



# Proceedings of PRS Spring Meeting

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Research Centre for Clinical Kinesiology (RCCK)  
Department of Physiotherapy, Cardiff University



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# Invited Speakers

# Biographies of Invited Speakers

## **Dr Maggie Bailey (NPRN Keele Hub Representative)**

Qualifying in 1970 I worked in Bristol then Lancaster. Returning to UK after two years in Southern Africa, I worked in Coventry, completing my BA (Open) during this time. Undertaking physiotherapy teacher training at Coventry, I then taught at the Wolverhampton School from 1980 to 1994, whilst completing my MSc (Liverpool University). I moved to the Oswestry School, then Keele University in 1994 whilst completing my PhD in Psychology (University of Birmingham 2005). I teach neurology and research methods. My research is around the assessment and treatment of unilateral visual neglect in stroke. I love countryside-walking, horse-riding, Greece, and Lord-of-the-Rings!

## **Dr Karen Barker, Physiotherapy Research Unit, Nuffield Orthopaedic Centre NHS Trust Oxford**

Karen Barker is the Head of Physiotherapy Services at the Nuffield Orthopaedic Centre NHS Trust in Oxford. Following her initial training at King's College Hospital in London, Karen has undertaken further post graduate study with an MSc in Ergonomics and a PhD based on studies of return to function after limb reconstruction and leg lengthening procedures. Her main research interests are developments and service delivery in orthopaedic surgery, back pain, joint replacement and limb reconstruction. For 3 years she was a Smith and Nephew Research Fellow, researching outcome after Ilizarov surgery and co-authored the Clinical Guidelines for the Physiotherapy Management of the Ilizarov Patient.

## **Kate Button, ESP Knee service, Cardiff and Vale NHS Trust**

I qualified as a physiotherapist in 1994 and quickly decided to specialise in musculo-skeletal physiotherapy, completing an MSc at Cardiff University in 2001. During this time I developed an interest in knee injuries and my MSc research evaluated the biomechanics of landing in anterior cruciate ligament deficient (ACL) individuals. For the past 6 1/2 years I have been working as an Extended Scope Practitioner/clinical specialist physiotherapist. Within this role I have developed clinical research and I am currently completing a PhD part time. The aims of this are to evaluate functional recovery and the effectiveness of providing movement feedback on outcome following ACL rupture. Results have recently been published in the British Journal of Sports Medicine.

**Dr Allison Cooper, Clinical Specialist Physiotherapist, Gwent Healthcare NHS Trust**

Dr Allison Cooper is a Clinical Specialist Physiotherapist in Gwent Healthcare NHS Trust, South Wales. She qualified in 1982 from Teesside Polytechnic and after initially working in Middlesbrough, moved to Gwent in 1983 where she has specialised in neurorehabilitation for the last 20 years. After gaining an MSc in Interprofessional Health Studies from University of Wales Institute, Cardiff in 1996 she registered for a PhD in the Department of Physiotherapy, School of Healthcare Studies, University of Wales College of Medicine in 1999 and gained a WORD personal bursary to support her studies. Allison obtained her PhD in July 2006 with a thesis entitled “The relationship of hemiparetic gait patterns to underlying neurological impairment and its relevance to physiotherapeutic intervention”. She hopes to continue research in the field of stroke rehabilitation.

**Denise Jones, Clinical Specialist Physiotherapist (shoulders), Cardiff and Vale NHS Trust**

Since qualifying from Manchester University in 1994 I have worked in a variety of Hospital settings around the UK. I started working for the Cardiff and Vale Trust in 2001 and have been a Clinical Specialist in Upper limbs since 2003. During my time in this post I have completed my MSc and become a member of the MACP. My post has involved the set up and running of an Acute Shoulder Screening Service. I am also currently involved in post graduate training partaking in clinical placement supervision and lecturing.

**Dr Fiona Jones, Senior Lecturer, St George’s University of London**

Fiona Jones has worked as a physiotherapist in neurorehabilitation for over 20 years. Her research interests in self-efficacy and self-management developed after her experiences in a community post working with individuals at different stages after their stroke. She completed an MSc in Neuroscience in 1997, and this led to registration for a part time PhD at the University of Brighton which was completed in 2005. She has recently been involved in a series of studies which have explored factors influencing progress after stroke, and developed a stroke self-management intervention for use by individuals and their carers. Fiona has been in her current post as a senior lecturer at St Georges University London for three years and hopes to continue to combine the role of lecturer, researcher and clinician. She has recently become Editor of Physiotherapy Research International.



**Dr. Robert van Deursen, Department of Physiotherapy, School of Healthcare Studies, Cardiff University**

I trained for a BSc in Physiotherapy in the Netherlands (1981), an MSc in Human Movement Sciences at the Free University in Amsterdam (1994) and a PhD in Kinesiology at Penn State University, USA (1997). Based in Cardiff at the School of Healthcare Studies since 1998, I have established the Research Centre for Clinical Kinaesiology, a fully equipped biomechanics laboratory, to research human movement within a clinical context. Research interests include the prevention and rehabilitation of lower limb complications due to diabetic neuropathy, mobility problems in chronic neurological conditions, and rehabilitation of joint instability after knee injury. The effect of exercise on patients is a common thread in this research. I was recently appointed Director of Physiotherapy at Cardiff University and am the research lead for the School of Healthcare Studies.

**Audrey Wang, Clinical Specialist Physiotherapist, INPUT, St Thomas' Hospital**

Audrey is a Clinical Specialist Physiotherapist at INPUT, Pain Management Unit, St. Thomas' Hospital, London. Her experience includes working in interdisciplinary teams in chronic fatigue management (Essex Centre for Neurosciences) and pain management services including return to work rehabilitation and case management in United Kingdom. Her involvement in research projects includes the Job Retention and Rehabilitation Pilot (Work Care) - a Department of Work and Pensions and Department of Health initiative and a study on patients with fatigue in primary care. She has also worked within the public and private sector in New Zealand. Having completed her Bachelors degree in Physiotherapy at Otago University, Dunedin, New Zealand, she is presently undertaking her dissertation for her Masters of Science in Applied Biomechanics with the University of Strathclyde, Glasgow. Audrey is also a member of the British Pain Society, Chartered Society of Physiotherapy (UK) and Physiotherapy Pain Association(UK).

Dr Maggie Bailey (NPRN Keele Hub Representative)

**“A local initiative to focus the ‘R’ in practice”**

The National Physiotherapy Research Network (NPRN) emerged from a CSP initiative and was officially launched in June 2005. Steered by a core executive, the Network comprises 20 regional ‘hubs’, based in universities across UK and Ireland, and linked with local clinicians and managers, and another hub representing other clinical interest and occupational groups. NPRN aims to promote and facilitate research activity, relevant to practitioners, that meets health care needs. Hub representatives and members use a variety of approaches within their hub areas to work towards this aim.

