion
In-patient postural management provided by a specialised inter-disciplinary team is key to allowing optimal assessment and rehabilitation, as well as reducing the care needs and maximising comfort. Skill, continuity of care, and on-going review were vital. Postural management, including wheelchair provision, is a priority for complex patients and should be provided as part of a specialist inter-disciplinary assessment and management.

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P4

CLINICAL EFFECTIVENESS OF INCREASED STANDING TIME IN YOUNG CHILDREN WITH CEREBRAL PALSY: A PILOT STUDY PROTOCOL

Presenter: Rachel Rapson
Additional Author: Jonathan Marsden

Summary
Children with Cerebral Palsy (CP) who are unable to walk often develop several leg impairments, including hip dysplasia. There is a lack of evidence to show optimal duration or the effectiveness on preventing hip dysplasia (NICE, 2012). This study pilots a randomised controlled trial (RCT) to explore the clinical effectiveness of doubling standing time.

Aims & Objectives
Aim: To pilot an RCT of the clinical effects of doubling the duration of standing in non-ambulant children with cerebral palsy.
Objectives: Determine: (a) presence of adverse events (b) recruitment/drop-out rate (c) compliance with intervention (d) feasibility of randomisation/minimization procedure, data entry and monitoring procedures (e) Proportion of outcome measures taken (f) effect size estimate (g) required study costs (h) effectiveness of blinding procedure.

Background
This study is piloting a multi-centred RCT. Thirty children with CP, who use standing frames, will be recruited via their treating physiotherapist by giving an information pack. Informed consent will be sought including a full demonstration of the outcome measures on a doll. Participants will be randomised into one of two groups that either (a) maintains the child's current standing frame programme - the control group (n=15) or (b) doubles the standing time - the intervention group (n=15). The intervention phase will last for one year (Caulton et al, 2004).

An audit of Child Development Centre records suggests that there are between 5-6 eligible participants over a 12 month recruitment period. With 8 main recruitment centres this would result in 40-48 potential participants and a required recruitment rate of 62-75%.

Inclusion Criteria: Participants will be included if they have a clinical diagnosis of CP or developmental delay (with spasticity, not due to a known neurological or neuromuscular disorder), GMFCS IV-V, aged 1-4 years who use a standing frame.

Exclusion Criteria: Participants will be excluded if they have had lower limb soft tissue release within a 6 month period or bony surgery within a 12 month period, from the onset of the participants' involvement in the trial, or a fracture that would prevent standing.

A minimisation algorithm will be used to ensure balance between the groups on the basis of the following:

- Age (<2 yrs. vs. 2 yrs.)
- Functional ability (GMFCS=IV vs. GMFCS =V)
- Baseline standing time (<30 mins vs. >30 mins)

Outcome measures will be taken at baseline and at 6 monthly intervals by a blinded assessor. The primary outcome measure will be the Hip Migration Percentage using the child's usual annual hip surveillance x-ray, to avoid additional exposure to radiation.
Secondary outcome measures will test the range of movement and passive stiffness in gastrocnemius, rectus femoris and hamstrings, using dual digital inclinometers and the Tardieu score. The medial head of gastrocnemius will be tested using the Myotonometer to indicate muscle tone. Portable ultrasound will be used to measure the depth and cross-sectional area of rectus femoris (Ohata et al, 2008) and a tape measure will be used to measure to the thigh girth. Movement ability will be scored using the Gross Motor Function Measure (GMFM-66-IS), and quality of life and comfort will be measured by the caregivers' priorities and child health index of life with disabilities (CPCHILD) and paediatric pain profile.

Discussion
This study commenced in March 2014 setting out to answer the question in the younger age group and experienced several recruitment problems. Initial estimates made of eligible children were inaccurate, with fewer children identified per team than expected, and some children not having a diagnosis fitting under the umbrella term CP. Physiotherapists tended to pre-screen families where they perceived that the trial might be a burden to a family who are already stressed. Indeed this was a reason given by some families for not participating. Several families did not respond at all.

After initial NHS ethics approval there were significant delays in processing Research and Development approvals in the various recruiting sites. This was partly due to the disbanded PCTs and the time taken identifying the various non-NHS organisations who were involved in providing assurities needed for this trial to go ahead.

The steering group for this trial involves two lay members who are parents of children who use standing frames. They have been instrumental in suggesting solutions. We have changed the initial approach to an advert in various clinics, nurseries and parent groups, with an invitation to participants to give their contact details in order to get involved. They advised that the parent information sheet with photos of outcome measures was quite off-putting, so this has been changed. We have increased the age range to include children up to 12 and GMFCS level III in order to be able to recruit sufficient numbers for this pilot study.
The trial is funded by the Physiotherapy Research Foundation fund of the Chartered Society of Physiotherapy and continues to recruit with the amended protocol.

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P5

THE USE OF TILT-IN- SPACE WHEELCHAIRS: TWO DIFFERENT PERSPECTIVES

Presenter: Emma Regan
Additional Author: Jackie Casey

Summary
Using tilt-in-space (TIS) in powered wheelchairs is presented from the perspectives of two wheelchair users. Personal accounts describe the functional application of both anterior and posterior tilt. TIS is used for a myriad of reasons and frequency, and use should be individualised to each wheelchair user.

