1. A CLUSTER RANDOMISED CONTROLLED TRIAL OF PHYSIOTHERAPY AND OCCUPATIONAL THERAPY INTERVENTION TO ENHANCE MOBILITY AND ACTIVITY IN CARE HOME RESIDENTS

Presenter: Prof Cath Sackley

Authors: *Cath Sackley1 ,Thomas J Hoppitt1 , Smitaa Patel1 , Maayken E L van den Berg1 , Karen Lett1 , Kristen Hollands2, Christine Wright2*
1Department of Primary Care and General Practice, University of Birmingham, UK
2School of Health Sciences, University of Birmingham, UK

Background:
Evidence for the benefits of physiotherapy and occupational therapy on functional independence and mobility for older people living in care-homes is inconclusive. This study investigated a rehabilitation intervention designed to improve these abilities.

Method:
A RCT, with independent cluster randomisation and blinded assessment was undertaken in care-homes for older people in Birmingham, UK. Homes were assigned to intervention or standard care (control). Residents with Barthel score <16 were eligible. The intervention comprised a targeted three-month occupational and physiotherapy programme. Participants were assessed at 0, 3, and 6months. Primary outcomes were Barthel ADL Index and Rivermead Mobility Index (RMI). Analysis was by intention-to-treat.

Results:
Twelve care-homes (n=249) were randomised to the intervention arm (n=128, mean age 86), twelve to control (n=121, mean age 84).
After adjusting for home effect and pre-intervention values, no significant differences were found at 3-months in mean Barthel scores across treatment arms (95% CI-1.14to1.30; p=0.90), assessments (95%CI -0.63to0.60, p=0.96), or assessment-intervention interaction (95%CI -0.48to1.32, p=0.36). Similarly, no significant differences were found in mean RMI scores across treatment arms (95%CI -0.51to1.76, p=0.28), assessments (95%CI -0.65to0.35, p=0.55) or interaction (95%CI -0.02to1.44, p=0.06).

Discussion:
The intervention in this study had no significant influence on mobility or independence, but the prevalence of cognitive impairment and depression was higher than expected. This variability suggests larger samples would be required to provide more definitive evidence.

Conclusion:
As there is little evidence of benefit in a care-home setting it suggests that scarce community rehabilitation resources are targeted to those living in their own homes.

2. EXPERIENCES OF AN EXERCISE REFERRAL SCHEME FROM THE PERSPECTIVE OF PEOPLE WITH CHRONIC STROKE: A QUALITATIVE STUDY

Presenter: Mrs Helen Sharma

Author: *Sharma, H.; Bulley, C.; van Wijck, F.*
Queen Margaret University, Edinburgh.

Background:
Following stroke, physical activity is important to maximise recovery. Increasingly, patients are referred to Exercise Referral Schemes (ERS). Numerous studies have demonstrated the effectiveness of group exercise, but there is a lack of data on user views. This qualitative study aimed to explore the experience of an ERS by people with chronic stroke.

Method:
Located within the constructivist paradigm, this study focused on individual participants' values and meanings. Non-random sampling identified important sources of knowledge. Inclusion criteria were diagnosis of stroke and previous participation in a neuro-specific ERS in South London. Semi-structured interviews were transcribed verbatim and thematically analysed in a rigorous manner, incorporating respondent validation, peer checking of support for themes and reflexivity.

Results:
Nine community-dwelling adults participated (mean age 51, range 37-61 years; time post stroke 1-4 years). Following the ERS, all participants experienced improved physical and psychological well-being and associated ERS with increased physical activity participation, physical improvement, more internalised perceptions of control and improved confidence. Participants believed the ERS instigated subsequent improvements in lifestyle, work and social roles. Thus, the master theme 'One small step on the treadmill- one giant leap towards independence' emerged, encompassing descriptions of the ERS as a pivotal stage in regaining independence.

Discussion:
This exploratory study demonstrates the value of evaluating user views. These should be assessed alongside physical and psychological outcomes in ERS research and service evaluation.

Conclusion:
This study supports ERS as a method of targeted rehabilitation for people with chronic stroke, through which they can achieve personally-valued improvements towards greater independence.

