Exercise and Activity participation in a Semi-rural population: Interviews from a Welsh Parkinson’s Disease population

B Sarin, Cardiff University, P Sloan (ABM ULHB)

Improvement in trunk control and posture with Targeted Training following head injury: a single case study

P B Butler, P M Holbrook, The Movement Centre, Robert Jones & Agnes Hunt Orthopaedic Hospital NHS Foundation Trust

A Comparison of the effects of exergaming versus standard exercise on balance in health sedentary adults.

G Barry, A MacSween, J Dixon, P van Schaik, S Dixon, D J Martin, Teesside University

Knee proprioception before and after medial patellofemoral ligament reconstruction

T O Smith, C J V Mann, S T Donell, University of East Anglia

Inter-rater reliability of the Hindi version of the Berg Balance Scale

S Shah, N Snowdon, V Joshi, Sheffield Hallam University

Medio-lateral control of the knee remains a problem after ACL reconstruction

K Button, P Roos, R van Deursen, Cardiff University

Exercise professionals’ perceptions on working with clients with Multiple Sclerosis

N Vaz, N Snowdon, Sheffield Hallam University

Adaptations in Transtibial Amputee Balance Function and Postural Control Following Rehabilitation

C T Barnett, Nottingham Trent University, N Vanicek, University of Sydney, Australia, R C J Polman, Victoria University, Melbourne, Australia

The effects of Wii Fit™ and IREX™ exergaming platforms on postural stability, user-acceptance and flow: a randomised trial

J Robinson, D Martin, P van Schaik, A Macsween, J Dixon, Teesside University

The North Star Ambulatory Assessment for Duchenne muscular dystrophy

E Scott, A Mayhew, North Star Clinical Network

Older women with large between limb knee strength differences preferentially adopt a dominant-trail limb strategy during stair ascent

L Alcock, University of Hull, N Vanicek, University of Sydney, Australia, T D O’Brien, Bangor University

The effects of a 3-month supervised exercise programme on the gait biomechanics of participants with peripheral arterial disease and intermittent claudication

S King, University of Hull, N Vanicek, University of Sydney, Australia, K Mackford, Hull Royal Infirmary, P Coughlin, Cambridge University Hospitals NHS Foundation Trust

Improving Patient Choice in Treating Low Back Pain Study: Design and Development of a Decision Support Package for Low Back Pain Patients
Progressive declines in clinical outcome measures within a cohort of healthy, independent community-dwelling older women ................................................................. 18

L Alcock, University of Hull, N Vanicek, University of Sydney, Australia, T D O'Brien, Bangor University 18

Investigating the effects of video based observational analgesia on pain perception in healthy adults 19

F Siess, T Hunter, University of East London ........................................................................ 19

Poster Abstracts .................................................................................................................. 20

Children and young people with Cerebral Palsy’s experiences of adapted dynamic cycling- interview and diary findings .......................................................... 20

D M Pickering, L M Horrocks, K Visser, G L Todd, Cardiff University ................................ 20

Reliability of a new computerised system to detect walking ability in the early stages of recovery post stroke ................................................................................... 22

A S Iqbal, P R Woznowski, A Cooper, A D Preece, R van Deursen, Cardiff University ............ 22

The Effect of Upper Limb Dysfunction on Self Concept after Stroke: a Narrative Review ........ 24

J Purton, York St John University, S Hunter, Keele University ............................................ 24

Perceptions of Indian Physiotherapists of challenges encountered in management of chronic musculoskeletal condition: an Interpretative Phenomenological Approach ........................................... 26

K Mehta, H Batty, H Horobin, Sheffield Hallam University ................................................ 26

The relationship between cortical organisation, core muscle function and balance in healthy participants .................................................................................. 27

S Potter, H Frampton, N Smith, D Hodgson, J Dixon, C Ryan, Teesside University ............... 27

Experiences of Loss in People with Multiple Sclerosis (PwMS): A modified systematic review ...... 28

N Farooqui, Jedda, Saudi Arabia, S Hunter, Keele University ............................................. 28

E-training for AHP’s: A systematic literature review of methods for training therapists ........ 29

H Richmond, C Bridle, S Lamb, University of Warwick ..................................................... 29

Effects of prolonged icing on neurophysiological measures of muscle tone: A Randomized Controlled Trial ................................................................................... 30

N D Kasar, A S Morley, Sheffield Hallam University ............................................................ 30

The reliability and validity of the Berg balance scale (BBS) for people who have multiple sclerosis (MS) 31

L S Yoward, P Doherty, C Boyes, York St John University ................................................ 31

To identify the perceptions of stroke survivors and their carers about physiotherapy in India ....... 33

V Saboo, S Patki, Jackie Hammerton, Sheffield Hallam University ....................................... 33
Oral Abstracts

Exercise and Activity participation in a Semi-rural population: Interviews from a Welsh Parkinson’s Disease population

B Sarin, Cardiff University, P Sloan (ABM ULHB)

Background: It is suggested that physical activity and exercise have a protective effect towards the progression of deterioration with Parkinson’s Disease (PD) [1,2,3]. However engagement with formal exercise by the PD population within semi-rural Wales is limited. This study investigates present exercise and activity participation in this population to identify local profiles of engagement.

Methods: Semi-structured interviews were conducted through an iterative process with 7 participants with PD purposively selected via the Welsh Movement Disorder Network database. Ethical approval was gained. Data was analysed using thematic analysis.

Results: Three themes emerged. Activities: Participants engaged in leisure activities that fit into their lifestyles rather than formal PD based exercises, e.g. dancing, walking and swimming. Barriers: Pain, fatigue and reduced co-ordination were major causes of withdrawal from participation. Other barriers included PD-motor symptoms, fear of falling and negative attitudes. Enablers: Appropriate medication made greatest impact on participants’ ability to engage in activities. Further enablers were partners’ and friends’ encouragement, social camaraderie and positive attitudes.

Conclusions: Findings suggest that people within this population prefer more leisure-based activities within a social context normalising on-going disease management within daily life. By focusing on these forms of activities rather than formalised exercise programmes it may enhance activity engagement.

Implications: Healthcare Professionals should consider developing an ‘Index of Socially Orientated Activities’ that are local, accessible and relevant to their population’s needs to support activity engagement. Specialist support should also be available for specific problem-solving where physical difficulties interfere with on going participation.