Aims & Objectives
To highlight the research evidence to support the clinical reasoning for using TIS in wheelchair prescription.
To outline the benefits of using posterior and anterior tilt from the perspectives of two wheelchair users.
To demonstrate that the TIS function can be used for a myriad of reasons and the frequency, angle applied, and reason for use is individual to each wheelchair user.

Background
TIS is used with a wide range of individuals of various ages and conditions (Sonenblum et al, 2009). There is a dearth of high quality evidence on the benefits of TIS upon users' function (Harrand et al, 2014). Smaller ranges of tilt appear to be helpful to improve posture, balance, comfort, and decrease pain, while larger ranges are effective for fatigue management and pressure redistribution. Altering the orientation of the wheelchair (either posteriorly or anteriorly) has also shown to aid transfers, assist with bowel and bladder management, reduce spasms, prevent sliding, improve breathing, and aid positioning for feeding. The research to date has a focus on the benefits as observed by therapists; however little has examined why the wheelchair users choose to alter their position or how often they decide to do so.
This paper investigates the reason why two wheelchair users choose to use the TIS function of their powered wheelchair.

The first wheelchair user highlights the reason he uses a posterior tilt. He reports that he uses between 10-15 degrees of backward tilt to feel balanced when driving. He explains that he neutralises the tilt in smaller spaces to decrease his turning circle and also to sit upright for feeding. He feels that by tilting his wheelchair back to 55 degrees and fully extending his legs rests, he can decrease fluid build-up around his ankles. He likes to rest in this position for 30 minutes a few times per day to reduce fatigue and pain. He concludes that being able to alter his position by tilting his wheelchair allows him to sit out longer, as he does not have to be hoisted back to bed for a rest during the day.

The second wheelchair user gives a personal account of using anterior tilt. He explains that by applying anterior tilt he can remove his footplates and place his feet on the floor which allows him to balance and lean forward to reach lower levels in his kitchen to complete functional tasks, such as loading the washing machine and using his oven. The ability to tilt forward and place his feet on the ground also assists his standing transfer. Tilting the wheelchair anteriorly allows this user to gain access under tables in cafes and restaurants as well as computer workstations in his local library.

Both wheelchair users state that the degree of tilt they apply, and the frequency of using tilt, can vary throughout their day depending on their activity. They both believe that using the TIS feature on their wheelchair enhances their independence.

Discussion

Clinicians should consider using TIS for a myriad of reasons which may include: maintaining posture, decreasing pain and fatigue, pressure management, ease of transfers and, importantly, to facilitate activity and social participation. From the research reviewed, there is minimal evidence for the recommended optimal angle of tilt for which particular function (Casey and Gittins, 2013). The reason for use and frequency differed between the wheelchair users who gave personal accounts based on their condition, physical ability and lifestyle. The use and frequency of TIS should therefore be individualised to each wheelchair user. The decision to prescribe manual tilt or powered tilt should be considered based on the ability of the wheelchair user. In situations where using posterior TIS increases the turning circle of the powered wheelchair, clinicians should explore wheel drive options to improve wheelchair manoeuvrability and environmental access.

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P6

DESIGN OF A LOW COST DEVICE TO EASE USE OF ATTENDANT PROPELLED WHEELCHAIRS OVER DIFFICULT TERRAIN

Presenter: Caroline Newe

Summary
A need exists for low cost methods of easing travel of attendant propelled wheelchairs over difficult terrain. In this project a device was designed and trialled which went some way to meeting this need. It is hoped that with refinement, the device would be a viable aid to wheelchair users.

Aims & Objectives
The aim of the project was the design and production of a low cost, lightweight device which could be attached to an attendant propelled wheelchair, essentially making it more all-terrain friendly. Specific objectives included researching current devices and factors influencing travel over rough terrain; conception, design and manufacture of a prototype; preliminary testing; and review of prototype performance.

Background
Design of attendant propelled wheelchairs requires consideration of both the occupant and the individual tasked with propelling them. Pushing an occupied wheelchair is not an insignificant task, often involving manoeuvring considerable weight around obstacles and over uneven surfaces. While it is essential that the occupant is transported safely and comfortably, the needs of the attendant must also be considered - that of being able to propel the chair safely with minimal strain (Cooper, 1995). Attendant propelled wheelchairs are intended to be lightweight mobility aids, and are not designed for use over rough ground. If such terrains are accessed, the burden on the attendant is significantly increased. The expense and specialisation of all-terrain wheelchairs tends to put them outside the reach of many individuals; however there are a number of devices available to make difficult terrain more accessible to standard wheelchair users. Such devices typically utilise a large diameter wheel positioned to raise the castors off the ground. These devices appear to be geared towards more able, self-propelling users and, while they are considerably cheaper than all-terrain wheelchairs, they are relatively expensive when compared with standard manual wheelchairs.

In developing the design, factors which contribute to increasing the effort of propulsion were considered. A device capable of reducing rolling resistance while increasing stability and not contributing excessively to the overall mass of the wheelchair was identified. It was further established that it should be easy to use, durable, safe and reliable. A number of concepts were created and subjected to a selection process, resulting in the evolution of a single concept which best met the requirements. In the final concept, two 16” diameter mountain bike wheels were added to the chair between the rear wheels and castors. The wheels were located outside the wheelbase of the wheelchair, behind the castors. The occupant’s weight was distributed between the castors and the added wheels. The addition of mountain bike wheels reduced the overall rolling resistance of the wheelchair, making propulsion easier for the attendant.