The Keele hub has, as part of its strategy, chosen to facilitate grass-roots research awareness and activity by the formation, in 2005, of a Neurology Research Group (NRG). Seventeen of us (senior physiotherapists and occupational therapists, a consultant nurse, a clinical psychologist, and three physiotherapy academic staff) meet for a half day, four times per year. We use Critically Appraised Topics (CAT) as a vehicle to develop our literature appraisal skills, and to help us answer relevant questions arising from every-day clinical practice. Our current CAT clinical question asks about the effectiveness of a resting splint for prevention of early wrist contracture in acute stroke. Our findings will be disseminated to local clinicians, and may be published in a CATs database. The idea for our group was based on a similar musculoskeletal group run by a consultant physiotherapist, at Keele.

In addition to working on CATs, our NRG group identifies and answers its research-related learning needs. For example, we have taught *ourselves* to use simple statistical tests and techniques and library staff have provided tutorials on literature-searching. NRG emphasises its supportive, non-threatening group atmosphere. We do have fun whilst honing our research skills and doing CPD! The future? We hope to expand, and encourage ‘splinter’ groups to form, facilitating the ‘R’ for research into our clinical practice.

Karen Barker PhD MCSP. Physiotherapy Services Manager, Nuffield Orthopaedic Centre NHS Trust, Oxford.

### **Managing and facilitating research in the NHS/hospital clinical setting**

The argument for conducting research within an NHS setting is presented. Clearly this conveys advantages in so far as:

- Research is driven by questions arising out of current clinical practice.
- Research capacity is developed within clinicians
- Ready access to patients
- Enables programme of research into practice

It is widely acknowledged that in an ideal world there should be a culture of finding, appraising and using research based knowledge for all staff, including managers (Moore 2006, Swage 2000). Organisations need the capability to generate and the flexibility to incorporate research evidence into practice. This is most likely to happen where research is embedded in the physiotherapy department, rather than seen as an activity associated with, and the responsibility of, HEIs.

There are considerable barriers to conducting research as part of core NHS activity including the financial situation in the NHS – the emphasis is increasingly on finance and less on high quality care, post freezing and redundancies, closure of services & Job uncertainty, growing pressure on existing workforce, increase in tendering processes in acute trusts, lack of time in clinical practice for standard data collection (SDC), audit, EBP and research.

However, it can be achieved using techniques to facilitate such as making research based activity part of job plans with protected time, mimicking the consultant contract. Linking research closely to IPR and KSF progression. Fostering a culture where research activity is viewed as a good career move for clinicians – incorporate into CPD portfolios. By convincing senior managers that physio therapy research is money well spent – feed activity reports into Health Care Commission return, Standards for Better Health etc.

Not easy – many conflicting demands on staff and resources – but overall worth it and essential to the forward progression of our profession.

Kate Button, ESP Knee service, Cardiff and Vale NHS Trust

### **Evaluating the effectiveness of movement feedback in the rehabilitation of acute ACL ruptures**

ACL deficient individuals compensate with altered movement strategies and have a poor functional outcome. Providing external feedback is a valuable tool in skill acquisition and may be a useful tool for motor learning following injury. The aim of this investigation was to evaluate if patients rehabilitated by physiotherapists who received movement feedback (FB) about individual patient performance had a better functional outcome than those who were treated by physiotherapists that did not receive such feedback (non-FB).

A prospective cohort design was used to compare concurrent FB and non-FB treatments. Based on a power analysis 35 subjects were required in each group. From 225 ACLD individuals that were assessed in the Acute Knee Screening Service between January 2005 and July 2006, 115 subjects were recruited into the investigation. Patients were randomly assigned to the FB or non-FB groups. On completion of the study we had 25 data sets for each group. It was not possible for the physiotherapists and patients to be blinded but because FB and non-FB treatment took place on 2 different sites, they were not aware of the other condition. Both groups followed a rehabilitation program that was based around resolution of acute symptoms, improving neuromuscular control and maximising function. Movement feedback was given at 1, 3 and 4 months post injury in a standardised format. Its content included clinical factors, time distance variables and kinematics for gait, 1 legged squat, distance hop and run and stop. Movement variables were measured and analysed using a SONY video camcorder, SONY VAIO laptop, Matlab and Silicon coach software.

All subjects were followed up at 5 months post injury. Outcome measurements were time distance and kinematic variables from the clinical movement analysis, SF-36, Cincinnati knee rating scale and selected clinical variables. Independent t-tests and Chi square were used to compare the FB and non-FB treatment and baseline characteristics. Both groups were matched at baseline for age, height, weight, gender, pre-injury activity levels, pathology and amount of physiotherapy received. Five months post injury there were no significant differences between the FB and non-FB groups for the time-distance or kinematic variables for gait, 1 legged squat, distance hop or run and stop. Reasons for loss to follow-up were similar between the groups.

Issues related to the study design and confounding factors within the clinical setting help account for the non-significant p-values. A retrospective power analysis revealed that this study was underpowered. We had effect sizes of 0.29 so 193 subjects would have been needed in each group. Altered administrative policies and staffing changes within the clinical setting interfered with the randomisation process and our reasoning for 2 separate treatment sites. Alternative forms of randomisation may have been more appropriate. This preliminary study provided insight into how movement feedback should be structured and applied.

Dr Allison Cooper, Clinical Specialist Physiotherapist, Gwent Healthcare NHS Trust

### **Conducting clinical research: lessons learned from a PhD**

A project was carried out to determine the relationship of hemiparetic gait patterns with underlying neurological impairment and its relevance to physiotherapy intervention following stroke. The findings of this research will be presented together with a discussion of the process and lessons learned.

Carrying out clinical research for a PhD on a part-time basis has its advantages and disadvantages. Remaining in the clinical field maintains strong links between the researchers study and clinical work, allowing the two to inform each other. Part-time study also fits in with work, personal and financial commitments allowing experienced clinicians to carry out study at higher degree level.

Problems of obtaining adequate time, feelings of isolation, of maintaining motivation and practical issues can contribute to the difficulties of part-time study. Negotiating adequate protected time with managers and making good use of that time is essential. Effective strategies to maintain motivation and reduce isolation need to be explored and implemented, such as a good supervisor/student relationship and a good peer support network or mentor. Organising good technological support such as essential hardware and software, portable and compatible data storage, and remote library access can help with time management.

Denise Jones, Clinical Specialist Physiotherapist (shoulders), Cardiff and Vale NHS Trust

### **Do patient reported outcome measures relate to routinely used clinical outcome measures in patients with rotator cuff tears?**

Rotator cuff tears (RCT) account for half of major shoulder injuries. Reported prognosis is variable and there is controversy regarding best treatment. The lack of consensus on the choice of outcome measure used to assess the effect of the condition/interventions is likely to have contributed to this, leading to a disparity in the reported results. There are a wide number of shoulder outcome measures available – some purely patient reported, and some including objective measures. As a full thickness RCT would be expected to effect objective measures of range of movement (ROM) and power, as well as patient report of function, the purpose of this study is to compare both types of outcome measure to see if they relate. This study identified the relationship between the Constant Murley Score (CMS), and two patient reported scores, the Oxford Shoulder Score (OSS) and the Western Ontario Rotator Cuff index (WORC) in patients with a confirmed rotator cuff tear (RCT).