References:
Improvement in trunk control and posture with Targeted Training following head injury: a single case study

P B Butler, P M Holbrook, The Movement Centre, Robert Jones & Agnes Hunt Orthopaedic Hospital NHS Foundation Trust

Background: Targeted Training (TT) is a physiotherapy method of improving control of posture and thus, function in motor impairment at the level of individual joints and segments. TT has been shown to improve sitting balance and gait in children but has not previously been used following traumatic brain injury (TBI).

Method: A single case study was undertaken to evaluate the effect of a nine-month course of TT on a 23 year old man who had sustained a TBI in an RTA 4 years 8 months previously. He also sustained multiple lower limb fractures and had received on-going physiotherapy since that time but his progress had plateaued. Outcome measures used were the Berg Balance Scale, the Segmental Assessment of Trunk Control (SATCo) and photographs of posture.

Results: Initial presentation was with marked postural scoliosis and insecure standing and walking ability. The Berg Balance Score increased from 31 to 39 with TT and the SATCo showed that assured trunk control was initially at upper thoracic level and improved to lower lumbar level. Postural scoliosis was eliminated and standing/walking increased in confidence. These results were maintained at six month follow up.

Conclusions: The results show clear improvement in posture and function suggesting that TT was effective in advancing progress for this patient who had plateaued. After four years of rehabilitation, changes of this magnitude are uncommon.

Implications: This case study has demonstrated the potential for improvement of function by the use of Targeted Training after TBI and supports the need for a larger study.
A Comparison of the effects of exergaming versus standard exercise on balance in health sedentary adults.

G Barry, A MacSween, J Dixon, P van Schaik, S Dixon, D J Martin, Teesside University

Background: Exergaming is the use of computer gaming technology and virtual reality environments for exercise is an option to encourage people to exercise. Exergaming has been used clinically with positive results [1-5]. As exergaming is still a novel approach, there is a shortage of good quality evidence of its effects on balance, an outcome of functional importance.

The aim of this study was to investigate the effects on balance of a two-week exergaming programme compared to a standard exercise programme.

Methods: Ethical clearance was granted by Teesside University (TU) School of Health and Social Care Research Governance and Ethics Committee. We tested claims that exergaming is useful for improving balance in an experimental design with a convenience sample of healthy sedentary adult participants randomised to one of two groups taking part in a two week programme of either exergaming (n=17) or standard exercise (n=16). Balance was measured with a Kistler™ force platform as the range and standard deviation of the centre of pressure (CoP) excursions in the anterior-posterior and medio-lateral directions, and the CoP velocity during both unipedal and bipedal standing.

Results: Analysis of covariance (ANCOVAs) comparing the post-intervention differences between the groups, with baseline values comprising the covariate where used. An alpha level of 0.05 was used throughout and 95% confidence intervals of the differences between the groups’ post-intervention scores were calculated. Results showed statistically significant differences in the range (p < 0.05) and standard deviation (p < 0.01) of the anterior-posterior CoP excursion in unipedal standing between the exercise groups after intervention, with lower values in the exergaming group, indicating better postural stability.

Conclusion: The results show that exercising in an exergaming environment can be more beneficial for balance training than doing the same exercise without that environment.

References:
Knee proprioception before and after medial patellofemoral ligament reconstruction

T O Smith, C J V Mann, S T Donell, University of East Anglia

**Background:** Previous literature has suggested a significant deterioration in proprioceptive capability following recurrent patellar dislocation. Accordingly, proprioceptive exercises are prescribed to people following recurrent patellar dislocation. This study aimed firstly to determine whether proprioception deficits, as measured by joint position sense (JPS), occur in people who have experienced recurrent patellar dislocations; and secondly to determine whether JPS changes following medial patellofemoral ligament reconstruction (MPFL) reconstruction.

**Methods:** Ethical approval was obtained prior to recruitment. Thirty people awaiting MPFL reconstruction for recurrent patellar dislocation were recruited. Pre-operative JPS was assessed using the passive angle reproduction test to determine actual angular error (AAE). Clinical outcomes were assessed using the Kujala Patellofemoral Disorder Score, the International Knee Documentation Committee subjective knee evaluation form (IKDC), pain by visual analogue scale (VAS), knee range of movement, isometric knee extensor muscle strength and frequency of recurrent patellar dislocation. Outcomes were assessed pre-operative, 6 weeks, and at 3 and 12 months post-operatively.

**Results:** Sixteen males and 14 females with a mean duration of 95 months (Standard Deviation (SD) = 81.9) from initial dislocation to operation were recruited. Mean AAE was 2.2° (inner range; SD=2.1) to 3.9° (mid-range; SD=3.6); this was not clinically significant. There was no statistically significant difference between the baseline-to-6 week, 6 week-to-3 month or baseline-to-12 month AEE measures (p=0.38 to 1.00; Student’s T-Test). There was a statistically significant change in clinical outcomes with significant improvements in Kujala and IKDC scores, reduced pain and increased isometric knee extension strength at 12 months (p<0.01; Student’s T-Test).

**Conclusions:** Following recurrent patellar dislocation, people exhibit minimal deficits in JPS. Whilst MPFL reconstruction significantly improved clinical and functional outcomes, this operation does not significantly alter JPS during the first post-operative year.

**Implications:** The need for proprioceptive exercises in the rehabilitation of this population is therefore questioned.
Inter-rater reliability of the Hindi version of the Berg Balance Scale.

S Shah, N Snowdon, V Joshi, Sheffield Hallam University

Background: Use of outcome measurement is an important part of modern professional practice. The Berg Balance Scale (BBS) appears to be used in many Indian rehabilitation centres but no official version has been previously available in Hindi, the most widely spoken Indian language. The Berg Balance Scale was translated into Hindi by the current authors, according to accepted guidelines. The aim of this study was to test the reliability of this translated version.

Methods: The study was approved by Sheffield Hallam University Research Ethics Committee and was carried out at Sancheti Institute for Orthopaedics and Rehabilitation, Pune, India. Thirty patients aged 65 - 81 (mean age 69 ± 4.3) were recruited from outpatient clinics. Informed consent was taken and each individual was assessed once with two raters observing. Inter-rater reliability was analysed using both the Intra-class Correlation Coefficient (ICC) and weighted kappa (Kw).

Results: The mean total BBS score was 49 (+/- 6). Distribution of scores was significantly different from a normal distribution (p< 0.013) with most participants having relatively good balance.
For the total BBS score, the ICC was 0.977 (95% Confidence Interval 0.951-0.989) and the Kw was 0.819 (95% Confidence Interval = 0.734-0.905). Kw values for individual items varied from 0.592 to 1.000. The least reliable items were Item 4 (stand to sit) and Item 5 (transfers).