A preliminary test run was carried out with the assistance of two able bodied volunteers. During the test, one volunteer was seated in the wheelchair while the second volunteer pushed them around a woodland park over a distance of approximately 50m. The test was then repeated with the device in place. The volunteer pushing the wheelchair found propulsion over the bumpy ground to be

extremely challenging, with the occupant almost tipped out when a tree root was encountered, and significant effort was necessary to begin movement of the chair. The occupant reported that the ride was relatively comfortable although it was evident that the attendant was struggling. On addition of the device, the attendant reported that propulsion of the wheelchair around the same course was somewhat easier and she was not straining as much to start the chair moving. The occupant reported that the ride was comparable to the previous trial although felt that it might have been marginally more comfortable with the device.

Discussion

This project was subject to a strict time constraint. If more time had been available, further testing of the device would have been carried out, encompassing a variety of terrains and test distances, before ultimately being assessed by a select number of patients and their carers. There would also have been the opportunity to refine the design between test periods, allowing any issues to be addressed as the testing progressed. In comparing the device against the specified requirements, the majority were met, including the fact that the device was lightweight (3.6kg) and low cost to produce (£77.30). The adaptation produced was an early prototype, but the testing performed indicated that the concept had potential. It is envisaged that a minimal amount of further work on the device would bring it from the proof of concept stage through to a viable, all-terrain adaptation.

Currently there are devices available intended to make manual chairs more all-terrain friendly, however the provision of such devices is outside the scope of the NHS. While the device in this project does not totally alleviate the difficulties associated with the propulsion of an attendant propelled wheelchair over rough terrain, it does go some way towards easing the burden associated with travel over such surfaces. It is hoped that with more testing and further refinement of the design it could be a viable device, allowing users who traverse difficult terrain to do so at a fraction of the cost of devices currently on the market.

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P7

A CASE STUDY OF THE USE OF THE STARLOCK CUSHION FOR TWO CLIENTS WITH MULTIPLE SCLEROSIS (MS)

Presenter: Judith Ruddle

Summary
This poster outlines the use of the Starlock cushion with two clients with Multiple Sclerosis (MS). Both clients are full time powered wheelchair users and both are dependent on their carers for all activities of daily living. Over the years they have both had intermittent problems with sacral pressure ulcers.

Aims & Objectives
Aim: To present a poster about the use of the Starlock cushion for two clients with MS.

Objective: To present information about -
- background history of clients
- clients' goals
- assessment of mobility and associated pressure care
- postural evaluation
- identified seating goals
- planned intervention
- outcome to date

Background
Robert (70 yrs old) and Maureen (72 yrs old) both have MS and have been wheelchair dependent for the last 15 years. As a result of poor muscle tone caused by the MS and the extended periods of time now spent in their wheelchairs, they are both prone to recurring sacral pressure ulcers - for Robert over his left ischial tuberosity and for Maureen over her coccyx. Latterly, both Robert and Maureen have had to spend extended periods of time in bed in order to relieve pressure to allow for healing, as well as to relieve the pain caused by the pressure area when seated. Due to this time in bed, Robert and Maureen have felt not only socially isolated, but increasingly dependent on their carers, and at risk of other health related complications e.g. chest infections and contractures.

Discussion
Robert and Maureen were visited at their home, and both had been on bed rest in excess of 3 months as directed by the district nursing service. Both were feeling very fed up with being in bed and feeling socially isolated. Within that 3 month period both had had to use their wheelchair but experiencing a lot of pain over the area of tissue damage when seated; both were concerned about causing any further damage by being in their wheelchair before the pressure area was fully healed. Robert and Maureen each have NHS occupant controlled indoor/outdoor powered chairs with recline and tilt facility and both are competent at operating their wheelchairs. At the time of the visit both clients were using an alternative high profile air cushion which, until their last recurring pressure ulcers, was working well and, prior to that, they used a selection of foam and foam & gel cushions which met their needs at the time of issue.

As a result of the visit both clients' goals were as follows:
- to be able to sit in the wheelchair rather than being in bed
- to be able to sit in their wheelchair and still achieve healing of their pressure ulcers without incurring any further pressure damage

- to be able to sit in their wheelchair and be comfortable and pain free
- to increase the time they spend in their wheelchair
- to regain some of their independence and participation in social activities.

As a result of intervention using the Starlock cushion, the poster presents how these goals were achieved by outlining the postural evaluations, therapeutic goals and planned intervention. It is an informal presentation completed with the clients and which also highlights client centred working.

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A PRESSURE MAPPING COMPARISON OF CARVED WHEELCHAIR CUSHIONS MADE FROM DIFFERENT MATERIALS OR A COMBINATION OF MATERIALS

Presenter: Shallum Sardar

Summary
Critically appraising various materials used to construct wheelchair cushions. Including how pressure map results vary when using different types of foam; thus determining whether it is better to use a specific type of foam or a combination of foams in order to prevent the development of pressure ulcers.

Aims & Objectives
Discuss the properties of different types of foam, but the same shape and contouring, used in the manufacture of wheelchair cushions, and how it affects the outcomes for the user. Using pressure mapping to compare combinations of materials against a singular material for wheelchair cushions; therefore determining which type of cushion material applies the least pressure on load bearing areas and the minimum angle of tilt required to relieve pressure.