Twenty-five adult subjects with a 6-month history of an RCT confirmed by MRI or Ultrasound were recruited to this study. One rater assessed the subjects once using the CMS, the OSS and the WORC. The objective measures of the CMS were recorded using a goniometer and hand held dynamometer before the subjective measures were administered. Pearsons correlation coefficient was used to compare each of the 3 outcome measures total scores. Individual objective measures of the CMS were correlated with the OSS and the WORC. Age was also correlated with the power measure from the CMS.

All of the outcome measures demonstrated a significant correlation with each other. The CMS and WORC being the strongest ( $p < 0.0005$ ), There was a 39% variation between the scores. Abduction range was found to have the strongest correlation with the WORC ( $p < 0.005$ ) and abduction power the lowest ( $p < 0.025$ ). Stepwise regression noted that abduction accounted for the greatest alteration in the WORC. Isometric abduction power demonstrated the strongest correlation with age ( $p < 0.025$ ).

The findings implicated that although the CMS and WORC were correlated the extent of variation suggests that they are not interchangeable. Abduction range could be used as a predictor of the WORC score and active range rather than isometric power relates more to the patient's reported function. It also confirms that abduction power could be a indicator of age than of reported function.

Dr Fiona Jones, Senior Lecturer, St George's University of London

### **Self-efficacy training following stroke: research designs for complex interventions**

Stroke remains the most complex and prevalent disability in the UK 1. Research can portray negative descriptions of long term psychosocial consequences with depression reportedly high 2. Self-efficacy can provide a theoretical basis to understanding confidence and belief about continued progress following stroke and has been shown to be a strong predictor of depression, quality of life and level of disablement post stroke 3. A stroke self-management intervention was developed for community dwelling stroke survivors, and consisted of an interactive workbook with supported self-management training. The intervention was designed to utilise the main sources of self-efficacy described by Bandura.

The intervention was tested using a series of 10 single case studies employing a Multiple AB Basic Design. The stroke self-management workbook and training was randomised for each subject which allowed for statistical analysis of both individual and group effects. Hypotheses were tested using a primary measure of stroke self-efficacy and secondary measures of activity, participation and mood. A stroke self-efficacy questionnaire was developed to test hypotheses along with other primary and secondary variables. Statistical analysis of group effects showed a significant change in self-efficacy ( $p < 0.01$ ). A change was also demonstrated in secondary variables for the majority of subjects, but this was not statistically significant.

The challenge for researchers is to first define the active ingredient of complex interventions and then utilise appropriate and creative research designs. The relative merits and disadvantages of a multiple participant single case study approach used in this study will also be discussed.

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2. Lewis S, Dennis M, O'Rourke S, Sharpe M. Negative attitudes among short term stroke survivors predict worse long term survival. *Stroke* 2001;31:1640-1645.
3. LeBrasseur N, Sayers S, Oullette M, Fielding R. Muscle impairments and behavioural factors mediate functional limitations and disability following stroke. *Physical Therapy* 2006;86(10):1342-1350.

Dr. Robert van Deursen, Department of Physiotherapy, School of Healthcare Studies, Cardiff University

### **Movement analysis using digital video in the clinical setting.**

A 3-dimensional kinematic and kinetic analysis performed in a biomechanical laboratory can provide a lot of detail about functional movements, however, the equipment required for such an analysis is not readily available in a physiotherapy department and is expensive and time consuming to use routinely during rehabilitation.

On the other hand the use of observational analysis during clinical assessment has its limitations. For instance, visual joint angle estimation is dependent on the precision in judging angles and cognitive processes can interfere with an objective visual recording. Yet treatment objectives are primarily directed at restoring functional movement so the need for appropriate outcome measures related to functional movement is self-evident. Video technology has become simpler to use especially since the advent of digital video equipment which is now easily compatible with computers and computer software. Video cameras are 2-dimensional and although movement is always 3-dimensional, it is possible to develop protocols that permit the assessment of specific outcome measures related to functional movement and posture. In fact, the technology available is quite flexible to purpose design analyses. Protocols for quantitative measures of angles, distance, velocity and timing as well as qualitative measures using slow motion and split screens can be designed for instance to determine spinal position during movement, phases of a functional movement, and functional performance during landing/deceleration. There are requirements for setting up the camera perpendicular to the plane of movement to ensure measurements are as accurate as possible, but these measurements used through a period of rehabilitation can provide a lot of detail about the changes occurring in functional movement. Such deeper insight into problems of movements that need to be restored and into the recovery process should provide us with more knowledge how functional movement can be restored in patients.



Audrey Wang, Clinical Specialist Physiotherapist, INPUT, Pain Management Unit, St Thomas' Hospital, London

**Interval brisk walking in a chronic pain population: Using the WINGATE protocol within a pain management programme. A feasibility study.**

Exercise programmes have been shown to improve the mental speed and physical function of people living with many long term conditions. Walking is an easy exercise to do and a common recreational activity. Some chronic pain patients have slowed their walking speed considerably as a response to pain; fears of movement, falling or causing damage compounding the problem. The aims of this project were to investigate the feasibility of including an interval brisk walking programme (IBWP) into an intensive 4-week residential cognitive-behavioural chronic pain management programme (C-BPMP), and examining its additional effect on outcome. The IBWP is based on the WINGATE protocol. Patients underwent the usual battery of physical performance and self-report psychological and demographic measures on the C-BPMP and in addition, were given a colour and word recognition test (Stroop test) to assess cognitive speed.

As well as assessing any additional effect of IBWP on the outcome, change in pre- to post-C-BPMP measures was examined in relation to pre-treatment levels of psychological and physical function and to demographic factors. This was to see if a subgroup of patients who gain greater benefit from the addition of the interval brisk walking could be identified. This might assist in future developments of IBWP as part of C-BPMP.

# Oral presentations

## Can the effects of community based inspiratory training be maintained in patients with chronic lung disease?

**Sharon Baines**<sup>1,2</sup> **Stephanie Enright**<sup>3</sup>

1. Physiotherapy Directorate, University of Salford UK 2. Central Lancashire Primary Care Trust Leyland UK. 3. Department of Physiotherapy, School of Health Care Studies Cardiff University.

**Background:** Previous research in Inspiratory muscle training (IMT) demonstrates improved symptoms of chronic lung disease. This study addresses maintenance of changes in symptoms and quality of life indices following (IMT).

**Method:** Following Local Research Ethics Council approval, 18 patients (13 men, 5 women) entered a Randomised Controlled Trial. Subjects with a diagnosis and symptoms of Chronic Lung Disease (CLD) were recruited from PCT based respiratory clinics. All patients received 6 weeks IMT at 80% of Maximum Inspiratory Pressures (MIPs) using a computerised interval training programme, the Test of Incremental Respiratory Endurance (TIRE). The cohort was then randomised into two groups. A training group (TG) continued using a Threshold Inspiratory Trainer at a maintenance level of 30% MIPs for 6 weeks.