Conclusions: The ICC shown here is similar to that found in previous studies for both the original BBS and previous translated versions. This indicates that it is as reliable as these previous versions. The weighted Kappa is a more appropriate reliability coefficient and is above the 0.75 minimum reliability level recommended for clinical use.

Implications: The BBS can be used by experienced physiotherapists for elderly patients. Further evaluation of psychometric properties is recommended.

References:
Medio-lateral control of the knee remains a problem after ACL reconstruction

K Button, P Roos, R van Deursen, Cardiff University

**Background:** Rehabilitation of ACL injured individuals tends to focus on improving quadriceps strength and medio-lateral control of knee movement [1]. Single leg hop for distance is often used in late stage rehabilitation [2]. The aims of this study were to investigate recovery of single leg hop performance in ACL reconstructed (ACLR) compared to ACL deficient (ACLD) and healthy individuals (CONT).

**Methods:** 19 ACLR, 19 ACLD and 20 CONT performed four single leg hops for distance and regained balance after landing. Ethical approval was obtained from the Local Research Ethics Committee. Kinematic and kinetic data were collected using VICON and analysis focused on the landing phase. Fluency of medio-lateral Knee movement was calculated as the number of times the velocity of this movement crossed zero per second (adapted from [3]). Statistical differences between the ACL and CONT groups were analysed using a general linear model univariate analysis, with velocity prior to landing as co-variant.

**Results:** Hop distance in ACLR was not significantly different from CONT, but significantly increased compared to ACLD (1.33±0.04, 1.34±0.04 and 1.05±0.03 m) and peak adductor moments were not significantly different between ACLR, CONT and ACLD (0.18±0.02, 0.18±0.02 and 0.14±0.02 N.m/body weight.height). Varus/valgus knee range of motion in ACLR was significantly increased compared to CONT and decreased compared to ACLD (23±1°, 19±1° and 27±1°). Fluency of medio-lateral movement of the knee in ACLR was less fluent than in CONT, but similar to ACLD (7.2±0.3, 5.7±0.3 and 6.7±0.4).

**Conclusions:** While hop distance was recovered in ACLR, they had not fully regained medio-lateral control of the knee to the level of CONT and performed more similar to ACLD. This was not reflected in their adductor moments.

**Implications:** More effective rehabilitation of ACL injured individuals needs to address medio-lateral control of the knee (both fluency and varus/valgus range of motion) to prevent long term complications.

**References:**
Exercise professionals' perceptions on working with clients with Multiple Sclerosis

N Vaz, N Snowdon, Sheffield Hallam University

Background: Multiple Sclerosis (MS) patients need long term exercise to prevent de-conditioning and subsequent secondary complications. Current evidence favours exercise for these patients, as opposed to no exercise at all1. Patients report barriers to exercising in fitness centres including uncertainty about the suitability of this environment for their needs. This may prevent long term exercise, a vital part of self-management2. This study investigated exercise professionals' perceptions of working with MS clients with the aim of understanding the suitability of fitness centres for this client group.

Methods: This qualitative study purposively sampled 9 exercise professionals from 4 fitness centres in Sheffield. Semi structured interviews were recorded, transcribed word for word and thematically analysed. Ethical approval was obtained from Sheffield Hallam Research Ethics Committee.

Results: All exercise professionals were positive in their attitudes towards working with clients with MS and were confident in their ability to adapt exercise programmes for individuals. Main themes arising were the need to ensure client safety and the importance of working with individuals to design specific exercise programmes that maximised motivation, client autonomy and individual capability. All the exercise professionals interviewed said that if they were informed a client had a specific condition then they would search for information from sources such as colleagues and the internet prior to designing an exercise programme. They were asked about whether they might attend a face-to-face course on MS and all felt that the barriers would outweigh the benefits because of the large variety of conditions they might come across in their work.

Implications: Collaboration of physiotherapists with exercise professionals may lead to improved long term exercise adherence and greater opportunities for exercise for people with MS. The growing body of information around using exercise for people with MS may be best disseminated via internet resources.

References:


Adaptations in Transtibial Amputee Balance Function and Postural Control Following Rehabilitation

C T Barnett, Nottingham Trent University, N Vanicek, University of Sydney, Australia, R C J Polman, Victoria University, Melbourne, Australia

**Background:** Amputees have poorer balance, postural control and an increased falls risk when compared to able-bodied individuals [1, 2]. Studies have not investigated the longitudinal process of adaptation in balance function and postural control in transtibial amputees. The aim of the current study assessed the adaptation of postural responses in transtibial amputees following discharge from rehabilitation.

**Methods:** Ethical approval was granted by the local NHS REC (08/H1304/10). Seven unilateral transtibial amputees [age 56.1±14.9 years, height 1.82±0.08m, mass 91.7±11.4kg] fulfilling inclusion/exclusion criteria, completed the Sensory Organisatioin Test [SOT] and the Limits of Stability [LOS] on the Neurocom Equitest® at one, three and six months post-discharge from rehabilitation. A linear mixed model assessed statistical differences, alpha level of significance set at p≤0.05 a priori.

**Results:** Overall balance performance improved significantly (15.2%) [p=0.02] following discharge as did utilisation of somatosensory input (9.7%) [p=0.01]. Participants were heavily reliant upon vision throughout the test period. Participants’ reaction time increased, movement velocity was unchanged. Participant’s ability to spatially explore their limits of stability improved, particularly towards the intact side (78.8%) (p=0.02).

**Conclusions:** Overall balance ability improved however, participants were still heavily reliant upon vision. Participants increased spatial and accuracy aspects of volitional exploration of their LOS, although temporal aspects did not change.

**Implications:** Results suggested that increased utilisation of somatosensory and vestibular information, along with improved affected limb function may increase overall balance function. Further practice of performing volitional postural movements under increasing time pressure, may improve balance ability and postural control. This has implications for attempts aimed at reducing the associated high falls risk, fall related injury and the socio-economic cost of falling.

**References:**
The effects of Wii Fit™ and IREX™ exergaming platforms on postural stability, user-acceptance and flow: a randomised trial

J Robinson, D Martin, P van Schaik, A Macsween, J Dixon, Teesside University

**Background:** Exergaming (exercise using computer-gaming technology) has been shown to help in physical rehabilitation (1-2) and psychological functioning (3). Previous research is generally positive, but often based on small sample sizes and combined interventions. In spite of the popularity of commercially available exergaming systems, research that makes direct comparisons between purpose-built and the less expensive commercial exergaming systems is lacking.