Background
One important task of the wheelchair cushion is the prevention of pressure ulcers. When we sit, only one third of the body's surface is supporting all of its weight, and blood flow is restricted. In the presence of muscle atrophy, which is experienced by people with spinal cord injuries, circulation is limited further by the loss of muscle which once served as a natural cushion. Further, an additional risk of sitting is shear force, as we tend to slide forward in the cushion, causing stress across the surface of the skin which results in pressure ulcers.

The aim of a wheelchair cushion is to distribute pressure evenly and provide optimum postural support for people with physical disabilities; hence the aim is to sit the person in a neutral pelvic position. To achieve the ideal seated posture, the contour of the cushion needs to work with the anatomy to provide all the support required. By shaping foam anatomically and layering different foams, it will gain the best properties from different foams by maximising surface contact area and decreasing pressure in areas of greater risk.

Researchers have used pressure-mapping technology to find that a minimum tilt angle of 30 degrees is required to alleviate pressure at the ischial tuberosities and sacrum for wheelchair-seated individuals with spinal cord injury.

Using appropriate materials in the construction of wheelchair seat cushions can -
- improve pressure distribution by maximising the overall contact surface area
- reduce dynamic shear by providing some ‘flow’, which would allow bony prominences limited movement within the seat surface
- provide required levels of support so that the client remains in the intended position on the seat cushion
- provide breathability which decreases heat and humidity at the tissue level

Types of foam
All foams can be classified by three main properties:
- Density

- Indentation load/Force deflection
- Modulus

Polyurethane foams vary greatly in their quality and properties, depending on which chemicals and processes are used in their manufacture. When foam is optimally shaped and used in layered combinations, it can provide a supportive and stable cushion that will maximise the surface contact area, and re-distribute pressures away from bony prominences onto more fleshy areas. Potential issues are peak pressures and ability to weight shift.

Visco-elastic foam (memory foam) assists in the reduction of pressure to the user's vulnerable bodily points and areas, whilst providing stability and shock absorption. It also helps in the reduction and prevention of pressure ulcers. Plastazote is a uniform rigid structure which provides good postural support. It is a lightweight material and the rigidity helps to maintain pelvic position.

Discussion

Seating people with postural problems can be a challenging task, but assessing the client's posture, mobility needs and functional requirements thoroughly allows the application of appropriate equipment which fits the client's anatomy, posture and social needs.

When the client is seated on the cushion for a prolonged period of time, there is always a risk of a pressure ulcer developing. Hence, a well-designed cushion will provide good pelvic alignment and lead to good spinal position and shape. This also increases stability and functional ability for the client. It will also result in the back support having less force exerted through it because the spine will be in a more natural and balanced posture.

Hanson et al (2012) suggest that pressure mapping may be a new path to pressure ulcer prevention. This paper will look at understanding the different types of foams used in the manufacture of wheelchair cushions and determine, using pressure mapping, the advantages and disadvantages of using different types of foams, such as PU foam, memory foam, platazote, so that the clinician will have a knowledge of the different types of foam, and know when to prescribe what type of foam. Using pressure mapping will show how a combination of foams can be used to provide postural support as well as pressure relief.

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CLINICAL AND USER CONSIDERATIONS IN DESIGNING A NEW MODULAR SEAT

Presenter: Richard Earl

Summary
A technical presentation of the clinical and user considerations in designing an effective and adaptive modular seat. Outlining the process, people and design methods involved in creating a game changing, marketable modular seating system.

Aims & Objectives
- To design a modular chair that optimally manages posture, and is desirable to the end user
- To incorporate a central structure with a streamlined chassis to allow for maximum growth, and to optimise cost effectiveness
- To include patient support structures for maximum adjustment and control
- To feature an optional damping system to provide a dynamic back where required

Background
It was felt by the author that there was a clinical need to design a modular seat that would offer significant advantages over existing products in the seating market place. This presentation sets out to describe the research conducted and clinical considerations in designing and building a new modular seat that provides optimal posture management, cost effectiveness, and is desirable to the user.

It is widely reported that pelvis position is a critical success factor in posture management; pelvic control should therefore form the foundation of any specialised seating device. The author conducted market research, interviewing both clinicians and end users, to understand their requirements for a clinically effective and desirable seat.

The results were analysed along with a review of existing modular seating to identify the required design features which formed the basis of the design concept:

- Desirable appearance – not like a piece of medical equipment
- Effective and adjustable control for pelvis, trunk and thighs
- Adjustability for the chair to grow with the user
- Backrest angle adjustment for specific users
- Lightweight
- Available off-the-shelf and with fast delivery
- Ease of use and cost effective
- Meets the requirements of ISO 16840

A project team - comprised of therapists, clinicians, rehabilitation engineers and design engineers - worked to create a modular seat that would fulfil the clinical and end user's needs and desires. The initial concept designs were centred on the main structural element, and explored many available options. Following several design iterations, a central structure was adopted to form a chassis to which the patient support structures could be attached. A lightweight, streamlined chassis offers a discrete structure to minimise the chair bulk and to create a softer look that would be as attractive as possible to the end user. Designing the chassis to be adjustable for height, width and length enables a single chassis to extend across the entire size range, thus fulfilling the brief to

provide adjustability for the seat to grow with the user and potentially offer ‘a seat for life’ with consequent cost and clinical benefits. The design also ensures that the seat would be available off-the-shelf, be easy to assemble and use, and could potentially be provided in a single day.
Design of the thoracic and thigh supports followed well-known principles for effective posture management. The pelvic support features optional additional lateral supports for pelvic stability and adjustable support posteriorly to maintain the optimum position for the pelvis. The thoracic and thigh supports offer maximum adjustability for optimal comfort and posture management for each individual user.