3. THE USE OF MULTI-SENSORY STIMULATION TO IMPROVE FUNCTIONAL PERFORMANCE IN OLDER PEOPLE WITH DEMENTIA: A RANDOMISED SINGLE BLIND TRIAL

Presenter: Dr Lesley Collier

Authors: *Collier, L. University of Southampton; MacPherson, K. Auckland University of Technology; Ellis-Hill, C. University of Southampton; Bucks,R. University of Western Australia*

Background:
Multisensory Environments(MSEs) utilising stimulating equipment targeting the senses, have been used with people with dementia for many years. However, no controlled studies have been conducted exploring the efficacy of MSEs on functional performance. This study explores how MSEs influences functional performance of people with moderate/severe dementia compared with a control intervention.

Method:
Thirty participants,selected from people with moderate/severe dementia, were allocated using stratified randomisation to either a MSE or control intervention(gardening). Baseline data were collected using the Pool Activity Levels tool (PAL) and the Adult Sensory Profile (ASP) in order to structure the interventions. Primary outcome data were collected by a blind assessor using the Assessment of Motor and Process Skills (AMPS) pre/post intervention. Participants attended 12 interventions, three times a week for four weeks, supervised by their key nurse/therapist.

Results:
Results revealed significant main effect of interventions from baseline to last treatment session, $F(1,27)=8.63, p=.007$. Analysis baseline to session 6 revealed significant main effect of MSE intervention, $F(1,19)=9.67, p=.006$, and significant interaction, $F(1,19)=7.07, p=.016$. Sessional analysis using delta scores revealed significant improvement in motor performance for the MSE intervention, $t(28)=2.28, p=.030$. Overall, both interventions were found to improve functional performance on a session by session basis.

Discussion:
This study revealed both interventions have the potential to improve functional performance. An improvement in performance can be achieved after one session. This study supports the use of sensory activity for people with moderate/severe dementia to improve functional performance and recommends the use of the PAL and ASP to plan and facilitate such activity.

Conclusion:

4. THE USE OF FALLS DIARIES TO SURVEY THE CIRCUMSTANCES SURROUNDING FALLS AMONG PEOPLE WITH PARKINSON'S DISEASE

Presenters: Prof Ann Ashburn

Authors*: Ashburn A*, Stack E*, Ballinger C^, Fazakarley L*, Fitton C*.*
** School of Health professions and Rehabilitation Sciences, University of Southampton*
^Faculty of Health and Social Care, London South Bank University

Background:
Falls Diaries are one way of recording fall frequency and the circumstances surrounding falls. Completing diaries encourages recall, and the content focuses intervention. Falls are common in Parkinson's disease (PD).

Method:
Independently mobile, cognitively intact people with a diagnosis of PD were asked to maintain a Falls Diary for six-months during an RCT of fall prevention. Using monthly diary sheets, answers to questions about 'Location', 'Fall-related Activity', 'Suspected Cause', 'Landing' and 'Consequences' of every fall were recorded. Responses were coded and frequencies counted.

Results:
One hundred and thirty-four diaries were reviewed, completed by 142 RCT participants (mean age 72 years; mean years since diagnosis 8) and excluded ten (7%) for missing data and/or unintelligible writing. The 124 remaining diaries recorded 639 falls: 80% happened at home, commonly in bedrooms, living areas, kitchens and gardens. Fallers had been ambulant in 45% of events, standing in 32% and transferring in 21%. Six activity-cause combinations accounted for 55% of falls (tripping 13%; freezing, festination and retropulsion 11%; and postural instability when bending or reaching 9%, transferring 8%, walking 7% and washing or dressing 7%). Misjudgement and distraction played a part in 12% of falls described.

Discussion:
Most participants completed Falls Diaries successfully and most of the 600 falls surveyed happened at home, provoked by postural instability, tripping and freezing. People with handwriting difficulty may require a typed diary, proxy diarist or interview.

Conclusion:
Further research into combinations of environmental adaptation, cognitive training and movement rehabilitation in falls prevention in PD is needed.

5. THE PHYSIOLOGICAL RESPONSES TO TREADMILL WALKING WITH NORDIC POLES IN PATIENTS WITH INTERMITTENT CLAUDICATION

Presenter: Dr John M Saxton

Authors: *Oakley, C.E., Zwierska, I., Tew, G., Beard, J.D. & Saxton, J.M. Centre for Sport and Exercise Science, Sheffield Hallam University and Sheffield Vascular Institute, Northern General Hospital, Sheffield.*

Background:
The aim of this study was to investigate whether walking with Nordic poles increases the claudication and maximum walking distances in patients with intermittent claudication (IC), thereby potentially providing a means to increase the stimulus for cardiopulmonary adaptations during exercise rehabilitation.