**Methods:** The aims of this study were to explore the potential of exergaming using both physical and psychological measures. Ethics approval was granted by Teesside University School Research Governance and Ethics Committee. A convenience sample of 33 healthy-sedentary adults from Teesside University were randomly assigned to four weeks of balance orientated exercise (thrice-weekly, each lasting 30-40 minutes), using either the (purpose-built) IREX™ (n=16) or the (commercially available) Nintendo Wii Fit™ (n=17). Balance was measured using a Kistler™ force platform as centre of pressure velocity (CoP), and the range and standard deviation in the anterior-posterior (AP) and medio-lateral (ML) directions during bipedal and unipedal standing. User-acceptance and flow experience (a psychological state of immersion) was measured using the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Flow State Scale (FSS) questionnaires, respectively.

**Results:** Using a mixed analysis of variance (mixed ANOVA), significant improvements were found in four of the five unipedal postural stability measures for the IREX™ group (p<0.05), and two for the Wii Fit™ group (p<0.05). None of the bipedal measures were significant for the IREX™ group, and only one for the Wii Fit™ group (p<0.05). For both UTAUT and FSS questionnaires, significant increases were found at post-programme (mixed ANOVA, p<0.05). An analysis of covariance (ANCOVA) showed that for both balance and questionnaire measures there were no significant between-group differences (p>0.05).

**Conclusions:** Our results support the use of both IREX™ and Nintendo Wii Fit™ as supplements to therapeutic exercise regimens and prescription in terms of not only improving balance but also user-acceptance and flow experience, which may assist in exercise uptake and concordance.

**References:**
The North Star Ambulatory Assessment for Duchenne muscular dystrophy

_E Scott, A Mayhew, North Star Clinical Network_

**Background:** Reliable measurement of disease progression and the effect of therapeutic interventions in Duchenne muscular dystrophy (DMD) require clinically meaningful and scientifically sound rating scales. The North Star Ambulatory Assessment (NSAA)*, a clinical assessment scale to measure functional ability in ambulant boys with DMD, was developed to address issues with the psychometric properties of previously developed scales.

**Methods:** Experienced neuromuscular physiotherapists determined the conceptual framework, scale construct and content of the NSAA. Following training, inter-rater reliability testing was undertaken (N=17). Data were collated on the National Neuromuscular Database and NSAA data from 191 subjects were examined using Rasch analysis; including clinical meaning, targeting, response categories, model fit, reliability, dependency, stability and raw to interval level measurement. All analyses were performed in RUMM2020.

**Results:** Inter-rater reliability testing: strength of agreement based on total subject scores was very good (ICC, 0.95 and ≥ 0.93 for consistency and absolute agreement respectively). Overall, Rasch analysis supported the NSAA as being a reliable (high person separation index of 0.91) and valid (good targeting, little misfit, no reversed thresholds) measure of ambulatory function in DMD. One item displayed misfit (lifts head, fit residual 6.9) and there was evidence for some local dependency. Potential solutions were recommended. The hierarchy of items within the scale produced by the analyses was supported by clinical opinion, increasing the clinical interpretability of rating scores.

**Conclusions:** Rasch analysis supported the original development of the NSAA as a psychometrically robust scale for use in DMD clinical research. This study also demonstrates how Rasch analysis is a useful instrument to detect and understand key measurement issues of rating scales. Work is ongoing to reconfirm our findings in a longitudinal dataset, evaluate the responsiveness of the NSAA and to “transform” the raw level NSAA data into linearised measurement.

**Implications:** The NSAA provides a psychometrically sound measurement tool for clinical and research purposes, with the potential to detect clinically meaningful difference within a linearised rating scale.

* A copy of the NorthStar Ambulatory Assessment can be downloaded from the Muscular Dystrophy Campaign Website: http://www.muscular-dystrophy.org/assets/0002/5040/North_Star_Ambulatory_assessment.pdf
Older women with large between limb knee strength differences preferentially adopt a dominant-trail limb strategy during stair ascent

L Alcock, University of Hull, N Vanicek, University of Sydney, Australia, T D O’Brien, Bangor University

Background: The transition from gait to stair ascent (SA) poses a challenging and high-risk situation. Understanding the mechanics of the lead and trail limb during SA is important for physiotherapy and rehabilitation, but has rarely been investigated. Older adults have reduced musculoskeletal capacity and adapt their gait patterns, and limb dominance may influence locomotor strategies. Purpose: investigate lead limb preference and the mechanical actions of the lead/trail limbs during the gait-stair transition.

Methods: The local NHS REC approved this study. A biomechanical analysis of 36 women (60-83 yrs) ascending a 3-step staircase was conducted. Lead limb preference was explored with relation to dynamometer-derived knee moments. Differences between the lead (step 1-3) and trail (floor-to-step 2) limb were investigated. T-tests identified significant differences (p<0.05).

Results: Participants who demonstrated a consistent (left/right) lead limb preference strategy (unilateral group), were younger and had larger between-limb strength differences than those who used limbs interchangeably (bilateral group) (effect size: flexors-0.4Vs.0.49, extensors-0.25Vs.0.51, p<0.05). The unilateral group consistently used the dominant limb as the trail limb. The trail limb cycle was significantly shorter with greater forces generating increased propulsion and the lead limb produced greater joint powers.

Conclusions: In older women, when large between-limb knee strength differences exist, the dominant limb is preferentially utilised as the trail limb during the gait-to-stair transition. This allows the dominant limb to provide propulsion during the challenging and high-risk initial 2-step SA, whilst the non-dominant limb provides stability. This limb preference strategy results in significant biomechanical differences between the limbs.

Implications: The preferential dominant-trail limb strategy during the gait-to-stair transition likely represents a mechanism to control this high-fall-risk situation. Large between-limb knee strength differences may provide a clinically useful means to identify potential SA difficulty. Clinical and exercise-based interventions should consider these findings when recommending SA strategies for older women.

References:
The effects of a 3-month supervised exercise programme on the gait biomechanics of participants with peripheral arterial disease and intermittent claudication

S King, University of Hull, N Vanicek, University of Sydney, Australia, K Mockford, Hull Royal Infirmary, P Coughlin, Cambridge University Hospitals NHS Foundation Trust

Background: Peripheral arterial disease with intermittent claudication (PAD-IC) is an atherosclerotic disease which reduces blood flow to the lower limbs, resulting in diminished walking ability and impaired gait biomechanics. The decrease in blood flow means insufficient oxygen is circulating to skeletal muscles and causes a cramping type pain in the legs that is worsened with activity and relieved by rest. Treatment of PAD-IC can be multi-faceted with exercise therapy being a key form of treatment within this population; however an evidence-based programme with proven benefits has yet to be determined.