A dynamic back was incorporated by designing a solid state rotary damper with customised polymer. As the research showed that a dynamic back was only recommended for specific users, this element is intended as an option to minimise weight and cost for users not requiring this feature.

Discussion
The effectiveness of the pelvic support will be assessed over the coming months as the field trials are completed. The design will then be reviewed again, and enhanced if the clinical team feel that further improvements can be made.

The highlights of the project have been seeing the user driven aesthetic wants and the clinical requirements marry together to give an attractive yet functional modular seat, that can meet the needs of the user today and into the future. This has not happened without some hard decisions and engineering challenges to ensure that, not only can we provide a seat that is effective at postural support and the changing needs of the user, but also at a cost that the NHS can afford. In achieving this we have inadvertently created a seat that not only grows and adapts with the user, but can be assessed for, set-up and supplied at one visit to the clinic. This would reduce the amount of contact needed with each user, and make the provision of effective postural support much more efficient. The one area that we would do differently is with regards to resource, making sure that it is set aside at the start of the project and rigorously adhered to until sign off. This would have enabled us to launch this game changing modular seat design on the market sooner.

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PL2

TRANSLATION OF PRESSURE ULCER RISK FACTOR RESEARCH INTO PRACTICE

Presenters: Professor Jane Nixon and Dr Susanne Coleman

This presentation will highlight the risk assessment work package of the recent National Institute for Health Research (NIHR) Pressure Ulcer Research Programme (PURPOSE). It will describe the development of a new evidence-based risk assessment framework - Pressure Ulcer Risk Primary or Secondary Evaluation Tool (PURPOSE T) and a new active monitoring model of care.

PURPOSE T development incorporated five distinct phases:

1. Developing the evidence base by undertaking a systematic review of the epidemiological literature relating to pressure ulcer risk factors to identify those most predictive of pressure ulcer development

2. Consensus study, incorporating an expert group, consideration of the evidence, and service user views to agree the content for PURPOSE T

3. Conceptual framework development to show the critical determinants of pressure ulcer development and underpin PURPOSE T

4. Design and pre-testing with clinical nurses to confirm the content and improve ease of use

5. Clinical evaluation involving 230 patients with expert and ward/community nurses to assess reliability, validity, and ease of use clinically

Other components of the PURPOSE programme explored:

- The relationship between localised skin pain and pressure ulcer development
- Organisational factors associated with severe pressure ulcer development
- The impact of pressure ulcers on patients' quality of life

The results from these studies together with PURPOSE T development were drawn together through an active monitoring model of care.

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WEDNESDAY, 15TH JULY 2015

PL3/1

IMPROVING STANDARDS & OUTCOMES FOR DISABILITY EQUIPMENT, WHEELCHAIR AND SEATING SERVICES

Presenter: Brian Donnelly

This presentation will take a brief look at the important role disability equipment, wheelchair and seating services plays across care settings, and how introducing and raising standards for commissioning and providing equipment improves clinical and financial outcomes and the overall user experience.

It will include an overview of the work of CECOPS in supporting organisations in delivering safe, good quality, and effective services via our widely supported code of practice and accreditation scheme. It will also look at some of the CECOPS support tools available e.g. approved training and iCOPS® self-evaluation and performance management tool, and how these support and drive continuous improvements.

There will be a brief look at some of the outcomes resulting from introducing CECOPS code standards.

This session will benefit commissioners, service providers and clinical professionals working with disability equipment, wheelchair and seating services by demonstrating how the outcome-based code of practice and work of CECOPS and iCOPS® help deliver all-round improved clinical and financial outcomes.

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PL3/2

WORKING IN PARTNERSHIP TO DEVELOP PATIENT CENTRED OUTCOME MEASURES (PCOMS) FOR CHILDREN AND YOUNG PEOPLE WHO USE WHEELCHAIR AND POSTURE SERVICES

Presenters: Fiona Ellis, Krys Jarvis and Rebecca Johnson

The Shropshire and Telford Clinical Commissioning Groups (CCGs) presented a joint pathfinder bid to NHS England in January 2015 to develop Patient Centred Outcome Measures (PCOMS) to improve outcomes for wheelchair users. The bid was successful and Shropshire CCG was awarded £20,000 to deliver the project.

The project is a collaboration between the voluntary sector, community health care provider service and clinicians, commissioners, with input from service users, their families and parent/carer groups.

The aim of the project is to improve outcomes for young wheelchair users in Shropshire by

- consulting with children and young people and their families
- seeking guidance from health professionals, education and social care
- considering the latest research

This is a unique piece of work, as there are currently no agreed and comparable patient-centred outcome measures in existence for wheelchair and posture services.

We are approaching this project with the view to it potentially being rolled out more widely, as part of the national work around improving wheelchair services, which will provide an opportunity to benchmark services using quality outcomes.