Method:
A total of 20 patients with stable IC (57-79 years) were recruited from the Sheffield Vascular Institute and, following a period of accustomisation, performed two standardised treadmill tests (3.2 km.h-1 at 4% gradient) in random order on separate days. The distance to onset of claudication symptoms (claudication distance: CD) and to maximum exercise tolerance (maximum walking distance: MWD), peak heart rate (HR) and leg pain (Borg scales), and peak oxygen uptake were recorded during both tests. As the data were not normally-distributed, they were analysed using the Wilcoxon Signed Rank Test and expressed as median (range) values.

Results:
CD increased from 58 (28-503) to 97 (41-492) m ($P<0.001$) and MWD increased from 206 (81-1067) to 285 (107-1067) m ($P<0.001$) when patients used the Nordic poles, in comparison to normal walking. Claudication pain at MWD was less despite higher peak HR [113 (76-152) vs 103 (71-173) beats.min-1: $P<0.05$] and oxygen consumption [1.20 (0.76-1.93) vs 1.02 (0.53-1.47) l.min-1: $P<0.001$) in the Nordic poles condition.

Discussion:
These results suggest that Nordic pole walking could be a useful strategy for improving the stimulus for cardiopulmonary adaptations during exercise rehabilitation.

Conclusion:
Patients with intermittent claudication can walk further with lower leg pain, despite higher heart rate and increased levels of oxygen consumption.

6. CONCURRENT VALIDITY OF THE IDEEA ACTIVITY MONITOR TO QUANTIFY MOBILITY-RELATED ACTIVITIES AMONG PEOPLE WITH STROKE IN FREE-LIVING CONDITIONS

Presenter: Mr Andrea M Atzori

Authors: *Atzori AM, University of Southampton*
Hyndman D, University of Southampton
Ashburn A, University of Southampton

Background:
IDEEA is an activity monitor developed to quantify mobility-related activities performed in normal daily life. The aim of this study was to establish its concurrent validity among people with stroke in free-living conditions.

Method:
Sixteen community-dwelling people with stroke were asked to perform a protocol of activities of daily living in their own homes, while wearing IDEEA and being simultaneously video recorded. Validity was assessed by calculating agreement scores (overall agreement, sensitivity and specificity) between the activity monitor and video analysis output for six activity categories (lying, sitting, standing, walking, stepping and transition). In addition, agreement between overall durations and counts of activities determined by both techniques was assessed using Bland-Altman analysis.

Results:
Overall agreement was 80.2%. Sensitivity and predictive values for lying, sitting, standing and walking ranged from 61.3 to 93.9%, while for stepping and transitions varied between 3.7 and 29.9%. The narrowest limits of agreement were obtained for the duration of stepping (-4.7,+3.3%) and the count of lying (-2.3,+9.0).

Discussion:
Agreement scores varied considerably for the different activity categories. Ranges of discrepancy for both overall durations and counts appeared to be clinically relevant. Misdetections seemed to be related to specific postures and altered patterns of movement.

Conclusion:
Findings highlight concerns about the validity of IDEEA to quantify mobility-related activities among people with stroke in free-living conditions. However, sources of error identified in this study could be used to inform changes in the dedicated software and improve activity detection.

7. PREVALENCE OF LOW BONE MINERAL DENSITY IN PATIENTS AT A NATIONAL REHABILITATION CENTRE

Presenter: Dr Eimear Smith

Author: *Smith, E., Royal National Orthopaedic Hospital, Stanmore.*
Carroll, A., National Rehabilitation Hospital, Dublin.

Background:
Patients with disability are at risk of falling. They may also have other risk factors for osteoporotic fractures including vitamin D deficiency, periods of prolonged immobilisation and hypogonadism.

Method:
Cross-sectional study of adult patients disabled for at least 3 months due to acquired brain injury, spinal cord injury, other neurological condition or lower limb amputation. All completed a questionnaire, had laboratory investigations including measurement of 25-hydroxyvitamin D, and had DXA (dual energy x-ray absorptiometry) of the lumbar spine and at least one hip.

Results:
There were 255 participants, 178 males, 77 females. Mean age was 48.7 years (SD15.6). Vitamin D deficiency occurred in 56 (22%), insufficiency in 104 (40.8%). Low bone mineral density (BMD)occurred at at least 1 site in 51.8% of patients, 37 (14.5%) with Z-score below expected range for age, 59 (23.1%) with osteopenia and 36 (14.1%) with osteoporosis. At the hip, 43.6% had low BMD, 25 (9.9%) with Z-score below expected range for age, 54 (21.4%) with osteopenia and 31 (12.3%) with osteoporosis. On linear regression analysis, ambulatory status and duration of disability were independent predictors of BMD at neck of femur ($p = 0.002$, $p = 0.001$ respectively) and total proximal femur ($p < 0.001$ for both).

Discussion:
In over half of our patients with a disability, fracture risk is at least doubled at a minimum of one site, risk increasing with time since onset of disability.

Conclusion:
Patients who are unable to walk out of doors at 3 months post-onset of disability should have DXA assessment.

8. BILATERAL LIMB MOVEMENT EXERCISE IN CHRONIC HEMIPARETIC STROKE PATIENTS: A PHASE II RANDOMIZED CONTROLLED TRIAL

Presenter: Prof Cath Sackley (obo Mr Leif Johannsen)

Author: *Johannsen, L., University of Birmingham;*
Wing, A., University of Birmingham;
Pelton, T., University of Birmingham;
Brittle, N., University of Birmingham;
Kitaka, K., University of Birmingham;
Zietz, D., University of Birmingham;
van Vliet, P., University of Birmingham;
Riddoch, J., University of Birmingham;
Sackley, C., University of Birmingham;
McManus, R., University of Birmingham;

Background:
Bilateral arm movement training with rhythmic auditory cueing has been shown to facilitate recovery of arm function in chronic stroke. We compared the effects of a similar bilateral exercise for the legs.

Method:
A phase II RCT was conducted twenty-four stroke survivors (mean age=64yrs, mean time-post-stroke=60mnts) recruited from primary care. Participants were randomized to the intervention group, 10x30minutes bilateral leg flexion-extension, or to the control group, 10x30minutes arm exercise. Three blinded assessments were performed before (week 0), after the training (week 6) and three months later (week 20). Changes in Fugl-Meyer (upper and lower extremity subscales) at week 6 served as primary outcome measure. Secondary measures included motion-captured movement parameters during treadmill walking. Data were analysed using Mann-Whitney U-test and multivariate repeated-measures ANOVAs with baseline Fugl-Meyer score as covariate.

Results:
Eighteen subjects completed 10 treatment sessions and were assessed three times. Improvements in Fugl-Meyer lower extremity subscore tended to be greater for the intervention (n=9, mean=+3.4) than the control (n=9, mean=+1.1; U=21.5, p=0.09) and were accompanied by a significant increase of stride length (intervention=+33.7mm, control=-3.8mm; F=4.5, p=0.05). Group differences were not present at follow up. Loss to follow up was reasonably high (n=6, 25%).

Discussion:
Transient improvements of leg function in chronic stroke patients can be induced by bilateral leg exercise. It may be that participants require continuous periods of therapy to upkeep training effects.

Conclusion:
This study provided evidence for the feasibility of bilateral leg exercise. Future studies need to examine the training dose and period in a larger number of participants.

1. LOWER LIMB MUSCLE WEAKNESS IN HUNTINGTON'S DISEASE

Presenter: Dr Monica Busse

Authors: *Busse M.E., Cardiff University*
Hughes G.,Cardiff University
Wiles C.M.,Cardiff University
Rosser A.E.,Cardiff University

Background:
Lower limb muscle weakness may limit functional abilities in people with Huntington's Disease (HD). Sub-clinical involvement, including myopathic changes and mitochondrial dysfunction of skeletal muscle has been reported. This study aimed to assess lower limb muscle strength of HD subjects compared to healthy subjects with a view to developing physiotherapy-led functional training programmes.

Method:
Isometric muscle strength of the flexor and extensor muscle groups for the hip, knee and ankle was measured using a hand-held dynamometer and a standardised testing protocol. Rater reliability for the testing protocol was established. Between group differences for each muscle group was assessed using independent t-tests.

Results:
Mean (SD) age (years) and BMI of HD subjects (n=14; male=9) was 55.6 (6.9) years and BMI 25.2 (6.5) (healthy controls (n=14; male=8) 52.5 (5.40 years, BMI 26.9 (4.2). Unified Huntington's Disease Rating Scale scores of HD subjects ranged from 28 to 56. HD subjects were at least 30% weaker ($p<0.05$) than control subjects for all lower limb muscle groups.

Discussion:
Notwithstanding the limitations of hand-held dynamometry, this clinically observable, non-specific reduction in lower limb muscle strength does not appear to have been described in HD subjects before. It remains to be established whether this is related to the disease process itself, to disuse, to impaired activation processes or to primary muscle weakness.

Conclusion:
These findings have implications for the planning of suitable physiotherapy interventions for people with HD.

2. SHINING A LIGHT ON PHYSIOTHERAPY: THE EXPERIENCES OF PEOPLE WITH CEREBELLAR ATAXIA

Presenter: Mrs Elizabeth Cassidy

Authors: *Cassidy, E., Reynolds, F., Naylor, S., De Souza, L., Brunel University*
Khan, A., Private Practice

Background:
Little research has been conducted on the experience of living with ataxia. There is also limited information in the literature to inform the content of physiotherapy. As part of a broader programme of research examining the lived experience of ataxia, this paper reports the experience of physiotherapy as recounted by people with cerebellar ataxia.

Method:
One joint interview and ten individual interviews were conducted with participants who had been diagnosed with cerebellar ataxia for more than six months. Participants were aged between 31-73 years. Interviews were recorded and transcribed.
Each account was analysed using Interpretative Phenomenological Analysis. Findings from the idiographic analysis were compared, looking for similarities as well as differences in the reported experiences.
Each account was audited to consider alternative explanations and to ensure themes were well grounded and well represented in the transcripts.

Results:
Most participants regarded physiotherapists as a valuable but scare resource. Provision was inconsistent and follow up services limited in most instances. Most participants actively sought other avenues for further support or pressed for referral to specialist services. Participants regarded access to, and the practice of, physiotherapy as somewhat opaque.

Discussion:
Similar findings would not necessarily emerge from all people with cerebellar ataxia. However, participants spoke similarly and several overarching consensual themes emerged. Important issues about service provision and content should be considered in terms of theoretical generalisability.

Conclusion:
People with cerebellar ataxia require specialist services to meet their ongoing and complex needs. Ongoing research about physiotherapists' perspectives will be reported shortly.

3. SELF-OPTIMISATION OF WALKING SPEED FOLLOWING STROKE?

Presenter: Dr Johnny Collett

Authors: *Collett, J., Movement science group, Oxford Brookes University*
Dawes, H., Movement science group, Oxford Brookes University
Dennis, A., Movement science group, Oxford Brookes University
Elsworth, C., Movement science group, University of Birmingham
Howells, K., Movement science group, Oxford Brookes University
Wade, D., Oxford centre for Enablement

Background:
Healthy individuals self-select optimal walking speeds at which minimal metabolic and mechanical energy costs occur. Furthermore when gait parameters are constrained individuals will self-optimise. Given this evidence it is conceivable that individuals following stroke will self-optimise walking according to limitations dictated by their level of impairment.

Method:
Nine individuals with chronic stroke walked over ground at self-selected slow, preferred and fast speeds. At each walking speed steady state metabolic cost (net J.kg-1.m-1) and estimated centre of mass (COM) displacement was measured. From COM displacement external mechanical work (Wext J.kg-1.m-1) and the efficiency of COM energy transductions (%recovery) were calculated.

Results:
Walking speeds increased ($p<0.01$) over the slow (mean 0.69±0.22 m.s-1), preferred (mean 0.81±0.25 m.s-1), and fast (mean 0.92±0.30 m.s-1) speed levels. There was no difference ($p>0.05$) in metabolic cost (slow: mean 3.71±1.36 J.kg-1.m-1, preferred: mean 3.71±1.51 J.kg-1.m-1, fast: mean 3.81±1.61 J.kg-1.m-1), Wext (slow: mean 0.54±0.26 J.kg-1.m-1, preferred: mean 0.56±0.18 J.kg-1.m-1, fast: mean 0.58±0.26 J.kg-1.m-1) or %recovery (slow: mean 51.2±12.9, preferred: mean 51.6±12.9, fast: mean 51.1±10.3) between speed levels.

Discussion:
Metabolic cost, Wext and %recovery were not significantly different at preferred walking speed from fast or slow speeds. Thus we did not find evidence to support self-optimisation of walking speed following stroke. However, the range of speeds may not have been great enough to elicit significant changes in walking energetics.

Conclusion:
Further studies are needed to determine whether self-optimisation occurs following stroke. Evidence of self-optimisation would support interventions that facilitate patient selected walking.

4. CAN BOTULINUM TOXIN, ADMINISTERED IN THE EARLY STAGES FOLLOWING A STROKE HELP THE RECOVERY OF ARM FUNCTION? ESTIMATING EFFECT SIZE FROM A PHASE II PILOT STUDY

Presenter: Mrs Elizabeth Cousins

Author: *Cousins E., Keele University; Ward A.B.,University Hospitals of North Staffordshire; Roffe C., University Hospitals of North Staffordshire; Rimington L.D., Keele University; Pandyan A.D., Keele University*

Background:
Spasticity is believed to interfere with arm function poststroke. Outcomes for the arm may be improved if spasticity could be prevented. Botulinum toxin (BTX) is advocated for the treatment of established spasticity, but potentially if it could aid prevention of spasticity, functional recovery may be improved.

Method:
A phase II pilot study, with a double-blind randomised placebo controlled design. Participants were allocated to one of three groups, half standard dose of BOTOX®, quarter standard dose or placebo. The outcome measure was arm function, using the Action Research Arm Test (ARAT), which was recorded at baseline, and 20 weeks post intervention.

Results:
Thirty participants [mean time post stroke 23 days - standard deviation 9 days] were recruited, of whom 23 had data that could be included in the final analysis. All groups improved functionally by week-20, with the placebo group improving the most. Effect sizes were 0.131 and 0.417 in favour of the placebo group.
A subgroup analysis including only those participants with a baseline ARAT score of zero showed that only the treatment groups made functional improvements. Effect sizes were 0.51 and 0.637 for the half and quarter dose groups respectively.

Discussion:
Although all groups improved, early BTX treatment may not be beneficial for individuals with recovery of active function. However, early treatment may have facilitated recovery in the severely disabled stroke patient.

Conclusion:
Prophylactic use of BTX, in severely disabled stroke patients, needs to be carefully evaluated in a larger study.

5. MODELLING RECOVERY AFTER STROKE

Presenter: Ms Shweta Malhotra

Author: *Malhotra S,Research Institute for Life Course Studies, University of Keele, UK*
Day C, Research Institute for the Environment, Physical Sciences and Applied Mathematics,University of Keele,UK
Koufali M,Stroke Team for Audit & Research, Aintree University Hospitals NHS Foundation Trust, Liverpool, UK
Sharma A, Stroke Team for Audit & Research, Aintree University Hospitals NHS Foundation Trust, Liverpool, UK
Jones P,Research Institute for Science and Technology in Medicine, University of Keele, UK
Pandyan A, Research Institute for Life Course Studies, University of Keele, UK

Background:
Stroke is the most common cause of disability and loss of independence in the elderly population. Accurately modelling the recovery process is essential to our understanding and optimization of the recovery and rehabilitation processes. The main aim of this study was to compare the effectiveness of neural networks based models against standard regression models in predicting recovery after stroke.

Method:
A model was developed to predict dependence (Barthel Index<8) or partial independence (Barthel Index≥8) based on the following independent variables; type of stroke, days post stroke, discharge destination from acute ward, multidisciplinary involvement, weakness, cognition, initial Barthel scores and pre morbid Rankin. Data was obtained from the Aintree stroke register (1995-2005) and was categorised, normalized, shuffled and randomly allocated to training and testing sets. The former was used for model development and the latter for model testing. The models were compared by calculating their sensitivity and specificity.

Results:
The complete dataset consisted of 1375 useable patient records, which were split into 690 records for training and 685 records for testing. The accuracy of neural network technique in predicting dependent or partially independent functional outcome was (78% sensitive, 91% specific) similar to that obtained from regression methods (77% sensitive, 94% specific).

Discussion:
Both neural network and regression models are useful tools for predicting recovery. Initial indications suggest that both the techniques have a similarly high accuracy of prediction of recovery.

Conclusion:
Further work is now required to explore the clinical usefulness of these modeling techniques.

6. WALKING AND WHEELCHAIR NAVIGATION IN STROKE PATIENTS WITH LEFT SIDED VISUAL NEGLECT

Presenter: Mrs Kelly O'Leary

Authors: *O'Leary K, United Bristol Healthcare Trust*
Gabb J, United Bristol Healthcare Trust
Dewar S, University of Bristol
Turton A, University of Bristol
Gilchrist I, University of Bristol

Background:
Patients with neglect veer to one side when walking or driving a wheelchair, however previous work is equivocal about the direction of the deviation. This study, of stroke patients of mixed mobility status, investigated navigational trajectory in an ecological setting.

Method:
Fifteen patients with unilateral visual neglect and nine patients without neglect walked or steered a powered wheelchair, ten times, along a corridor. Performance was video-recorded and position relative to centre of the corridor was later measured. Two additional neglect patients were recorded both walking and using the wheelchair to determine whether any differences were task or patient dependent.

Results:
Neglect patients steering a wheelchair consistently deviated to the left of centre (mean (SD) –16cm, (8cm)) and those walking consistently deviated to the right (mean (SD) 11cm, (8cm)). These deviations from the central path were statistically significant: (wheelchair $t=-6.78$, $p<0.001$; walking $t=7.08$, $p=0.002$). Control patients steered a relatively central path (mean (SD) 5cm, (11cm), wheelchair, 3cm (8cm) walking)) and showed no significant difference between wheelchair driving and walking trajectory ($t=1.4$, $p=0.206$).
The direction of deviation in the patients who did both tasks was dependent on the task. Leftward deviation when driving the wheelchair but a rightward deviation when walking, (mean difference: patient1, 22cm, patient2, 41cm, t:8.3, 23.2 respectively, $p=0.001$).

Discussion:
Neglect patients exhibited an abnormally deviated trajectory relative to non-neglect controls. The direction of deviation was dependent on the mobility task with walking leading to rightward deviations and wheelchair driving leading to leftward deviations.

Conclusion:

7. MODULATING PERFORMANCE ON WHEELCHAIR NAVIGATION IN PATIENTS WITH UNILATERAL NEGLECT FOLLOWING STROKE

Presenter: Dr David Punt

Authors: *Punt, T.D., Leeds Metropolitan Univerisity*
Kitadano, K., University of Birmingham
Hulleman, J., University of Hull
Humphreys, G.W., University of Birmingham
Riddoch, M.J., University of Birmingham

Background:
Previous studies have characterised errors when navigating a wheelchair in patients with unilateral neglect following stroke. This study aimed to apply rehabilitation techniques (spatial cueing and limb activation) which have shown promise on bedside tests of neglect to the 'real life' activity of wheelchair navigation.

Method:
Patients with neglect (n=4) were assessed on two measures of navigational performance; (i) Wheelchair Assessment Course (WAC): an obstacle course where number and side of errors were counted, and (ii) Doorway Accuracy Tests (DAT): a finer-grained measure using motion tracking to assess the ability to steer a midline course between two obstacles. Patients operated the power chair by using (i) ipsilesional hand/ipsilesional joystick (control); (ii) ipsilesional hand/contralesional joystick (spatial cueing), or (iii) contralesional hand (where possible)/contralesional joystick (limb activation). Conditions were randomised across multiple trials to account for practice/order effects.

Results:
In all cases, spatial cueing or limb activation led to improved performance compared with the control condition and these improvements proved statistically reliable in 3 out of the 4 cases. For the WAC, there were reduced contralesional collisions ($p<0.05$) and for the DAT, trajectories were closer to midline ($p<0.05$).

Discussion:
These simple techniques derived from theory led to marked change in the individuals studies. The application of such techniques to functional tasks is rare in research. Further studies investigating performance in everyday environments would be welcomed.

Conclusion:
Spatial cueing and limb activation can be applied to functional tasks and may be valuable in stroke rehabilitation.