Methods: The aim of this study was to examine the effects of a 3-month supervised exercise programme (SEP) on the gait biomechanics and functional measures of PAD-IC patients. Twelve participants (mean±SD age 67.3±6.8 years, height 1.6±0.09m, mass 79.4±14.0Kg, Ankle Brachial Pressure Index 0.71±0.17) were recruited after approval from the local NHS ethics committee. Patients took part in a circuit training SEP using body weight based exercises interspersed with walking, for 3-months as part of their standard care. Biomechanical parameters were collected pre- and post-exercise intervention using 3D motion capture and ground reaction force data. All variables were analysed using a linear mixed model with a p value of 0.05.

Results: There were no statistically significant differences in functional measures such as the distance walked before onset of claudication pain (ICD) and absolute claudication pain (ACD) or gait parameters post-intervention. However there were visible trends towards functional improvements such as ICD (22.2% increase) and ACD (14.5% increase).

Conclusions: It appears that the current SEP for PAD-IC patients has little benefit for functional ability and gait biomechanics. This may be due to a lack of individual specification on training load and intensity, and progression through the programme. In order to devise disease-specific SEP tailored to this population, it is first important to establish the musculoskeletal characteristics of the PAD-IC muscle that can then be targeted through exercise.
Improving Patient Choice in Treating Low Back Pain Study: Design and Development of a Decision Support Package for Low Back Pain Patients

A S W Ngunjiri, M Underwood, S Patel, Warwick Clinical Trials Unit

Background: Treatment preference and choice is important for people with persistent low back pain (LBP). The 2009 NICE back pain guidelines recommend different treatment options but do not offer any direction on how to help patients make this choice. There are currently no suitable decision aids to assist patients in making their treatment choice for LBP.

Aims:
1. To develop a decision aid - Decision Support Package (DSP) - that will contain information on the treatment options available to the patients
2. To develop a training package for physiotherapists on how to use the DSP

Method: We developed a DSP informed by existing research and collaboration with physiotherapists, patients and experts in the field of decision aids and LBP. We did six pieces of exploratory work: literature review; 2009 NICE LBP guidelines review; qualitative screening interview transcripts of people with LBP; focus groups (patients); nominal group (physiotherapists), and Delphi study (experts). We collated these data to develop the DSP. We also developed a training package for physiotherapists.

Results: A LBP patient resource for use prior to their first consultation and a training package for physiotherapists. The DSP contains information on acupuncture, structured group exercise, manual therapy and cognitive behavioural approach. The training package for physiotherapists was on DSP use and communication skills during consultation.

Conclusion: We have developed an evidence and theory informed Decision Support Package and physiotherapists training. We are currently piloting its use in one NHS Trust (N=300) to test is effect on improving patient satisfaction with LBP patients’ treatment choices.
Progressive declines in clinical outcome measures within a cohort of healthy, independent community-dwelling older women

L Alcock, University of Hull, N Vanicek, University of Sydney, Australia, T D O’Brien, Bangor University

**Background:** Short clinical-based outcome measures are administered within multiple settings and populations, helping to identify those who experience difficulty with daily tasks and may be at risk of falling. Age-related changes have previously been assessed by categorising older adults into discrete age groups (i.e. 60-64, 65-69, 70-74, 75-59, >80y)\(^1\). Purpose: to explore the progressive nature of ageing and its influence on outcome assessments and examine relationships between different types of outcome measures.

**Methods:** The local NHS REC approved this study. Forty-one community-dwelling older females (60-83 years) were assessed during 30s STS test, TUGtime, knee dynamometry, preferred gait speed (GS), Barthel Index and SF-36. These measures were regressed against age and cross-correlations were computed.

**Results:** Linear relationships between age and many of the measures indicate deterioration within the older age continuum. According to the regression model annual losses in performance were; knee moments: extensor 2.8%, flexor 4.0%, knee powers: extensor 4.0%, flexor 5.3%, GS:1.22%, and SF36:<1.3%. TUGtime increased by 1.2%/year, The largest explained variation was observed in the knee moments, powers, and GS (32>R\(^2\)%<60).

Reduced GS and knee moments and powers were strongly associated with increased age, TUGtime, and decreased physical-functioning (SF-36) score (r>0.6,p<0.05). TUGtime correlated with many variables (0.4>r<0.8). Knee ROM did not correlate with age or any of the measures studied.

**Conclusions:** These results emphasise the continuous loss across old age and provide baseline data for healthy older women. Recommendations towards establishing a minimal capacity required for activities of daily living may be a more innovative way of characterising dependence, independence or near-independence.

**Implications:** Performance-based tests appear to provide the greatest amount of information about functional ability and may be used to provide an early indication of immobility. GS and TUGtime were re-affirmed as good markers of functional decline. Caution should be aired when inferring extended ability based on knee ROM, and perhaps, a threshold for knee ROM may be more clinically meaningful.

**References:**

Investigating the effects of video based observational analgesia on pain perception in healthy adults

F Siess, T Hunter, University of East London

**Background:** There is growing evidence to indicate that verbal information provided to patients during their clinical encounter can influence their subsequent response to pain [1]. The aim of this study was to investigate the effects of observing an analgesic response on pain perception in healthy individuals.

**Methods:** Twenty-five healthy right handed adult female volunteers were randomly allocated into two groups after ethical approval was granted. Group 1 subjects watched a video of a demonstrator showing an analgesic effect when painful electrical stimuli to the back of the hand were paired to a green light but not a red light (18 Red, 18 green). Group 2 subjects watched a video sequence of same number of red and green lights. All subjects then received 36 painful electrical stimuli to the back of their hand (18 paired to a red light/18 paired to a green light). Pain perception was assessed with the Numerical Rating Scale (NRS; 0=no pain/10 = maximum imaginable pain). The difference in mean NRS scores for the red and green lights was compared using the Wilcoxon Signed-Rank Test.

**Results:** There was a significant reduction in NRS scores reported for the electrical stimuli paired with the green light in Group 1 (1.99 ± 1.5 p< 0.001) but not Group 2 (0.05 ± 0.15 p=0.21).