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PL3/3

PRELIMINARY ASSESSMENT OF VISION, PERCEPTION AND COGNITIVE FUNCTION FOR SAFE DRIVING OF POWERED WHEELCHAIRS IN CLIENTS WITH NEUROLOGICAL CONDITIONS

Presenters: Dolores McFadden and Dora Sneddon

Summary
People with compromised independent mobility who have neurological conditions or have suffered brain trauma often have the goal of using powered mobility. As therapists we need to assess their base-line functional capacity prior to making a decision with them about what wheeled mobility may be most appropriate for their needs and capabilities. We will present an evidence-based sequential process which assesses vision, then visual processing, then cognitive functions, to establish whether the person's essential skills for driving a powered wheelchair are intact, prior to considering introducing practical driving training.

Aims and Objectives
Attendees will gain an understanding of the importance of preliminary assessment of vision, visual processing and cognitive functions necessary for driving a powered wheelchair. They will participate in some assessment processes to gain direct experience of the kind of essential information these can provide. The difficulty of disappointing people found to have serious deficits which rule out powered wheelchair driving will be discussed, together with how having good assessment information can increase insight into deficits for the client and their family. Thus making it easier to discuss specific problems, reducing the possibility of disagreement, and making conflict less likely.

Background
This process has been developed over 10 years as a result of the significant risks of powered provision for those with neurological problems who have had unrecognised deficits come to light. The motivation has been to make the decision-making process equitable, transparent and effective for clients and therapists. The process aims to eliminate conflict and reduce the need for repeated interventions from therapists who previously found themselves having to retrace assessment steps to manage risk and understand deficits which had become apparent.

Discussion
We hope that by sharing this process, colleagues who assess people with neurological conditions for wheelchair provision will be better equipped to:

- Identify problematic visual, visual processing and cognitive deficits
- Discuss deficits with vision experts
- Communicate about deficits and the potential risks effectively with clients and their families
- Help clients and family members understand limitations and capabilities in a realistic way
- Make better decisions about appropriate wheelchair provision
- Reduce time-consuming reviews, reassessments and emergency risk-management interventions
- Improve resource management by providing the right wheelchair from the outset.

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FREE PAPERS

FP3

"THE UNSEATABLES"?

Presenters: Cate James and Peter Rowell
Additional author: Sally Pumphrey

Summary
Successful provision of a seating system and electrically powered indoor chair (EPIC) to allow a complex high double above knee amputee with no hip flexion, who was at high risk of pressure ulcers and who spent all day prone, to be independently mobile. Unconventional equipment also eventually accepted for transportation by ambulance service.

Aims & Objectives
AIMS
- Independent powered mobility in own home
- Ability to attend hospital appointments safely and comfortably
- Posture/comfort managed in system
- No negative impact on pressure management
- Ultimate aim accompanied electrically powered indoor outdoor chair (EPIOC) use.

OBJECTIVES
1. Foamcast moulded seat insert in prone
2. Tilt in Space (TiS) mid wheel drive powered base
3. Forearm support padded platform
4. Day time pelvic strap for security

Background
The whole process behind the management of this complex client was based on the Healthcare Standards for NHS Commissioned Wheelchair Services (NWMF et al, 2010). Client initial diagnosis was transverse myelitis. Under the care of Midlands spinal injuries unit. Known to wheelchair service since 1974 and had preference for steel frame Carters style chairs. Also used a Roho cushion for pressure relief. In 2008 left ischial tuberosity pressure ulcer diagnosed and pressure ulcer on his foot. 2009 Midlands spinal injuries unit advised that non-healing had resulted in a bilateral above knee amputation. Due to pressure ulcers client was nursed prone. Large postural issues as client had no hip flexion. Previous grade 4 pressure ulcers on sacrum and also trochanters meant skin was fragile. Extreme wasting of gluteal muscles and ongoing sacral pressure ulcer. Client spent all day prone or prone with forearm support. He was also always naked because of issues with personal needs and clothing.

Client wanted independent mobility around his home with a longer term view to EPIOC provision with supervision. Wheelchair service liaised with Specialised Orthotics Seating company re our aims. Decided to make a foamcast prone ‘chair' on a tilting base with padded pelvic belt. Mid wheel drive chair was decided for stability and TiS to allow offloading of elbows. In November 2012 casting was done at home with slide sheet transfer onto casting bag. In December 2012 a midfit was completed to establish control position. Handover was in January 2013. Need for discretion bag for catheter. TiS fixed at best angle for comfort and to minimise slippage and shear forces. Weeks later, issues arose re transportation to hospitals and Midlands Centre for Spinal Injuries as they would not transport client in system without suitable paperwork. This despite local ambulance service transporting him

prone on a stretcher. Client was so comfortable in the chair he did not want to travel by stretcher as it made him sore. This situation required close liaison with ambulance transport management and development of specific bespoke risk assessment and suitable harness that was agreed by them in writing.

Following further home adaptations, client was able to successfully negotiate all aspects of the home environment and drive with a good level of control. All was going well, and discussion was underway re best way forward for client to be able to use the system outside, when he sadly passed away.