Maximum Inspiratory Pressures (MIPs), Incremental Shuttle Walk Test (ISWT), Medical Research Council Dyspnoea Scale (MRCDS) and St. George's Respiratory Questionnaires (SGRQ) were completed at 0, 6 and 12 weeks were analysed using a repeated measures Anova and paired t-tests.

**Results:** All outcome measures demonstrated a statistically significant improvement from baseline to post TIRE training. After the maintenance phase the TG demonstrated no deterioration of the outcome measures ( $p= 0.17- 0.27$ ). While the CG demonstrated a statistically significant deterioration in MIPs ( $p= 0.03$ ), SGRQ ( $p= 0.02$ ). Their MRCDS and ISWT did not show significant changes.

**Conclusion:** Inspiratory muscle strength (MIPs), Dyspnoea (MRCDS), exercise tolerance (ISWT) and quality of life (SGRQ) were maintained post TIRE training using an Inspiratory Threshold Training device in CLD patients.

## Patient experiences of COPD: the impacts of interactions with health professionals

**C. Bulley<sup>1</sup>, L. Salisbury<sup>2</sup>, S. Whiteford<sup>3</sup>, M. Donaghy<sup>1</sup>, E. MacKay<sup>3</sup>.**

1. Queen Margaret University College, 2 Edinburgh University, Centre for Integrated Healthcare Research, 3. NHS Greater Glasgow and Clyde

**Introduction:** Chronic Obstructive Pulmonary Disease (COPD) has negative impacts on function and quality of life. There are actions an individual can take to manage their symptoms optimally. A study was designed to explore individuals' experiences of COPD and its management prior to attendance at pulmonary rehabilitation. This abstract focuses on the impacts of interactions with health professionals on their experiences and views regarding attendance.

**Methods:** Individuals with COPD who were referred to a pulmonary rehabilitation service were invited to participate in a single interview prior to joining the programme. Purposive selection of five men and four women ensured a variety of experiences. All participants were white Caucasians living in Glasgow, Scotland and were aged between 59 and 82. Semi-structured interviews (50-90 minutes) were carried out in participants' homes. A topic guide was developed to focus on experiences of COPD and its management. Ethical approval was granted by the Multi-Region Ethics Committee in Scotland. Transcribed interviews were analysed within the framework of Interpretative Phenomenological Analysis<sup>1</sup>. Two researchers iteratively developed a classification of views and experiences (themes), progressing to locate relationships between themes. Data management utilised the QSR N6 package.

**Results:** Classification of experiences demonstrated positive and negative interactions with health professionals. Positive interactions included the provision of effective advice on coping with symptoms. This advice, from paramedics, nurses and physiotherapists, was remembered and implemented by patients. Positive experiences were associated with feelings of faith in clinical staff. This led to positive expectations of further management such as pulmonary rehabilitation. However, several individuals described an absence of advice, except in relation to smoking cessation. They often felt dismissed by medical staff and felt that visits to specialist clinics were a waste of time. This was associated with concerns that the burden of attending pulmonary rehabilitation would exceed the benefit.

**Conclusions:** In this group of individuals with COPD the provision of expert advice had a positive impact on feelings of faith in clinical staff, as it led to increased coping with symptoms. It is important that health professionals are aware of the impacts they may have on patient participation in management. Communications with patients over the course of their disease appear to be integrated into beliefs about the benefits of management and value of investing time and effort in pulmonary rehabilitation.

**Acknowledgments:** support was provided by Queen Margaret University College and the Centre for Integrated Health Care Research in Edinburgh.

References:

1. Smith J. Semi-structured interviewing and qualitative analysis. In: Smith J, Harre R, Van Langenhare L. (Eds) Rethinking methods in psychology. London, Sage Publications, 1995

**The effects of a high density foam wedge on the intensity of back pain in a group of 97 14-16 year olds when used on normal school seating: a randomised controlled trial.**

**Candy, EA<sup>1,2</sup>, Stephenson, RC<sup>1</sup> Jerosch-Herold C<sup>1</sup>**

1. University of East Anglia, Norwich, Norfolk. UK
2. Gwent NHS Healthcare Trust, Gwent, Wales, UK

**Background:** Back pain is reported at levels of 50-80% in the adult population (1). By 15 years self reported back pain is common (2). A history of childhood back pain increases the risk of further episodes. Links with school seating and back pain have been previously identified. This study was designed to provide further information about these links.

**Method:** A randomized controlled trial (RCT) was designed to assess if a high density foam wedge used on school seating would change the intensity of back pain. Following ethical approval and consent 185 pupils aged 14-16 years with back pain were recruited from 12 schools. Intensity of pain was recorded using a numerical rating scale (NRS) 0-10 scale, twice daily on school days. The RCT took place during term time, in 4 groups of 4 week blocks. Randomisation occurred as schools entered the RCT. At the beginning of week 2 the intervention group were given a wedge to use on their school chairs. Follow-up was approximately 1 month after each block. Data were entered into Excel, and transferred to SPSS. The participants' individual pain scores were compared using a random effects model.

**Results:** Full data sets were received from 97 students. 3 schools withdrew. 2 failed to recruit. 21 students were withdrawn. Incomplete data sets were received from 10, 1 withdrew. A further 56 students failed to return data. Significant reduction in pain intensity was noted in the intervention group compared with the control group (95% CI 0.20 to 0.43 p=0.01) and all the students reported more pain in the evening compared with the morning (95% CI 0.20 to 0.45 p<0.01).

**Conclusion:** This study indicates that seating position can affect the intensity of back pain. Further research would be beneficial to investigate, in more depth, the links between back pain and school ergonomics.

This study was supported by funding from the Chartered Society of Physiotherapy Eastern Board and Backcare (registered charity no: 256751)

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## Exploration of physiotherapists' motivations to embark upon taught masters level study

**P. Glover<sup>1</sup>, C. Bulley<sup>2</sup>**

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**Background:** Continuing Professional Development (CPD) is a professional responsibility for allied health professionals<sup>1</sup>. Post-qualifying study is one means of meeting CPD requirements, which may partially explain why the uptake of physiotherapy-related Masters level study (MLS) is increasing<sup>2</sup>. However, there is a lack of literature investigating why physiotherapists undertake MLS. This research attempted to address this gap in the literature by exploring the motivations of physiotherapist to embark upon taught physiotherapy-related Masters study.

**Method:** Following appropriate ethical approval, a purposive sample of 9 volunteers (8 female, 1 male, mean age:  $36 \pm 7.29$ ) was recruited. A qualitative, interpretative, phenomenological study was undertaken with the assumption that reality is individual and all viewpoints are valid. Individual, semi-structured interviews (mean time: 67 minutes) were conducted using an interview schedule. Questions were derived from a review of motivational literature, developmental interviews, and expert approval. Interviews were transcribed verbatim. Following member-checking and peer review, Key Themes were inductively derived from the context and interpretation of the transcripts.

**Results:** Four Key Themes emerged that described the facilitators to commence MLS in different environments: social, educational, clinical, and working. These themes provided an integrated overview of the intrinsic and extrinsic motivators for this group of physiotherapists to undertake their MLS. Some participants indicated that a settled domestic life and future plans influenced their timing of MLS commencement. Personal and professional development was identified as a major motivator for participants, as were encouragement and inspiration from colleagues with experience of Masters study.