**Conclusion:** These findings suggest that observation of analgesic responses on video can influence pain perception in an experimentally induced model of acute pain.

**Implications:** Research is needed to investigate if video based observation of analgesia can be effectively harnessed to reduce acute pain in a clinical setting.

**References:**
Poster Abstracts

Children and young people with Cerebral Palsy's experiences of adapted dynamic cycling- interview and diary findings

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**Background** Children and young people with Cerebral Palsy (CP) have limited opportunities for participation and there has been limited research to explore this concept. Adapted dynamic cycling (ADC) is one activity that enables them to participate in the community. They also have a variety of communication styles where communication aids, picture boards or symbols as well as gestures and sign language are used. The aim of the study was to measure the effect of ADC on lower limb muscle strength and length and explore their cycling experiences.

**Methods:** Interviews were conducted with children and an accompanying adult to tell us about their experiences before and after six session of ADC. They also kept a diary about this experience. The researchers developed the interviews as they encountered different styles of communication. The use of pictures to encourage a dialogue about cycling was helpful. Closed questions were used with images of happy or sad faces to capture more feeling about the experiences when spoken language was not possible. Observation of their non verbal communication was essential. The data transcripts were verified by the accompanying adult and analysed using a template approach. The themes were sent back to the participants for comments.

**Results:** Twenty six interviews and eight diaries were collected from seventeen children and young people aged between 2 and 17 years. The emergent themes are firstly the impact on the child and family providing them with an opportunity to join in a recreational activity together. Secondly, their future cycling aspirations such as owning their own bike or going on a cycling holiday. Finally, the increase in social participation was evident from the new friends made and the independent cycling achieved. The children had enjoyed this adapted cycling experience.

**Conclusion:** The concept of participation requires deeper exploration for children and young people with CP.

**Implications:** Policy makers and parents may find the information useful to enable the child’s participation.

**References:**
Reliability of a new computerised system to detect walking ability in the early stages of recovery post stroke

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BACKGROUND: To regain independent walking is a primary goal for patients and rehabilitation services alike. Moreover, efficiently capturing the progressive phases of gait recovery in the early stages after stroke is found to be difficult. Therefore a new computerised system is being developed to assess multiple aspects of gait recovery. This study aimed to determine its reliability to measure assisted ambulation.

METHODS: Based on a real time location system consisting of Radio-Frequency (RF) ID tags with room location and movement detection capabilities, patient walking between two rooms was timed. Ten patients using a walking-aid and accompanied by a physiotherapist participated. Tags were attached around patients’ unaffected wrist and ankle (three per limb); to staffs’ uniform (one) and on the walking-aid (two). Ethical approval was obtained and a standardised protocol was used. Bespoke software was used to detect room departure and entry RF signals for each tag. Subsequently total time taken in seconds to cover this known distance was calculated. Intraclass Correlation Coefficients (ICC) and Pearson’s Correlation Coefficients (PCC) were used to determine reliability.

RESULTS: ICCs between 3 wrist tags, 3 ankle tags as well as between wrist and ankle tags were all excellent (ICC≥0.90). High correlations between patient tags and staff tags as well as between patient tags and walking-aid tags were obtained (all PCCs≥0.98).

CONCLUSIONS: The new system showed excellent reliability in measuring the time taken by patients to walk over a fixed distance. It was also highly reliable in detecting assisted/supervised walking and the use of walking aids, thereby effectively demonstrating its capability to measure important characteristics of assisted ambulation.

IMPLICATIONS: Based on the results obtained, validation and further development of the system is being undertaken to explore its potential for providing much needed quantifiable information about early stage functional recovery post stroke both in a hospital and at home.

References:


The Effect of Upper Limb Dysfunction on Self Concept after Stroke: a Narrative Review

J Purton, York St John University, S Hunter, Keele University

Background: Physical ability and appearance are foundations of body image, contributing to sense of self and self concept. Stroke can affect physical ability and appearance, sense of identity and self concept. Many stroke survivors consider their altered post-stroke body as unreliable. Altered function and appearance of the arm and hand often leads to the hand being concealed and objectified: ‘the hand’ rather than ‘my hand’. However, the impact of upper limb dysfunction on identity and self concept has not been explored.

Method: The aims of this study were: a) review literature on body image, self concept and stroke; b) identify categories of the ICF Core Set for Stroke that require upper limb function; c) consider the functions, activities and participation that could be affected by upper limb impairment, potentially impacting on self concept. A narrative review of literature was undertaken. Databases CINAHL, MEDLINE, AMED and PsycINFO were searched from 1985–2011 around themes of self, body image and stroke; 26 articles were selected for review. Functions, activities and participation that could depend upon bilateral upper limb movement were identified from the ICF Core Set. Ethics approval was not required.

Results: Stroke can negatively affect body image (11)*, self efficacy (10), self esteem (10) and life roles (8). Hand dysfunction impacts on self-efficacy (6) and body image (6) through loss of activity that enabled fulfillment of roles and a sense of pride and achievement in the body. Thirty-seven of the 130 categories of the ICF Core Set for Stroke, and 23 of the 51 categories of activities and participation require bilateral upper limb movement.

*numbers in brackets indicate number of studies

Conclusion: Upper limb dysfunction after stroke can contribute significantly to the challenges that stroke brings to the stroke survivor’s self concept.

Implications
Maximising potential for upper limb recovery should be considered from the start of rehabilitation to minimise the wider psychosocial effects of upper limb dysfunction after stroke.

References:
Perceptions of Indian Physiotherapists of challenges encountered in management of chronic musculoskeletal condition: an Interpretative Phenomenological Approach

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**Background:** Chronic Musculoskeletal conditions are a major cause of morbidity, affecting people’s physical, mental and social well-being (1). Part of the physiotherapy management is through dynamic engagement of therapist and client with the barriers to treatment strategies. This qualitative study explores the Indian physiotherapists’ perceptions of challenges they encounter in dealing with chronic musculoskeletal conditions and interventions to overcome this impact.

**Objective:** To explore the perceptions of Indian physiotherapist’s of the challenges encountered in the management of chronic musculoskeletal conditions.

**Design:** An exploratory, qualitative design using an interpretative phenomenological approach was undertaken.

**Methods:** Seven physiotherapists practicing Musculoskeletal Physiotherapy from Mumbai, India were interviewed. Interviews were transcribed and analysed using an Interpretative Phenomenological approach. Ethical approval was sought before conducting the study.