Discussion

- Was this client unseatable and if so, how does this support our holistic management and promotion of independence?
- Does prone lying constitute seating?
- Was he our responsibility anyway? - if not, whose was he?
- Have there been other cases where we maybe should have thought 'outside the box'?
- Whose responsibility was the transport harness?
- Thoughts on our risk assessment for transportation process

References

National Wheelchair Managers Forum, British Society for Rehabilitation Medicine, empower, Posture & Mobility Group, WhizzKidz. (2010*). Healthcare Standards for NHS Commissioned Wheelchair Services.* Available: http://www.wheelchairmanagers.nhs.uk/pubs.html

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FP4

AN INTEGRATED, CUSTOM CONTOURED CAR SEAT FOR A PERSON WITH ADVANCED MULTIPLE SCLEROSIS

Presenter: Dave Long
Additional Author: Rick Houghton

Summary
TECHNICAL: This presentation will explore the process of providing a bespoke seating insert for fitment to an industry standard seat frame in order to maintain the user's independence as a front seat passenger, and to enable her to travel longer distances again following postural deterioration.

Aims & Objectives
The principal aim, as described above, was to provide an improved level of comfort and postural support whilst sitting in the car seat, thus restoring the ability to travel further afield, including on holiday. A journey of 1.5 hours was the longest able to be tolerated, which was restrictive to a couple used to much greater amounts of travel.

Background
It is generally advised that wheelchair users transfer to the vehicle passenger seat wherever possible on the grounds of safety (Posture & Mobility Group, 2013; Ricability, 2011), but for those who require a significant amount of postural support, or to be hoisted, this is usually impossible. In these instances, a wheelchair accessible vehicle may be used to travel seated in one's wheelchair. However, some people with higher levels of postural need still prefer to transfer to the front passenger seat and to have their wheelchair stowed in the car boot (personal observation). This is dependent upon their moving and handling requirements and the willingness of the carer to engage with this process.

The service had previously provided a custom contoured (carved foam) seating system fitted onto a (privately purchased) Balder powered wheelchair in 2013. To travel, the patient was transferred by her husband to a swivel car seat, but that seat was found to be a) uncomfortable and b) lacking in postural support following postural deterioration. The patient's husband approached the service to enquire whether a second custom contoured seating system could be supplied and interfaced to the swivel car seat frame. The clinical and technical team worked with the patient and her husband to explore the feasibility of such a project. This presentation will explain the process of bringing the seating system into being, including a description of the challenges that were faced such as the management of the risks involved. A collaborative approach was adopted between the service, the patient, her husband and the manufacturer of the seat frame.

Discussion
The result of this intervention was the ability of the patient to travel greater distances in comfort, to the extent that the couple are now considering a holiday in Scotland this summer (they live in the south of England). She is pleased to be able to remain a front seat passenger, rather than being seated in the rear of a wheelchair accessible vehicle. No problems have been encountered since issue of the seating system in July 2014.

References
Posture and Mobility Group. (2013). *International Best Practice Guidelines: Transportation of People Seated in Wheelchairs.* Available: http://www.pmguk.co.uk/best-practice-guidelines.html

Ricability. (2011). *Wheelchair Accessible Vehicles.* Available: http://www.rica.org.uk/content/wheelchair-accessible-vehicles-wavs

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FP5

POWERED WHEELCHAIR PROVISION – IMPROVING CRITERIA AND ASSESSMENT

Presenters: Nick Brown and Rhian Davies
Authors: Sophie Bool and Nick Brown

Summary
The purpose of this project was to create a powered wheelchair assessment process to increase consistency, safety and suitability of adult service users being issued with powered wheelchairs.

Aims & Objectives
- To have a clear criteria for issuing a powered wheelchair
- To create a structured assessment process, in accordance with current powered mobility guidelines, using standardised assessments
- To identify relevant clinical issues that may impact upon driving ability
- To increase the relevance of the assessment process, aligning it with the skills required for driving a powered wheelchair
- To ensure consistency and increase clinical governance when different clinicians are assessing across a number of venues

Background
Investigations into powered wheelchair incidents highlighted that clients were being issued with powered wheelchairs, even after failing a basic driving assessment. Although these chairs were intended for indoor use only, the incidents had occurred outdoors. It was felt that the original method of assessment did not simulate the skills required for safe daily usage, and needed to be reviewed to promote clinical reasoning, justify decision making, and encourage safety.
The existing powered wheelchair criteria were updated and more rigid guidelines set for screening client referrals. This resulted in a higher proportion of appropriate clients attending powered clinics, and clients being informed sooner if they did not meet the criteria for a powered wheelchair. The new method also meant that all powered chairs (user, attendant and dual control) were issued through the powered clinic pathway, which had not previously been the case.

A triage assessment was developed based on guidance from various sources (Optical Confederation, 2013; Department of Transport, 2011; Department of work and pensions, 2013; Chisholm, 2008; DVLA, 2013). These documents advised on screening of visual acuity, visual field, reaction time, balance, posture, ability to sit for long periods, concentration, and transfer ability.
Another of the changes made was to link in with the Personal Independence Payment toolkit (Department of Work and Pensions, 2013) regarding clients' level of mobility. It was felt that this would provide some consistency across services.

Due to the complexity of the clients, it was agreed that it was appropriate to assess their cognition and spatial awareness. We selected known, standardised assessments including the Snellen scale, Donder's test, Star cancellation test, clock drawing test, and the Mini Mental State Examination (MMSE), to ensure accuracy and consistency in results. All clients were required to pass the triage before they could proceed to the driving or environmental assessments.