**Conclusions:** The experiences of this group of physiotherapists suggest that the factors motivating them to undertake MLS were varied and individualised. Their motivators could be practical, personal or professional in nature. There are possible implications for both educational providers and employers to promote the benefits of MLS and to invest in support structures to facilitate its commencement.

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## **Physiotherapists use of exercise therapy for knee pain in older adults: a mixed methods study**

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We completed a mixed methods study to investigate whether current physiotherapy practice is in line with recent exercise recommendations for knee osteoarthritis (OA)<sup>1</sup>.

Following ethical approval, a cross-sectional postal questionnaire was sent to a national random sample of physiotherapists, registered with the Chartered Society of Physiotherapy (n=1800). This included a vignette describing a patient, aged 65 years with chronic knee pain plus clinical management questions relating to the recent exercise recommendations. Telephone interviews were completed with 24 physiotherapists. Interviews were recorded and data analysed using a thematic approach.

The questionnaire response rate was 60% (n=1070) with 485 respondents treating a patient with chronic knee pain in the last 6 months. Of these 86% (416) were women and 55% (268) worked exclusively in the NHS. 99% of therapists reported using exercise therapy and advice to treat the patient, with local strengthening exercise (98%) being favoured over general exercise (65%) and aerobic fitness training (9%). 98% monitored exercise adherence, mainly through observation of exercise technique (95%) or verbal questioning (80%) rather than an exercise diary (12%). 75% of therapists would provide up to five treatment sessions, and 67% would offer no physiotherapy follow-up after discharge. Interview data supported quantitative findings and highlighted that patient comorbidity was a barrier to prescribing general exercise. Treatment pattern was influenced by a 'self-management' approach: the physiotherapists' role was to educate about exercise benefits, technique and dosage, but it was the patients' own responsibility to maintain their exercise programme over time.

In line with the recent exercise recommendations, physiotherapists commonly use exercise therapy plus advice to treat chronic knee pain. However, limited prescription of general exercise and emphasis on patient 'self-management' highlights that gaps exist between current practice and the exercise recommendations for knee OA. This poses challenges to their successful implementation.

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## **Muscle activity during progressions of a core stability exercise.**

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Segmental extension via a posterior pelvic tilt exercise (PPTE) is often used to improve trunk stability, with progressions involving a unilateral leg drop out or bilateral arm raise. There is however, little evidence to support their effectiveness. This study investigates muscle activity during progression of trunk stability exercises.

Healthy volunteer subjects (mean (SD) age 21.5 years  $\pm$ 1.57 (n = 22; 19 female) were recruited. Average normalised SEMG of internal oblique (IO), external oblique (EO), quadriceps (QS) and hamstrings (HS) was obtained during 3 randomly ordered conditions of PPTE (A), PPTE with a right sided leg drop out (B) and PPTE with a bilateral arm raise (C). A repeated measures ANOVA ( $\alpha = 0.05$ ) was used to assess any differences. Local ethical approval was obtained.

Results of progression from A to B show that there was significant increase in left EO (F=4.34 p=0.05) and right QS (F=16.81 p=0.001), with a significant decrease in right HS (F=14.93 p=0.001). Progression from A to C showed a significant increase left IO (F=7.35 p=0.013), right EO (F=8.96 p=0.007), right IO (F=5.42 p=0.03), left EO (F=7.87 p=0.011) and also left HS (F=6.65 p=0.018) and right QS (F=13.31 p=0.002).

During a PPTE with a bilateral arm progression convention would expect increases in overall abdominal muscle activity (1). This is corroborated by this study. A right leg drop out should result in an increase in left EO and right IO (1). However, only the EO component can be confirmed. With a correctly performed PPTE a progression should show no compensatory leg muscle activity (2). This can not be substantiated by this study. Clinically, this study provides some evidence for these progressions to be effective in trunk stability rehabilitation. Limitations include not evaluating the quality of the PPTE. Future work will focus on evaluation of abdominal and spinal stabilisers.

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Can a recumbent cycle be used to train muscles for the sit to stand task?

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**Introduction:** The ability to stand up from a chair is a key factor in preserving functional independence (Kerr et al., 1994). Consequently training the sit-to-stand (STS) task is a common feature of many rehabilitation programmes. This may be labour intensive for staff, fatiguing for the patient and arguably not targeted at power. A recumbent cycle may offer a safe, complementary, alternative for practicing powerful lower limb extension, a characteristic of the STS movement.

**Aim:** To explore the potential for recumbent cycling (RC) to be used as a training method for the STS movement this study compared the kinematics and muscle activation patterns between STS and RC.

**Methods:** Following ethical approval 12 healthy young (mean age 41 years +/-9.6, weight 74.2 Kg +/-9.1, height 1.64m +/- 0.07) subjects were recruited. Subjects performed 6 repetitions of two tasks . 1) RC with the bike adjusted by each subject and resistance set to allow a cadence of 60rpm. 2) STS from a standard dimension chair at a self selected pace. During these tasks the motion of four body segments (trunk, thigh, lower leg and foot) was tracked in the saggital plane (left side) using a 3 camera motion analysis system. The activity gluteus maximus (gmax), hamstrings (hams), quadriceps (quads), gastrocnemius (gastroc) and tibialis anterior (tibant) were simultaneously recorded using surface electromyography.

**Results:** The pattern of lower limb extension was found to be similar for both tasks in both the timing and amount of angular displacement albeit that RC started in a more flexed position at the hip and did not attain the same amount of extension at the knee and hip. The activation pattern of each muscle was similar for both tasks (table1).

Table 1 Muscle activation: percentage of the extension phase of STS and RC

Muscle	0-20%		20-40%		40-60%		60-80%		80-100%	
	STS	RC	STS	RC	STS	RC	STS	RC	STS	RC
Gmax	X	X	X	X	X	X	X	X		
Hams	X		X	X	X	X	X	X	X	X
Quads	X	X	X	X	X	X	X	X	X	
Tibant	X	X	X							
Gastroc		X	X		X	X	X	X	X	X

X=muscle active

**Conclusion:** The data suggests that RC may be similar enough to STS to be used as a training modality. In addition interesting synergies common to both tasks have been identified which have not previously been reported e.g. Tibant and quads during the early phase of the movement. Further studies including clinical trials are planned.

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Kerr, K. M., White, J. A., Barr, D. A. and Mollan, R. A. B. (1994). "Standardization and definitions of the sit-stand-sit movement cycle." Gait and Posture 2: 182-190.

## **Physiotherapists' use of advice and exercise for the management of chronic low back pain: a national survey**

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**Rationale:** To establish the current use of advice and exercise by Irish physiotherapists for the management of chronic low back pain (LBP), and to evaluate the extent to which clinical practice reflects current research evidence and guidelines.

**Methods:** A retrospective survey design was employed, based on the results of systematic reviews of both advice and exercise for the management of LBP, and recommendations from a pilot study. In March 2004 a questionnaire, along with a pre-paid reply envelope, was mailed to a random sample of 600 physiotherapists currently registered with the Irish Society of Chartered Physiotherapists (ISCP). Both open and closed questions were used to obtain information on the treatment provided to chronic LBP patients. In addition, therapists' priorities for treatment outcomes, and clinical use of LBP outcome assessment, were investigated.

**Results:** A total of 419 therapists returned the questionnaire: 280 (67%) indicated they currently treated LBP, of which 214 (76%) were either senior grade therapists or private practitioners. Advice and exercise respectively were the most frequently used treatments for chronic LBP. Ninety-five percent of respondents asked patients to complete exercises independently at least once per day; however supervision and follow-up advice were not common components of treatment. Pain intensity was the predominant means of assessing treatment outcome, with pain relief second only to improved function as the most important goal of treatment.

**Conclusions:** Research evidence for the use of advice and exercise with chronic LBP patients is reflected in clinical practice; however, contrary to current recommendations for this patient group to remain active *despite* pain, it appears that pain relief remains one of the principal goals of treatment. Further investigation into the preferences and expectations of chronic LBP patients may help to identify how advice and exercise can be provided to achieve improved outcomes.

**Keywords:** exercise, advice, chronic low back pain

The authors acknowledge grant support from the Department for Employment and Learning, Northern Ireland.

Ethical approval was not a requirement for this study. Therapist contact details were obtained from, and following approval from the ISCP membership committee.

## **Intra-rater reliability of the hand-held dynamometer in measuring quadriceps femoris muscle strength in children with cerebral palsy:**

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**Introduction:** There is little evidence on intra-rater reliability of the Hand-Held Dynamometer (HHD) in measuring Quadriceps Femoris (QF) muscle strength in children with Cerebral Palsy (CP). Available evidence suggests moderate to excellent reliability. However, majority of studies evaluate between test reliability at 90° knee flexion using average measures of summed scores<sup>1</sup>. This study evaluated single measures within test and between test reliability at mid range knee flexion.

**Methods:** Five children with CP (Aged 7-14; Mean 10.5; SD 2.1) participated in this study. The Gross Motor Function Classification System (GMFCS) was used to classify participants (2=level I; 1=level II, 2=level III; n=5). Muscle strength was measured with three repetitions bilaterally on 4 separate occasions over 6 weeks. Testing procedures were standardized to sitting with knee flexed to 60° while subjects were encouraged to do a Maximum Voluntary Contraction (MVC). Both subjects and examiner were blinded to test results. Reliability was assessed using the Intra-Class Correlation Coefficient (ICC). Ethical approval for this study was obtained from The North Bristol NHS Trust Research Ethics Committee.

**Results:** ICC within test single measures result was 0.997; between tests 0.971. This demonstrates excellent reliability of both within test and between test measures. Excellent reliability of single measures supports the use of one peak measure from several test repetitions. This is supported both by the high reliability of measurement within and between tests. Measuring at mid-range provides information of peak strength where muscle length-tension relationship is at optimum<sup>2</sup>. Measuring at mid-range may thus enhance reliability and also has increased relevance to the performance of everyday functional activities. Results support use of single measures at mid-range.

**Conclusions:** The HHD demonstrated excellent intra-rater reliability. This suggests it is an appropriate outcome measure for measuring muscle strength in children with CP but requires use of standardised procedures to minimize error.

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## **The effects of Masai Barefoot technology footwear on posture: an experimental designed study**

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**Introduction:** This study was approved by University of Southampton ethics committee and aimed to assess the anatomical changes to upright posture that occur in the sagittal plane as a result of wearing Masai Barefoot Technology (MBT) footwear during standing and walking. MBT claim that their innovative unstable shoes promote a more upright posture in which musculature is strengthened and joint wear reduced [1]. This could be helpful in the management and prevention of conditions such as osteoarthritis and back pain.

**Subjects:** 12 students (6 male and 6 female) at the University of Southampton aged between 18 and 40 participated in this study.

**Methods:** Participants attended one session at a biomechanics laboratory. The kinematics of posture wearing MBT shoes during standing and gait were examined using a two-dimensional motion analysis system and compared to a control shoe.

**Analysis:** Statistical significance was tested using a paired t-test and a Wilcoxon signed ranks test.

**Results:** Standing in MBT footwear demonstrated a statistically significant increase in plantar flexion at the ankle joint ( $P = 0.025$ ) [Mean 3.02 degrees, 95% Confidence Interval (CI) -5.6 to -0.4]. Walking in MBT's showed a decrease in trunk flexion ( $P = 0.007$ ) [Mean 1.44 degrees, 95% CI -2.4 to -0.4] and a reduction in anterior tilt of the pelvis, ( $P = 0.003$ ) [Mean 3.20 degrees, CI -5.06 to -1.35] at heel strike. At toe off a significant reduction in anterior pelvic tilt ( $P = 0.035$ ) was found in the MBT shoes [Mean 2.35 degrees, 95 % CI]. There was no significant difference found between the two shoe conditions at mid stance.

**Conclusion:** MBT footwear changes certain characteristics of posture in quiet standing and walking. These findings could have positive implications for the management of conditions such as osteoarthritis and back pain, however further research is needed.

The authors acknowledge support from Masai Barefoot Technology PLC.

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## **Rehabilitation in care homes (rich-t): a cluster randomised controlled trial.**

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In a care-home population, loss of independence in mobility is strongly associated with poor quality of life and mortality. This study assesses the effects of a targeted physiotherapy (PT) and occupational therapy (OT) intervention on mobility.

A cluster-randomised controlled trial was set in 24 care homes in Birmingham. Each home was independently randomised to an immediate-intervention group (12 homes, 128 residents) or a delayed-intervention control group (12 homes, 121 residents). Residents receiving end-of-life care were excluded. Ethical review was favourable.

The intervention comprised PT and OT targeted to mobility, delivered to individual residents, including equipment provision and carer education. Researchers masked to group allocation assessed residents with the Rivermead Mobility Index (RMI) at 0 and 3 months (pre- and post-intervention) and at 6-months. Data were analysed using SAS, with all statistical hypothesis tests performed at 5% level of significance. Intention-to-treat analyses were conducted on RMI accounting for clustering and baseline values.

185 (74%) were female; ages ranged from 48 to 108 years (mean 85) and 168 (67%) were cognitively impaired. Mean RMI scores at baseline were 5.8 (SD 4.1), 6.9 (SD 3.8); 3 months, 5.1 (SD3.5), 6.7 (SD3.7); 6 months, 5.2 (SD3.8), 6.5 (SD3.8), in the immediate- and delayed-intervention groups, respectively. Corresponding mean scores for Timed-Up-and-Go scores were 60 (SD42), 57 (SD54); 68 (SD50), 59 (SD56); 59 (SD37) 55 (SD37), respectively. There were no statistically significant differences in mean scores between groups on either outcome.

The intervention was well tolerated but no between group differences were seen. The sample size estimate in future studies should allow for the variability in participants and homes.

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## **Scapular taping in the therapeutic management of subacromial impingement symptoms – exploration of a clinical theory**

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Altered scapular rotator muscle activity has been implicated in symptomatic shoulder dysfunction of a subacromial impingement (SI) nature<sup>[1]</sup>. Scapular taping is a frequently applied clinical intervention in an attempt to change activity of the upper fibres of trapezius (UFT) and lower fibres of trapezius (LFT). The aim of this study was to investigate the clinical theory that with scapular taping in situ, UFT activity would be inhibited, LFT facilitated and accompanying symptomatic relief would occur.

Twenty subjects who demonstrated SI symptoms on clinical testing were recruited. Surface electromyography (EMG) was used to measure change in the muscle activity of UFT and LFT under “no tape” and “with tape” conditions. The test movement used was repeated humeral elevation in the scapular plane and the intervention was a commonly used scapular taping technique<sup>[2]</sup>. Within muscle differences between conditions were analysed using the related t-test. Subjective data was collected regarding symptom response to taping. Ethical approval was granted by the School of Healthcare Studies Ethics Committee, Cardiff University and by the South East Wales Research Ethics Committee.

There was a highly statistically significant ( $p < 0.001$ ) reduction in the EMG activity of the UFT but no statistically significant change in LFT activity ( $p = 0.132$ ) with taping in situ. Forty-five percent of subjects reported an improvement in their symptoms and/or a feeling of beneficial support for their shoulder when the tape was in place. However 40% reported there being no effect experienced and 15% stated that the tape felt restrictive.

This study provides support for the clinical theory that in subjects with SI symptoms UFT activity is inhibited in the presence of scapular taping. However the study findings do not provide evidence of LFT facilitation. Limited support is provided for the theory that symptomatic relief accompanies changes in scapular rotator activity.

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## **The effect of an ankle foot orthosis on non-ambulant people after stroke**

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**Introduction:** The restoration of walking after stroke is a priority for patients and professionals alike. Assistive devices such as an ankle foot orthosis (AFO) are thought to be beneficial, but research to-date has been limited to people with chronic stroke who are already able to walk (albeit in a limited capacity). The aim of this study was to assess the effects of an AFO in a new group: people under-going rehabilitation to restore walking

**Method:** A same-subject randomised cross-over design was used in which participants walked with an AFO and no aid (the control condition) in a randomised order. The following measures were taken; gait speed and affected step length (10m walk test) walking disability (Functional Ambulation Category) and participant satisfaction (questionnaire) in a one-off session; the AFO having been fitted earlier in the day. Participants were under-going rehabilitation to restore walking and unable to walk in every-day life but could walk 5m with stand-by assistance.

**Results:** Twenty participants were recruited; mean age was 65.6 years (sd = 10.3 yrs), mean time since stroke was 6.45 weeks (sd = 5.7 weeks), 14 (72%) had a left hemiplegia. There was a significant improvement in walking disability when using the AFO (FAC with an AFO = 1.57 (sd 0.59) vs 1.1 (sd=0.3) without (p=0.000). Participants were positive about the AFO; 40-55% felt it improved their gait, 85% found it comfortable and 95% would use it more often. However the AFO had no significant effect on gait impairments (gait speed: 0.3m/s (sd=0.12) with an AFO vs 0.29m/s (sd=0.14) without (p = 0.294) and affected step length: 0.53m (sd=0.15) with an AFO vs 0.52m (sd=0.16) without (p=0.530)).

**Conclusion:** An AFO had a beneficial effect on walking disability but not gait impairments in non-ambulant people with stroke and patients felt positive about using it.

# Poster presentations



## **Examining the relationship between objective measures of walking and quality of life for users of the Odstock Drop Foot Stimulator**

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**Introduction:** Foot drop is a common symptom of neurological conditions such as stroke and Multiple Sclerosis (MS). The Odstock Drop Foot Stimulator (ODFS) provides Functional Electrical Stimulation (FES) of the common peroneal nerve to dorsiflex the ankle, which helps to correct this impairment and facilitate gait, (1). In our clinical experience, some patients who do not have significant improvements in walking speed and energy expenditure continue to use a stimulator, as they feel it improves their quality of life (QOL). To investigate this observation, the Psychosocial Impact of Assistive Devices Scale (PIADS), (2), was used to evaluate the effects of the ODFS on perceived QOL for people with stroke and MS.

**Method:** 21 ODFS users with stroke and 20 with MS completed the PIADS questionnaire after 18 weeks of use. 10 meter walking speed and physical cost index (PCI) were recorded with and without stimulation. PIADS scores for stroke and MS were compared, and correlated with the walking test data.

**Results:** Both groups recorded positive median scores for all 3 sections of the PIADS questionnaire, indicating improved QOL as a result of using the ODFS; Competence (1.25 stroke, 0.912 MS), Adaptability (1.25 stroke, 0.5 MS) and Self-esteem (0.88 stroke, 0.75 MS). These were significantly greater for the stroke than the MS group for Competence,  $p=0.04$  and Adaptability,  $p=0.006$ , (Mann Whitney U test). There was no correlation between objective improvements in walking due to the ODFS and any section of the PIADS questionnaire,  $r= -0.29$  to  $+0.25$ , (Pearson's Product Moment Correlation Co-efficient)

**Conclusions:** Foot drop stimulation has a beneficial effect on perceived QOL for people with stroke and MS. This is significantly greater for those who have had a stroke. QOL scores do not correlate to objective measures of walking, which may explain why some users continue to use the ODFS when there is no significant change in objective measures.

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## **Are lateral wedges a useful tool in the conservative treatment of medial compartment osteoarthritis of the knee – a systematic review of the literature.**

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**Introduction:** A recent study indicates that there is an association between medial compartment osteoarthritis of the knee (MCOA) and the pronated foot. The current use of a lateral wedge orthotic as part of the conservative management of MCOA would, therefore, seem to be questionable as in sports physiotherapy and podiatry the treatment for the over-pronating foot is a medial wedge. A systematic review was carried out, therefore, to determine whether evidence exists to support the use of a lateral wedge in MCOA

**Method:** A systematic search of MEDLINE, EMBASE, CINAHL, Allied and Complimentary Medicine, PubMed, EBSCO HOST and PEDro and manual searching were used to identify studies using the terms “lateral wedge”, OR orthotic\*Or orthosis\* OR insole\*osteoarthr\*OR oa knee\*. MeSH terms orthotic devices AND osteoarthritis, knee were also used. ClinicalTrials.gov was searched for trials in progress and Cochrane and other Systematic Reviews were searched for in Database of Abstracts of Reviews of Effects. A total of 11 studies were found and all were considered. Data extraction was performed independently by the three authors using a form based on the CONSORT statement and CASP (Critical Skills Appraisal Programme) guidelines.

**Results:** Although widely cited, most studies were neither well designed nor rigorous and their findings were therefore inconclusive. There was only one well designed, completed randomised controlled trial and its findings did not support the use of lateral wedges as an effective conservative treatment of MCOA knee. There was no information on the effects of a lateral wedge on the biomechanics of the foot and ankle.