**Results:** The identified themes revolved around the issues of patient belief’s and perceptions in chronic conditions. The subordinate themes were the condition of the patient, attributes of patient, adherence and self-management, and the nature of the condition along with social and economic factors.

**Conclusion:** The analysis of themes revealed challenges mainly centered on patient attitudes and beliefs. The perception of barriers is enhanced by lack of patient involvement and negative attitudes towards treatment. This indicates a disjuncture between the therapist’s and patient’s perceptions in understanding of chronic conditions which warrants further investigation.

**References:**
The relationship between cortical organisation, core muscle function and balance in healthy participants

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Background: In individuals with chronic low back pain (CLBP) tactile acuity, a proxy measure of cortical organisation, is impaired. Furthermore, in CLBP patients, tactile acuity is related to lumbo-pelvic control and this may explain the balance impairments also seen in this patient group. The aim of this study was to investigate the relationships between 1) cortical organisation and balance and 2) cortical organisation and core muscle function, in healthy participants.

Method: 21 participants (age 29±6, female 13) were recruited. Lower back tactile acuity was determined using a measure of two-point discrimination (TPD). Core muscle function was measured as the intensity and onset timing of Transversus Abdominis (TrA) during a rapid straight arm raise using sEMG. Balance was measured as the range and standard deviation (SD) of anterior-posterior (AP) and medio-lateral (ML) sway during a test of unipedal eyes-closed balance using a Kistler force platform. Relationships were evaluated using Pearsons or Spearmans correlations, with alpha set at 0.05.

Results: There was a significant positive correlation between TPD and AP SD (r=0.452, p<0.05, n=21). The direction of the relationship suggests that poorer tactile acuity was associated with poorer AP balance. Multiple regression found that TPD and right TrA activity accounted for ~37% of the variance seen in AP SD. There were no significant correlations between scores of TPD and any of the other balance variables, TrA intensity or onset timing.

Conclusion: This study identified a relationship between sagittal plane balance and cortical organisation independent of core muscle function. No statistically significant relationships were found between cortical organisation and frontal plane balance, core muscle activity or onset timing. The finding of a relationship between AP balance and cortical organisation provides preliminary evidence for the investigation of sensori-motor training for balance improvement in patients with CLBP.
Experiences of Loss in People with Multiple Sclerosis (PwMS): A modified systematic review

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Background: Multiple Sclerosis (MS) is a common cause of disability among UK adults.[1] Experiences of “loss” are frequently reported by people with chronic illness and disability, including MS.[2] This study aimed to identify and synthesise the experiences of loss reported by PwMS in the literature, to provide greater holistic insight and understanding, and a framework for enhancing individualised care.

Methods: A modified systematic review of qualitative studies (interviews, focus groups) exploring lived experiences of adult PwMS was undertaken, with a comprehensive search of databases (CINAHL, PsycINFO, BNI, AMED, ASSIA, Ageline, Sociological Abstracts, Web of Science) using broad search terms (MS, experience, perception, perceive): the search identified 589 citations. Screening was undertaken by 2 reviewers according to inclusion/exclusion criteria; 25 studies were selected for review and assessed for methodological quality according to Popay et al’s (1998) seven criteria.[3] Data were synthesized using thematic analysis and constant comparison.[4] Ethical approval was granted from the School of Health and Rehabilitation Student Project Ethics Committee (SPEC) at Keele University, UK.

Results: All studies except one fulfilled four or more criteria for methodological quality; 6 studies met all 7 criteria. Data synthesis identified 7 main themes and 15 sub-themes including loss of: body (physical, mental); social (relationships, social involvement); identity (role, occupation, identity); self (worth, control, independence); and material loss (finance), ‘ought’ loss, and ‘anticipated’ loss.

Conclusions: In common with other chronic illnesses, individualistic experiences of loss affect all spheres of past, present and future lives of PwMS. The 7 themes portrayed interdependency, depicting non-linear interaction between different domains of a person’s life, and the spiral of consequences of chronic illness.

Implications: These findings can act as a framework for exploring the significance of each loss for individual PwMS, thereby advancing individualized care.

References:
3. Popay J, Rogers A, Williams G. Rationale and standards for the systematic review of qualitative literature in health services research. Qual Health Res. 1998; 8: 341-351
E-training for AHP’s: A systematic literature review of methods for training therapists

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**Background:** Research has shown a group cognitive behavioural therapy intervention for patients with LBP to be both clinically and cost effective compared to best practice advice\(^1\). The process of implementing this research into clinical practice to improve patient outcomes is multifaceted and complex. An initial stage in achieving this is to train health professionals treating these patients with the knowledge and skills to deliver this complex structured intervention. The use of the internet for education and training has been growing in popularity and would provide a cost effective alternative to traditional methods that could be easily disseminated. However there are concerns regarding its effectiveness.

**Aim:** Synthesise evidence on the effects of e-training among health care professionals.

**Methods:** Databases: MEDLINE (Ovid); CINAHL (Ovid); EMBASE (Ovid); AMED (Ovid); Pedro (physiotherapy evidence database); The Cochrane Library and ASSIA were searched from 2000-October 2011. RCT’s evaluating e-training compared to traditional training for health professionals were included. The Cochrane Effective Practice and Organisation of Care risk of bias tool was used to assess methodological quality. Study selection, data extraction and risk of bias assessment were completed independently. Data were synthesised qualitatively.

**Results:** 10 studies were included. Trials were in a range of health professionals, including physiotherapists, and the main outcomes were knowledge, practical skills and clinical behaviour. All studies reported that between-group differences on outcomes of interest were non-significant. However, sample sizes were small, and all studies included at least a moderate risk of bias. Interventions were poorly reported in terms of both their content and development.

**Conclusions:** The results suggest no significant differences between e-training and traditional methods. However, the research in this field was of poor methodological quality and little is known about the interventions themselves. Future research is needed to evaluate e-learning for training health professionals to deliver a complex clinical intervention.

**References:**
Effects of prolonged icing on neurophysiological measures of muscle tone: A Randomized Controlled Trial

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Background: The Rood Approach proposes prolonged icing (P.I.) for the management of spasticity. However, currently there is a substantial lack of evidence based on rigorous clinical trials regarding the effect of P.I. on spasticity. If it is effective in reducing spasticity, then P.I. can be suggested as an intervention for self-management of spasticity.