Initially, it was found that a large number of clients were failing the triage; however this appeared to be due to inappropriate screening prior to the new process. The driving assessment was also identified to be in need of updating. The driving assessment is completed at three different clinic

sites and it was agreed that there was a lack of consistency in the assessment. A review of these sites was completed and a specific assessment was created for each site ensuring that all elements were as consistent as possible. The assessment length was also increased from 30 to 60 minutes to allow more time for practice and familiarisation with the powered wheelchair.

Random samples of six powered clinics were reviewed from June 2014. Of the 41 clients who attended the clinics 34 passed both the triage and driving assessment, with 7 (5 triage, 2 driving assessment) not meeting the required standard. The 2 clients that did not pass the driving assessment had been identified through the triage assessment as having a borderline score in the MMSE and left sided inattention.

Discussion

The purpose of changing the powered process was to create a more comprehensive and detailed assessment to increase the safety and suitability of powered wheelchair users. In the short term, it is difficult to record success due to the brief amount of time the assessment system has been in place. Data comparison between 2011 and 2014 shows the overall number of powered wheelchairs issued has decreased. However, due to a significant change in the administration involved, we cannot compare this accurately to the amount of referrals received. Despite this, amount of service users that were assessed for powered mobility at clinic passing the tests and subsequently having a powered chair prescribed for them, has been compared.

1) In June 2011, using the original assessment, 89 % of assessed clients passed. However 96% of those assessed still had a powered wheelchair prescribed to them.
2) In June 2014, under the new process, 83% of assessed clients passed and the same 83% were prescribed a powered wheelchair.

The intention was not to drastically reduce the amount of wheelchairs issued to service users but to identify those who will be a potential risk to both themselves and others, and attempting to limit this risk.
Problems identified under the new process include communication and illiteracy problems during the triage assessment, as well as explaining to the clients at the end of a long assessment that they have not achieved the required standard and that a powered wheelchair will not be provided.

References

Chisholm, C. (2008). *Visual requirements for Driving*. Available: http://www.optometry.co.uk/uploads/articles/Jan%2025%2008%20Clinical%20driving.pdf. Accessed 23rd May 2013.
Department for Transport. (2011). *Mobility scooters and powered wheelchairs on the road – some guidance for users*. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211030/advice-for-mobility-vehicle-users.pdf. Accessed 23rd May 2013.
Department for Work and Pensions. (2013). *Personal Independence Payment Assessment Guide*. Available: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/368122/pip-assessment-guide.pdf. Accessed 10th May 2013.

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ALDERSEA LECTURE 2015

REFLECTIONS ON A CAREER IN ASSISTIVE TECHNOLOGY

GEOFF BARDSLEY

I have been lucky to enjoy a career in assistive technology (AT), spanning early days based on research and innovation, with only rudimentary services in place, through to current times with extensive services embedded as essential elements in healthcare delivery. Looking back on this period, a number of significant changes and developments can be seen to have had profound effects on the field.

This highly non-scientific paper will take a subjective view of these milestones, and reflect on their implications for the field as a whole and at a personal level. It will explore themes - such as service user focus, communication, community, teaching, R&D - to arrive at pointers for consideration for the future of AT.

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UPDATE ON PLANS FOR NHS WHEELCHAIR SERVICES IN ENGLAND

Introduction by Henry Lumley, chair of PMG's Strategy & Policy Committee

Two years ago at the PMG conference in Bristol we heard an interesting presentation by John Warrington from the Department of Health (DH) about the possible future direction of wheelchair services, including the surprise publication of the tariff proposals contained in the previously embargoed Deloitte's report "Developing a Wheelchair Tariff". Unfortunately, due to time constraints, the plenary session finished with more questions remaining un-asked than answered, and a considerable number of raised eyebrows as to what it all might mean.

Since then we have seen a number of initiatives launched by various stakeholders including:

- Two national summit meetings promoted by the Chief Executive of NHS England
- Wheelchair services included in the template for collection of national reference costs
- DH project to test the proposed tariffs and gather benchmark financial information
- National project to gather statistics on wheelchair services
- Launch of National Wheelchair Alliance

Where does all this take us? What does it all mean for the clients and for the services we all work so hard to deliver?

This session will try to draw the various themes together, to explain how the different pieces of work and projects are designed to combine to support the delivery of excellence in wheelchair services for the future. Importantly, this session will also give you a chance to raise the issues that concern you with the people who are supporting the drive for improvement. There will be ample time for discussion and to put your questions to the speaker panel.

1. How service users can influence the consultation process

Paula Moulton, lead of Summit workstream *Better informed and empowered service users & carers*; member of NHS England Advisory Board

2. How it all fits together

Krys Jarvis, Chair, National Wheelchair Managers Forum

3. The progress towards tariffs; timescales and plans

i) Wheelchair tariffs and currency
Sue Nowak, Head of Pricing Development Team, NHS England
ii) Reference costs
Deborah McEvoy, Reference Costs Development Manager, Department of Health
Nisha Mistry, Reference Costs Collection Manager, Department of Health

4. Improving wheelchair services: a view from NHS England

Rosamond Roughton, Director of NHS Commissioning

CPD REFLECTION SHEET

USE THIS PAGE TO HELP REFLECT ON THE CONFERENCE SESSIONS YOU ATTENDED

Sessions attended
What did I hope to learn when booking to attend the PMG conference?
How do the sessions attended fit into my training needs/CPD?
Key learning points achieved
What is the most important outcome from attending PMG in terms of addressing current and future learning needs?
How will my learning influence or change my clinical practice?