**Conclusions:** This review does not support the use of lateral wedge orthotics in the conservative management of MCOA knee. Further research into the clinical impact of lateral wedges and the biomechanical changes they produce in the foot and ankle appears warranted.

## **The effect of core stability training on the spinal-pelvic stability during running and on the single leg hop-for-distance performance test in female runners**

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Spinal-pelvic stability (SPS) is described as the ability of spinal-pelvic complex to prevent buckling and to return to equilibrium after perturbation<sup>1</sup>. The inability to resist the perturbations manifests itself in increased pelvic and spinal displacements, linked to a lower limb mal-alignment and injury<sup>2</sup>. Core stability training (CST) is performed to improve SPS. This study aimed to determine whether CST has any effect on SPS (spinal and pelvic angular perturbations control) during running and on single leg performance test.

A Group of female runners (n=36) were divided into training group (n=16) that undertook 6-week CST and control group (n=20). Pelvic obliquity (PO) and spinal side flexion (SSF) during stance phase of running was measured using two-dimensional video-analysis. Single leg hop-for-distance (SLHD) was a performance outcome measure. 2-way ANOVA was calculated to determine the between-group differences in the measured outcomes. A reliability study was also carried out to assess the intra-rater and test re-test reliability of the two-dimensional video-analysis system.

High intra-rater and test re-test reliability was demonstrated in measuring PO ( $r=.990$ ;  $r=.960$  respectively) and SSF ( $r=.974$ ;  $r=.982$  respectively). The training group demonstrated a reduction in SSF from  $17.95^{\circ}$  (SD=3.66) to  $9.85^{\circ}$  (SD=3.46), ( $p \leq 0.05$ ) and in PO from  $8.65^{\circ}$  (SD=2.36) to  $4.37^{\circ}$  (SD=2.28), ( $p \leq 0.05$ ). The subjects in the training group also demonstrated improvements in SLHD from 94.73cm (SD=21.13) to 113.3cm (SD=21.31), ( $p \leq 0.05$ ).

Based on the links between reduced SPS and injury, the results may warrant a possible use of CST in maximization of movement efficiency and potential injury prevention in female runners. The authors acknowledge support from Cardiff University.

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## **Reliability of measuring neck angle and head tilt using Siliconcoach™**

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The use of computers is an increasing factor in many work situations. Neck and head posture when working at a computer can be influenced by many factors including ergonomics. Sustained sitting postures can lead to neck pain and time off work. Reliable measurement of such postures is important in determining the most appropriate advice regarding work station management. This study aimed to determine the reliability of siliconCOACH Pro™ in measuring neck angle and head tilt when sitting at a personal computer (PC). To date there is limited evidence of the reliability of this measurement tool<sup>1</sup>.

10 subjects fulfilling specific inclusion criteria were recruited and sat facing a PC with their arms resting on their thighs. Markers were placed on C7 and the tragus of the right ear. An image of the head and neck was taken from side on and exported to siliconCOACH Pro™. This procedure was repeated two weeks later. Neck angle was determined by lines drawn from C7 to the tragus. Head tilt was determined by lines drawn from C7 to the tragus to the outer canthus of the eye. Three independent physiotherapists (VS, PC, LS) determined the angles using siliconCOACH Pro™. ICCs were calculated to determine intra, inter and test retest –reliability<sup>2</sup>.

Multiple intra-rater reliability neck angle and head tilt was .992, .990 respectively. Inter-therapist reliability for neck angle and head tilt .988, .990 respectively. Test re-test reliability for neck angle and head tilt was .896, .934 respectively.

This study has demonstrated high reliability for intra, inter, and test re test reliability of neck angle and head tilt using siliconCOACH Pro™. This measurement tool can be utilised with confidence in measuring head and neck position and can inform clinicians regarding work station assessment.

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## **Development of a framework for evidence-based choice of outcome measures in neurological physiotherapy**

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### **Project Team**

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**Purpose:** Neurological physiotherapists recognise the need to include standardised outcome measures in their clinical practice but lack of information about the outcome measures available hampers utilisation. This paper reports the first stage of a project to identify the most clinically feasible and clinimetrically robust outcome measures for use in neurological physiotherapy. The aim of this stage of the project was to identify the domains that physiotherapists need to measure during a neurological assessment, the results of which will be used to inform systematic reviews in stage 2.

**Method:** Focus groups were held using 3 patient vignettes to represent the acute, rehabilitation and community settings. Thirty senior neurological physiotherapists participated and were asked “*what would you observe, test or measure if assessing this patient?*” Each of the authors analysed the data using independent thematic content analysis to identify and define the items and domains. Internal and external member checking ensured validity.

**Results:** Items from the data collection were classified in to 17 domains that physiotherapists need to measure: weakness; range of movement / contracture; pain; muscle tone / spasticity; sensation; ataxia / co-ordination; personal fatigue; oedema; subluxation; postural impairment; balance impairment; walking impairment; upper limb; balance disability; walking disability; mobility disability and falls.

**Conclusions and implications:** The 17 domains that physiotherapists need to measure during clinical assessment were identified. In the second stage of the project (which is currently underway) these domains will inform systematic reviews to identify the most robust outcome measures for use in clinical practice.

## **A systematic review of measurement tools to assess ataxia.**

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**Purpose:** A systematic review of measurement tools for ataxia to assess their psychometric properties and suitability for clinical use.

**Databases:** CINAHL, Medline, AMED, Psycinfo, Sportsdiscuss and Embase.

**Keywords :** combinations of the following: ataxia / tremor / co-ordination and measurement / assessment / outcome / outcome measure / measurement tool. Limits: English and those involving adult humans. Analysis: Identified articles were assessed for psychometric properties (inter and intra rater-reliability, validity and sensitivity to change) and clinical utility (cost, portability, time taken to perform and need for specialist equipment). Article quality was assessed using criteria based on the Scottish Inter-Collegiate Guidelines Network and methods described by Jorstad et al. Minimum standards for weak, adequate and good quality evidence for psychometric properties and clinical utility were defined.

**Results:** Five tools were identified: Fahn's Tremor Rating Scale [FTRS], Graded Finger-Nose Test [GFNT], Clinical Tremor Rating Scale [CTRS] and International Cooperative Ataxia Rating Scale [ICARS] and Tremor Disability Questionnaire [TDQ]). Only ICARS was ataxia-specific; all others were tested on people with conditions causing multiple impairments. Reliability, validity and clinical utility were examined for all tools but sensitivity to change was unaddressed for all. Reliability of the FTRS, ICARS and upper limb and head sections of the TDQ were adequate or good but for GFNT, CTRS and lower limb section of the TDQ was weak. Validity compared with measures of disability and clinical assessment was adequate or good but with instrumented measures of impairment ranged from weak to good. Clinical utility was good for all measures.

**Conclusion:** FTRS has the best overall score for psychometric properties and clinical utility but can be time consuming to complete and sensitivity to change was untested. None of the measurement tools fulfilled all the assessment criteria and could not be recommended for clinical use.

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