Methods: Ethical approval for this parallel design randomized control trial was obtained from the ethics committee at Sheffield Hallam University. A power calculation was done and 34 normal participants were recruited. They were concealed and randomly allocated to an intervention group (I.G.) (n=17) receiving P.I. over calf region of dominant leg for 20 minutes and control group (C.G.) (n=17) with no intervention and rest for 20 minutes. Hmax/Mmax ratio obtained from Soleus H-reflex and SR/Mmax ratio obtained from Soleus stretch reflex were measured before and after 20 minutes for both groups. Duration of data collection for each participant was about two and half hours.

Results: At baseline, no statistically significant difference (p=0.56) between I.G. (mean±SD) 0.411±0.193 and C.G. 0.37±0.207 for Hmax/Mmax ratio with independent t-test was found. Similarly, for SR/Mmax ratio with Mann-Whitney test between I.G. (median±IQR) 0.069±0.584 and C.G. 0.096±0.122, revealed no statistically significant difference (p=0.26).

After 20 minutes, comparison for Hmax/Mmax ratio with independent t-test demonstrated statistically significant difference (p=0.03) between I.G. (mean±SD) 0.56±0.216 and C.G. 0.39±0.214. However, Mann-Whitney test for SR/Mmax resulted in no statistically significant difference (p=0.67) between I.G. (median±IQR) 0.083±0.115 and C.G. 0.1±0.155.

Conclusion: P.I. increases Soleus Hmax/Mmax ratio thereby indicating increase in alpha motor neuron excitability; however it has no effect on Soleus stretch reflex activity as SR/Mmax remained unaltered in normal subjects. Probable neurophysiological mechanism for increase in alpha motor neuron excitability may be P.I. induced disinhibition of inhibitory influences over the alpha motor neuron. Reason of unaltered stretch reflex activity may be due to cumulative effect of P.I. induced depressed muscle spindle sensitivity counterbalanced by excitatory influences over it by Alpha-Gamma Coactivation and Skeletofusimotor system.

Implications: This study helps to understand neurophysiological effects of P.I. based on which hypothesis could be made for its clinical application. Moreover, considering this future research on flaccidity can be recommended.
The reliability and validity of the Berg balance scale (BBS) for people who have multiple sclerosis (MS)

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Background: Many people with MS have difficulty with balance [1] and it is common practice among neuro-physiotherapists to measure balance using the BBS [2]. The core standards of physiotherapy practice state that a reliable and valid measure should be used to evaluate patients [3] so it is pertinent to review the psychometrics of the BBS for people who have MS.

Methods: A search was undertaken using a wide range of electronic databases (AMED, CINAHL, Cochrane, EMBASE, MEDLINE, PedRO, PsychINFO, SPORTDiscus) and search terms. Inclusion criteria were that the research should be related to any type of MS and available in English. Reference lists were scrutinised for further data and authors of abstracts were contacted for further information. Clinical Rehabilitation was hand-searched and a ZETOC alert was utilised. Data extraction and quality assessment was undertaken; no article was excluded on quality assessment.

Results: The search (2011) resulted in eight studies being available for review. There was limited use of the English version of the BBS and no psychometric testing for the short form version was found. Studies did not present data according to type of MS and not all studies included all types of MS.

Only two studies investigated reliability. Inter-rater reliability was good demonstrated by ICC 0.96 (95% CI 0.90 to 0.97) [4] and 0.99 (95% CI 0.97 to 1.00) [5]. Test-retest reliability was good demonstrated by ICC 0.96 (95% CI 0.91 to 0.98) [4] and ICC 0.85 (95% CI 0.72 to 0.94) [5]. There were variations in presenting measurement error for example using the standard error of measurement [4,5] and as the minimal detectable change [6] with three points change suggested [4,6].

Responsiveness to deterioration was investigated by one study [6] but found non-significant minimally important change values over a two year period from either the clinician or participant perspective.

The BBS had varying levels of validity with a range of measures for example the Timed Up and Go (-0.62) [7], Dynamic Gait Index (0.78) [7]; Rivermead Visual Gait Assessment (-0.79) [8]; 12-item MS Walking Scale (-0.368) [9]. Predictive ability for falling was addressed by two studies and had varied results for example one study found sensitivity of 40 and specificity of 90 [7] whereas another study found sensitivity of 94 and specificity of 32 [10]. However the former study used a cut-off score of 44 for fall discrimination and the non-fallers mean score was 48.9 whereas the latter study used a cut-off score of 55 and their fallers had a mean score of 48. Only one study examined the ability of the BBS to predict ability in self-care, mobility
and domestic care [11] demonstrating that the measure was able to predict self-perceived independence in the domains.

Conclusions: There has been limited testing of the BBS in English and not all types of MS or range of abilities have been represented in investigations. The limited testing of the psychometric characteristics requires addressing with further studies to investigate or confirm current evidence.

Implications: Levels of reliability, including measurement error, and validity are important to clarify before clinicians use tools to assess baseline characteristics and intervention effect. Current testing of the BBS in MS is sparse and warrants further investigation.

References:
To identify the perceptions of stroke survivors and their carers about physiotherapy in India

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Background: World-wide 15 million people are likely to experience a stroke, about 5 million of whom will have permanent disability (1). A service user’s perception of the quality of health care they receive can be regarded as an outcome of care and a major contributor towards better compliance and therefore improved clinical outcomes (2). Identifying the perceptions of service users could identify any gaps in the system of service provision and their views can guide in planning future strategies and programs to design rehabilitation. In India cultural beliefs, family values and social stigma attached to disability may influence treatment-seeking behaviour thus the perception amongst Indian carers and service users may differ from previous findings.

Design: Qualitative.

Method: Ethical approval was taken from Sheffield Hallam University and two private physiotherapy centres located in Indore, India. Participant’s contact details were gathered from these two centres. Nine patients and ten carers (six month post stroke) were recruited and data were obtained through in-depth semi structured interviews in regional language. Interviews were tape recorded and translated into English. Data were analysed by using conventional content analysis.

Results: Main themes that emerged were: need for physiotherapy, knowledge about physiotherapy, positive attitude towards therapy, power play of therapist, improvement and expectations from physiotherapy. The patients and carer’s views were similar for majority of the themes. Slight differences of opinions were noted in improvement and expectations from physiotherapy.

Conclusion: This study enables an insight into the physiotherapy trends in India. Lack of awareness and education about physiotherapy is evident. Improved government schemes for rehabilitation, accessibility to clinics and cost effective home treatment were perceived as factors for improving the quality of care provided.

Implications: A study identifying the perceptions of physiotherapists would help in evaluating other side of the coin.

References: