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POSTER 1

ABSTRACT 306

SCHISANDRIN B PROTECTS Aβ$_{25-35}$-INDUCED PC12 CELLS VIA APP AND VPS35

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Abstract

Background and Aims: It is said that Schisandrin B has strong effect on antioxidation. however, The current researches are limited to drug content measurement, liver and kidney protection, anti drug-resistant tumor and so on, In our experiment, we aim to explore its role of schisandrin B on similar neural cells induced by amyloid β-protein$_{25-35}$.

Methods: We established the in-vitro model of Alzheimer's disease using 20μmol/L Aβ$_{25-35}$ on PC12 cells, and added 5, 10, 25μmol/L schisandrin B respectively to make up five groups (the normal group, Aβ$_{25-35}$-treatment group, Aβ$_{25-35}$+5, 10, 25μmol/L Schisandrin B group). MTT assay and Hoechst 33342 staining were used to detect the activity and apoptosis of PC12 cells. RT - PCR, immunocytochemical stains and Western blotting method were utilized to observe the expressions of mRNA and protein of amyloid β-protein precursor(APP) and vacuolar protein sorting(VPS35).

Results: In Aβ$_{25-35}$-treatment group, the livability of PC12 cells decreased to (50.4±3.2)% and apoptosis rate increased to (21.1±1.2)%, while adding 5, 10, 25μmol/L Schisandrin B, the livability was increasing gradually and apoptosis rate decreasing by degrees (P<0.05). RT-PCR, immunocytochemical stains and Western blotting show that, the expressions of mRNA and protein of APP and VPS35 in Aβ$_{25-35}$ group are all increasing compared to the normal one (P<0.05), But when Schisandrin B of different concentration was also given to the PC12 cells, this expressions were decreasing gradually (P<0.05). The changing trend of VPS35 and APP is consistent, but in every single group, the expressions of APP were stronger than those of VPS35 (P<0.05).

Conclusions: VPS35 may be the important source of APP from upstream, and takes critical role in Alzheimer's disease. 5, 10, 25μmol/L Schisandrin B could antagonize the cellular injury of Aβ$_{25-35}$ with concentration dependence, and its mechanism may be bound up with the reduced expression of VPS35 and APP.

POSTER 2

ABSTRACT 375

A SYSTEMATIC REVIEW OF LOCOMOTOR TRAINING AS A THERAPY IN ANIMAL MODELS OF SPINAL CORD INJURY

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Background and aim: In the early 1980s experiments on spinalized cats showed exercise could enhance functional recovery after spinal cord injury (SCI). The aim of this review was summarize the evidence for the effectiveness of exercise training in promoting locomotor recovery in animal models of thoracic SCI.

Method: A systematic search of the literature was performed using Medline, Web of Science and Embase. The terms "locomotion", "exercise" and "spinal cord" were used as key terms. Studies were included if they compared any type of locomotor intervention to an untrained group.

Result: Of the 362 studies screened, 41 were included. The adult female rat was the most widely used animal model. The majority of studies (73%) showed exercise training had a positive effect on locomotor recovery. Studies employing a complete SCI were less likely to have positive outcomes. For incomplete SCI models, contusion was the most frequently employed method of lesion induction, and the degree of recovery depended on injury severity. Positive outcomes were associated with training regimes that involved partial weight-bearing activity, commenced within a critical period of one to two weeks after SCI, and maintained training for at least eight weeks. Considerable heterogeneity in training paradigms and methods used to assess or quantify recovery was observed. A 13-item checklist was employed to assess the quality of reporting and study design; only 15% of the studies had high methodological quality. Randomization of animals to group and blinding of assessments was often not reported.

Conclusions: The results of this systematic review suggest that exercise training following SCI in animals improves recovery of locomotion. Future studies should be carefully designed to minimize sources of bias. A small battery of objective assessment methods should be developed and routinely employed to allow future meta-analyses of the effectiveness of exercise interventions on locomotor recovery.

POSTER 3

ABSTRACT 531

TANSHINONE IIA PROTECTS PC12 CELLS FROM β-AMYLOID$_{25–35}$- INDUCED APOPTOSIS VIA PI3K/AKT SIGNALING PATHWAY

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Background and aim: Dementia is becoming a primary problem for the aging populations of any nation where life exceeds 65 years (Alzheimer's disease International; World Alzheimer Report, 2009). But there' s no effective solutions for clinical. In this study we aimed to investigate the effect of tanshinone IIA which we believed might be a potential treatment and the probable signal pathway in PC12 cells.

Method: β-amyloid$_{25–35}$ (20 μM) was used to induce apoptosis in PC12 cells, then tanshinone IIA(2μM), lithium chloride(20mM) or tanshinone IIA (2μM) combined with LY294002(20 μM) were given respectively. 24 hours later, flow cytometry was used to detect the apoptosis of PC12 cells. Fluorescence quantitative PCR (FQ-PCR) and western blot were used to detect the expression of GSK3β and Akt as well as their

phosphorylation level. The statistical analyses were done by using the SPSS13.0. Data are presented as mean ± SEM. The one way ANOVA test was used to calculate the statistical significance of the experimental data. The significance level was set as $P<0.05$.

Results: We found that tanshinone IIA increased the cell viability and reduced the number of apoptotic cells induced by $A\beta_{25-35}$. GSK3β inhibition is involved in tanshinone IIA-mediated cytoprotection. In mechanistic study, PI3K inhibitor LY294002 abolished the protective effects of tanshinone IIA, tanshinone IIA also induced the phosphorylation of glycogen synthase kinase-3β (GSK3β), a downstream target of PI3K/Akt. GSK3β inhibitor lithium chlorideblocked $A\beta_{25-35}$-induced cell apoptosis in a manner similar to tanshinone IIA.

Conclusions: The study demonstrates that tanshinone IIA is an effective neuroprotective agent and a viable candidate for PC12 cells and the neuroprotection of tanshinone IIA involves PI3K/Akt activation and GSK3β phosphorylation. And the specific mechanisms still needs more research.

POSTER 4

ABSTRACT 565

POLYPHENOL-FLAVONOL SYNERGISTIC PARADIGM FOR NEURAL REPAIR: COMBINATORIAL COMPUTATIONAL MODELING APPROACH FOR POST-TRAUMATIC M-CALPAIN INACTIVATION

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Background: Calcium-activated nonlysosomal neutral proteases, calpains, are believed to be early mediators of neuronal damage associated with neuron death and axonal degeneration after traumatic neural injuries (Jiao et al). This study provides a foremost comprehensive *in silico* evidence across combinatorial interventions for the potential inhibition of calpain (PDB: 1KFU) induced apoptosis (Strobl et al).

Methods: A library of biologically active small molecules such as E-64-D, Calpeptin, MDL-28170, SJA6017, Calpain inhibitor I, Calpain inhibitor II, AK275, AK295, PD150606 and PD151746 were used for model validation and inhibition site recognition. Static lattice atomistic simulations, sensitivity analysis employing Artificial Neural Networks (ANN), Ligand selection using a focused fragment-based geometrical optimization (isobolographic analysis), docking studies (Glide 4.0) and design of experiments (DoE were performed for quantifying the molecular attributes of the protein-ligand(s) interactions in the terms of various pertinent energy attributes and to generate preliminary data for protein-ligand sensitivity analysis, ligand-ligand interaction studies and combinatorial optimization.

Results: Curcumin and dihydro-quercetin demonstrated sensitivities toward m-calpain based upon the Mean Square Error and input-output mapping via ANN. Interestingly, curcumin interacted with ILE88, THR95-ILE97, THR115, GLU118, LEU121, LEU158, LEU165, HIS169, SER170, GLU175 and PHE176-ALA179 (Glide score:-4.23; Inhibition constant, Ki=3.84μM) whereas the dihydro-quercetin exhibited H-bonding with ILE88, ALA94-ASP96, THR115, GLU118, LEU121, SER170, GLU175, TRP177 and SER178 (Glide score:-2.89; Inhibition constant, Ki=25.21μM). A highly synergistic interaction was observed, using Loewe additivity relationship ($\Lambda = 0.58$), displaying a possible reduction in individual effective concentration by a factor of 3.2 and 8.5, respectively. An antiapoptotic combination of Curcumin and dihydro-quercetin (2:3) was proposed by the DoE model.

Conclusion: Our work offered first ever detailed polyphenol/flavonol-calpain interaction profiling and demonstrated inhibitory potential equivalent to PD151746 and MDL-28170, respectively, with implications reaching to *in vivo* studies.

References

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POSTER 5

ABSTRACT 12

REHABILITATION FOR CEREBRAL PALSY: ANALYSIS OF THE AUSTRALIAN REHABILITATION OUTCOME DATASET

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Background and Aim: Cerebral palsy (CP) remains a significant health problem and places a substantial burden upon patients and their caregivers. This study aims to examine the outcome of inpatient rehabilitation for CP, using the Australasian Rehabilitation Outcomes Center (AROC) database.

Methods: De-identified data from the AROC database was analyzed for all rehabilitation admissions during 2003 – 2008, using four classes for the functional level. The outcomes included: Functional Independence Measure (FIM) scores, FIM efficiency, hospital length of stay (LOS), and discharge destination.

Results: Of 141 case episodes 56.7% were female, mean age 48.5 years, 87.2% were discharged to the community and 64.5% (n = 91) were in the lowest functional classes (217, 218, and 219). The majority of CP patients were treated in the public hospital system (66.7% versus 33.3%), and had a slightly longer LOS compared with those treated in private facilities (22.6 versus 17.9 days, mean difference - 4.7 days, 95% CI - 9.2 to - 0.2, p = 0.041). The FIM for all classes (216 – 218) showed significant functional improvement during the admission (p = 0.001). As expected those in the most functionally impaired classes showed most change (FIM change: 16.6 in class 217, 15.3 in class 218). FIM efficiency was the highest in classes 217 compared to the other classes. The year-to-year trend demonstrated a mixed pattern for hospital LOS and was not significant (p = 0.492).

Conclusion: The AROC dataset is a valuable research tool for describing rehabilitation outcomes. However, more specific information needs to be collected alongside the core AROC data, to allow a more meaningful evaluation of outcomes for CP rehabilitation.

POSTER 6

ABSTARCT 31

PROSPECTIVE EVALUATION OF CO-MORBIDITIES IN PATIENTS WITH CEREBRAL PALSY AND ITS RELATION TO THE BLADDER FUNCTION

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Background/Aims: Cerebral palsy results in neurogenic bladder and bowel is well known but very few care givers assess the extent of bladder and bowel problems faced by a person with cerebral palsy. This study was done to evaluate bowel and bladder problems in patients with cerebral palsy.**Study Design:** This is a prospective study wherein the all the patients attending the clinic were screened for bladder and bowel problems and were included in study with the consent of the parents. **Study Participants & Setting:** All the children attending OPD were screened for duration of 1 year.

Materials/Methods: Detailed history, physical examination and IQ assessment was done. Urine examination and culture, bladder ultrasound and urodynamic studies were done as and when indicated (patients with urinary symptoms).The results obtained were analyzed using chi-square test .

Results: Demographic profile and the symptom evaluation of the study population reveals (n=184),M> F (78-21 %),Mean age Male – 6.74%, Female –7.45%, Spastic Diplegia most common (71.7%) stress incontinence and pain in beginning more in spastic diplegia grp,IQ moderate to severe MR 20% each group,. Symptomatic bowel and bladder problems seen were Bedwetting day 33.7% more in moderate to severe MR ($p<0.005$),Fever 15.7%,Vomiting 17.6 %, Frequency 15.8, Urgency 17.4, Burning micturition 5.4%, Disturbed stream 8.2%, Urinary retention 6%, Stress incontinence 6%, day night soiling 24.5% more in moderate to severe MR ($p <0.005$), Urge incontinence (9.2%), Pain abdo 7.6%, Difficulty initiation 10.3%, Constipation 15.8, Seizures 20.1%, Speech hearing problems 20.1%, Congenital anomaly 0.5, Dental problems 38.6 more in spastic and dyskinetic variety, Total 82 patients screened with ultrasound, Consent for urodynamic studies obtained in 30 patients. In the Ultrasound low capacity bladder was observed in in 27patients, increased residual urine volume in 6, normal capacity bladder in 1,increased bladder capacity in 2 patients was observed.

Conclusions/Significance: Bladder function screening should be done in every patient and symptomatic patients should be followed up with detailed urological investigations and appropriate timely treatment should be given so as to prevent long term sequelae and compromised kidney function and improve the quality of life of children with cerebral Palsy.

POSTER 7

ABSTRACT 106

RELATIONSHIP BETWEEN STRUCTURAL BRAIN CONNECTIVITY AND TREATMENT RESPONSE FOLLOWING INTENSIVE UPPER LIMB TRAINING IN CONGENITAL HEMIPLEGIA

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Aim: RCT to determine the relationship between structural connectivity of corticospinal (CST) and spinothalamic-corticothalamic (ST-CT) pathways and prediction of upper limb outcomes following intensive rehabilitation.

Participants and setting: Fifteen children with unilateral periventricular white matter damage (mean age 10.5 ± 2.9 years; 10 female; 7 right hemiplegia; MACS level I=4, II=11; GMFCS level I=4, II=11) who received 60 hours of intensive upper limb training over 10 days.

Methods: High Angular Diffusion Imaging (HARDI), probabilistic tractography and anatomical parcellation of high resolution images were used to determine structural connectivity captured at 3T. MRI asymmetry index (AI) based on the number of streamlines contained within the CST and ST-CT pathways were determined. The relationship between AIs and (i) baseline motor (Melbourne Assessment of Unilateral Upper Limb Function (MUUL) and Assisting Hand Assessment (AHA) and sensory measures (M2PD, stereognosis) (ii) change scores for motor outcomes post-intervention.

Results: ST-CT pathways were more highly correlated with baseline hand function than CSTs. M2PD was moderately correlated with ST-CT ($r=0.49$, $p=0.09$) but stereognosis was weakly associated ($r= -0.19$). Change on the MUUL was moderately negatively correlated with asymmetry of the PreCG CST ($r= -0.47$, $p=0.08$) and positively correlated with PostCG ST-CT asymmetry ($r =0.55$, $p=0.03$). There were no significant relationships between AIs and changes in bimanual function (AHA).

Conclusion: Motor function in children with hemiplegia and response to rehabilitation may be dependent upon reorganisation of the ST-CT rather than preservation of the CST. Less asymmetry of the corticospinal tract (e.g. less injury to the CST) and greater asymmetry of the spinothalamic-corticothalamic tracts (greater injury to the thalamic tracts) were moderately correlated with improvement in unimanual capacity after intensive upper limb training. Sensory feedback pathways may have an important role in both brain reorganisation after the initial brain injury and in response to treatment.

POSTER 8

ABSTRACT 107

SAFETY OF BOTULINUM TOXIN-A IN A DOUBLE BLIND SHAM CONTROLLED TRIAL OF CHILDREN WITH MARKED CEREBRAL PALSY TO IMPROVE CARE AND COMFORT

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Objective: To determine the safety of intramuscular Botulinum Toxin A injections (BoNT-A) combined with therapy in children with marked cerebral palsy (CP) for care and comfort goals.

Design: Double blind randomised controlled trial.

Method: Forty-one children were stratified for upper limb (21) or lower limb (20) goals, mean age 7.2 (SD 3.8) yrs, n=27 males; GMFCS IV=3,V=38 were randomly allocated to BoNT-A and therapy OR SHAM and therapy. Intramuscular BoNT-A (max 400U Botox®, 12U kg/BW, dilution 100U/1ml NS) was delivered using anesthetic cream and intranasal fentanyl, OR sham procedure of anesthetic cream and saline nasal spray. Parents, therapists, assessors and statisticians were masked to group allocation. Adverse events (AE) were collected at 2, 4, 16 weeks by physician masked to group allocation and independently reviewed by a pharmacologist. Adverse events were rated according to severity, relationship definite/probable, possible, unlikely/unrelated; and system/organ classification according to common terminology criteria reporting for cancer clinical trials.

Results: Allocation: 23 BoNT-A group and 18 SHAM group with all children completing phase 1. There were a total of 33 events in 23 children. 25 events were in 18 children in the BoNT-A group and 8 events in 5 children in the sham group. There were 3 serious adverse events in 3children in the BoNT-A group and 2 serious adverse events in one child in the sham group. There were 7 moderate adverse events in 5 children in the BoNT-A group and 4 moderate adverse events in 3 children in the sham group. There were 15 mild adverse events in 13 children in the BoNT-A group and 2 mild adverse events in 2 children.

The relationship between treatment allocation and moderate and serious adverse events at 4 weeks alone was not significant using fisher exact test p=0.497. The relationship between treatment allocation and all AE combined was significant, p=.002

Conclusion: To date no study has evaluated the safety of BoNTA in children with marked CP in a double blind RCT for care and comfort goals. Our study identified that children receiving BoNT-A administered with sedation were more likely to have an adverse event but not significantly likely for it to be a serious or moderate adverse event. All AE were short acting, reversible and most minor events. There is efficacy for BoNT-A to improve care and comfort however small number of children will have adverse events so all children who are GMFCS IV and V require careful monitoring.

Acknowledgment: This study was supported by a non-restricted grant from Allergan Australia through the Royal Children's Hospital Foundation.

POSTER 9

ABSTRACT 108

DOUBLE BLIND RANDOMIZED TRIAL OF BOTULINUM TOXIN-A AND THERAPY COMPARED TO SHAM AND THERAPY FOR CARE AND COMFORT GOALS IN CHILDREN WITH MARKED CEREBRAL PALSY

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Objective: To determine the efficacy of intramuscular Botulinum Toxin A injections (BoNT-A) combined with therapy (OT and PT) in non-ambulatory children with marked cerebral palsy (CP) for care and comfort goals.

Design: Double blind RCT.

Participants: 41 children with CP, mean age 7.1yrs, 27 males; GMFCS IV=3,V=38 were randomly allocated to receive BoNT-A and therapy or SHAM and therapy. Intramuscular BoNT-A (max dose 400U Botox®, at 12U kg/BW, ½-2U kg/muscle, dilution 100U/1ml saline) was delivered using intranasal fentanyl OR sham procedure and saline nasal spray. All parents, therapists, assessors and statisticians were masked to group allocation.

Main Outcome Measures: Outcomes were assessed using Canadian Occupational Performance Measure (COPM), Caregiver Priorities & Child Health Index (CPChild), Cerebral Palsy Quality of Life (CPQOL-Child) and the Pediatric Pain Profile (PPP). Statistical Analysis: Data were compared between groups at baseline, 4 and 16 weeks follow up using generalized estimating equations (STATA 10.0).

Results: 23 children were allocated the BoNT-A group (12 UL,11 LL goals); and 18 to the SHAM group (9 UL, 9 LL goals). No children withdrew. BoNT-A group made greater gains in COPM performance at 4 wks (EMD 2.2 95%CI 0.8-3.5; p=0.002), both groups improved equally at 16 wks. COPM satisfaction scores favoured the BoNT-A group at both 4 weeks and 16 weeks (EMD 1.8, 95%CI 0.1-3.5;p=0.04). The CPChild caregiver priorities Q favouring the BoNT-A group at 16 wks (EMD 6.8 95%CI 1.4-12.3;p=0.01). The Pediatric Pain Profile demonstrated an immediate reduction in pain at 4 weeks for both groups.

Conclusion: To date no study has evaluated the efficacy of BoNT-A in children with marked CP in a double blind RCT for care and comfort goals. Our results support the use of BoNT-A for treatment of spasticity for children with marked cerebral palsy with goals of decreasing burden of care and improving comfort.

POSTER 10

ABSTRACT 139

THE PRACTICE OF BRAZILIAN JIU-JITSU ORIENTED BY CONCEPTS OF FACILITATE INHIBITION NEUROMUSCULAR FACILITATION AND FUNCTIONALITY OF YOUNG WITH CEREBRAL PALSY

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This study used the application of principles of the Bobath Concept in Brazilian Jiu-Jitsu as a facilitator in the process of neurological rehabilitation. The Brazilian Jiu-Jitsu is a martial art sport practiced on the mat where a practitioner tries to get an advantage with respect to the opponent when it comes to biomechanics and balance.

Aim: To evaluate the improvement of motor coordination in young broad with cerebral palsy who trained Brasilian Jiu-Jitsu associated with the Bobath Concept principles.

Methods: Eight individuals participated in the study between ten and fifteen years with a clinical diagnosis of cerebral palsy were divided into two groups. Both groups had a traditional physical therapy appointments and only one group (experimental) was taught of Brazilian jiu-jitsu with an experienced instructor and academic physiotherapy. For evaluation it was used the Gross Motor Function Measure (GMFM) at the beginning and the end of the study. The study was conducted over a period of nine weeks, twice a week with an hour of training Brazilian Jiu-Jitsu adapted with principles of Bobath Concept, totaling seventeen sessions.

Results: It was applied the Wilcoxon test pre and post test as well as the sum of points. At the end of the study it was found that the improvement in total score between the beginning and end of treatment in the experimental group (5.78%) was higher than that obtained by the control group (1.04%).

Conclusion: The Brazilian jiu-jitsu associated with principles of the Bobath Concept proved to be a sport for therapeutic purposes beneficial from the standpoint of acquiring motor. This result can be explained by an increase of muscle condition and the motor learning acquired through the conditions attached to this sport as changes in position, and movements against resistance requirement in maintenance of posture and balance is thus showing an important exercise to be practiced as a complement to physiotherapy treatment.

POSTER 11

ABSTRACT 204

MEDICAL CARE PROBLEMS IN ADULTS WITH CEREBRAL PALSY

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Cerebral palsy has always been considered a static condition in neurological sense. This poster adresses the challenge faced by individuals with CP and developmental disability as they age in 30 persons. Secondary and associated condition that occure in the patients with cerebral palsycan progress over time. Possible interventions and outcomes over time are discussed in the context of the multidisciplinary team management of the individual with CP.

POSTER 12

ABSTRACT 291

THE EFFECTS OF HABILITATION TREATMENT ON ESTABLISHING MOTOR FUNCTIONS IN CHILDREN WITH CEREBRAL PALSY IN THE SPECIALIZED REHABILITATION HOSPITAL IN BANJA KOVILJACA

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Background and Aims: Cerebral palsy is caused by damage in the brain before or just after birth, and results in problems with muscle tone and movement and impact ability to perform everyday activities.

The aims were to determine effects of habilitation treatment on establishing motor functions and independent gait, in children with cerebral palsy, and to make comparison between groups in relation to the age of the children.

Methods: A retrospective study involved 97 children, age from 6 months to 14 years, with cerebral palsy and incapability to walk independently. The observation period lasted 1 to 7 years. All children were assigned into two groups: I – comprised children, 6 months to 5 years old (65 children) and II—children who were more than 5 years old (32).

The habilitation program included kinesi, hydro, occupational, and thermo therapy (paraffin/mud) and somatopaedic treatment.

We assessed their possibilities to control their heads, possibilities of pro-supination, sitting, standing, independent gait and presence of contractures. All data were statistically processed.

Results: In the group of younger children, all motor functions were improved with high statistical significance ($p<0.01$), and 38.4% of children were capacitated for independent walk.

In children older than 5 years, a functional status was not significantly changed.

The comparison between groups showed that the results were statistically significantly better in children younger than 5 years old than in older children ($p<0.01$).

Conclusion: Application of continuous balneo-physical habilitation treatment in early childhood (0-5 years) in significant number of children with cerebral palsy may result in establishing motor functions and independent gait. Similar results were achieved in some other studies (1).

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POSTER 14

ABSTRACT 302

CLINIMETRIC PROPERTIES OF THE PEDIATRIC MOTOR ACTIVITY LOG IN CHILDREN WITH CEREBRAL PALSY RECEIVING REHABILITATION

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Background and Aims: This study examined criterion-related validity and clinimetric properties of the Pediatric Motor Activity Log (PMAL) in children with cerebral palsy receiving rehabilitation therapy. **Methods:** Study participants were 41 children (age range: 28 to 113 months) and their parents. Criterion-related validity was evaluated by the associations between the PMAL and criterion measures at baseline and posttreatment, including the self-care, mobility, and cognition subscale, the total performance of the WeeFIM, and the grasping and visual-motor integration of the Peabody Developmental Motor Scale. Pearson correlation coefficients were calculated. Responsiveness was examined using the paired t test and the standardized response mean, the minimal detectable change was captured at the 90% confidence level, and the minimal clinically important change was estimated using anchor-based and distribution-based approaches. **Results:** The PMAL-QOM showed fair concurrent validity at pretreatment and posttreatment and predictive validity, whereas the PMAL-AOU had fair concurrent validity at posttreatment only. The PMAL-AOU and PMAL-QOM were both markedly responsive to change after treatment. Improvement of at least 0.67 points on the PMAL-AOU and 0.66 points on the PMAL-QOM can be considered as a true change, not measurement error. A mean change has to exceed the range of 0.39 to 0.94 on the PMAL-AOU and the range of 0.38 to 0.74 on the PMAL-QOM to be regarded as clinically important change. **Conclusions:** The findings support the clinimetric soundness of the PMAL used in children with cerebral palsy and the need for continued validations in this population.

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ABSTRACT 391

RASCH ANALYSIS OF FUNCTIONAL SKILLS EVALUATED WITH USING PEDIATRIC EVALUATION OF DISABILITY INVENTORY (PEDI) FOR CHILDREN WITH CEREBRAL PALSY

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Backgrounds and aims: PEDI (Pediatric Evaluation of Disability Inventory) was developed to evaluate functional limitations and extent of support from caregiver for children. Although one of its main indications was for the children who were received pediatric rehabilitation, the scaled score of PEDI calculated with using Rasch analysis, has not yet reported for the children with handicaps. Therefore, in the application for children with various impairments, the interpretation of the results was often difficult, because the acquisition order of functional skills of normal children and children with handicaps was different. In the present study, we perform Rasch analysis for children with cerebral palsy (CP) and determine the difference of scales score for each item for functional skills between both children.

Subjects: 337 children (144 boy, 193 girl) with CP participated in this study from the 44 institute of children with motor impairments. The average of participants was 8 years and 1 month. GMFCS (Gross Motor Function Classification System) was level I for 47, II for 60, III for 89, IV for 74, and V for 67.

Methods: Rasch analysis was performed with using Winsteps ver.3.62.1 (Linacure JM, Wimsteps Com) and scaled score of functional skills were transformed into the score distributed from 0 to 100. Obtained scores in this study were compared to the scores calculated from the data of 412 normal lived in USA.

Results: In the domain of social function, there were few items that the large difference was observed between both groups. As for the domain of mobility, the scaled score of many items from children with CP were larger than that of normal children. In the domain of self-care, large difference was observed in the skills with easier difficulty and the largest difference was 30.8 for the item 11 "Lifts open cup to drink, but may tip".

Conclusion: It was suggested from the results of this study that scaled score was different according to the characteristic of the sample for which Rasch analysis was performed and as for the children with cerebral palsy, the score was high in the mobility domain because of the feature of this population and we should use the score calculated from the sample with the same property when we hope to interpret the results of evaluation correctly.

POSTER 16

ABSTRACT 398

LIFE BEYOND MOBILITY FOR NON-AMBULANT CHILDREN WITH CEREBRAL PALSY

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Background: Cerebral palsy (CP) is the leading cause of childhood motor impairment and is associated with multiple co-morbidities such as visual, cognitive and communication impairments. The likelihood and severity of co-morbidities increases with decreasing mobility, however there is a paucity of literature that solely addresses non-ambulant children with cerebral palsy (GMFCS IV and V).

Aims: The aims of this study were to: 1) characterise the socio-economic aspects, co-morbidities, gross and fine motor and communication function in a cohort of 20 children with non-ambulant CP and 2) to assess activity, participation and quality of life in this group and then compare 1) and 2) with a) typically developing children and b) a group of ambulant children with CP..

Method: This cross sectional study assessed twenty non-ambulatory children with CP aged from five to twelve years who were recruited at random from the Cerebral Palsy Mobility Service database in use at PMH. The participants and/or their care givers completed: The Paediatric Activity Card Sort (PACS), Assessment of Life Habits questionnaire (LIFE-H) and the Cerebral Palsy Quality of Life questionnaire (CP QoL) as measures of activity, participation and quality of life respectively. This data was compared to similarly collected data for typically developing children and ambulant children with CP.

Results: A one-way ANOVA analysis of variance found statistically significant differences in all domains of all the outcome measures between the three groups. Post hoc analysis found that non-ambulant children with CP have lower rates of activity, participation and poorer quality of life than typically developing children and ambulant children with CP.

Conclusion: These findings highlight a need for research into interventions at all levels of the ICF to enable non-ambulant children with CP to take part in the world around them.

POSTER 17

ABSTRACT 466

ORTHOPAEDIC SURGERY IN CHILDREN WITH CEREBRAL PALSY

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Our study aims to assess the incidence and types of orthopaedic surgeries in children under permanent conductive education (CE) at the Pető Institute. The exploration contributes to preventive activities and, in collaboration with the orthopaedic surgeon, assists the scheduling of surgeries.

The homogeneous group of patients (cerebral palsy, aged 3 to 16 years) at the Peto Institute provides the opportunity for observation, monitoring and postoperative follow-up. In CP indications for surgery include preventing a deterioration of condition, decreasing of function disorder, facilitation of nursing, facilitation of wearing special aids etc., almost all of which may occur during long-term conductive education.

In 2010, the data of 222 children (117 boys, 105 girls) were collected, most of whom presented symptoms of CP, specifically spastic tetraparesis. We recorded the type of surgery the child had undergone, the number of previous orthopaedic interventions and similar or identical surgeries in the history. The data could be compared with the results of our 2005 survey.

45% of children participating in CE undergo orthopaedic surgeries. Not rarely orthopaedic surgery precedes the onset of conductive education. In the course of conductive education a second, third, often even a fourth orthopaedic surgical intervention may be carried out. Among children receiving CE the most frequently occurring orthopaedic operation was bilateral achillotomy.

Providing data for contribution to the scheduling and the success of surgeries (operation and aftercare) is essential. When scheduling interventions, along with orthopaedic aspects educational duties (school education, individual development plan etc.) must be considered as well. Maintenance of prevention opportunities is also an important aim.

Data collection has started in the current school year (2011-12) too. The survey will be extended to special aids needed in the pre- and postoperative phase and comparison will be made with similarly aged children not or not permanently receiving CE.

POSTER 18

ABSTRACT 495

GAIT ANALYSIS IN ADULTS WITH SPASTIC BILATERAL CEREBRAL PALSY

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Background and Aims: Walking deterioration occurs frequently in adults with spastic bilateral CP, but the gait characteristics of walking deterioration, as well as the overall gait characteristics in this group are largely unknown. The study aims were: 1) to compare selected gait analysis variables between those reporting and those not reporting walking deterioration, 2) to characterize the overall gait kinematic and kinetic gait deviations.

Methods: Participants (N=16) were recruited from a follow-up study, had spastic bilateral CP, <40 years in 2006, GMFCS level I-III, and could walk at least 10 meters without support. Eight reported walking deterioration (cases) and eight did not (controls). A theoretical framework linking work of walking, fatigue and deterioration in walking was developed. It was hypothesised that higher energy requirements during gait and larger gait deviations would be associated with deterioration in walking. Three-dimensional gait analysis was used to obtain centre of mass work, mechanical joint work, lower limb kinematics and kinetics, Movement Analysis Profile (MAP) and Gait Profile Scores (GPS).

Results: There were no differences between the cases and controls in centre of mass work, joint work, or in the GPS. The largest MAP deviations were seen in sagittal pelvis, hip and knee angles and foot progression. The overall median GPS score was 11.7°. Gait was characterized with increased pelvic tilt, hip and knee flexion and deviating foot progression angle. Almost half were in crouch gait pattern.

Conclusions: Walking deterioration could not be explained by these work and kinematic variables. The individual's perception of deterioration in walking is subjective, and might be experienced and interpreted differently across individuals. The crouch gait pattern may indicate increasing walking difficulties. Larger, longitudinal studies on the natural history of walking in spastic CP are needed. Qualitative studies on the subjective experiences of walking deterioration are also warranted.

Poster 19

ABSTRACT 509

THE INFLUENCE OF PARENTING STYLE IN THE EVOLUTION OF CHILD WITH CEREBRAL PALSY (CP)

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Background and aims: This paper aims to present parenting styles seen in children with cerebral palsy admitted to our clinic and how they influence the evolution of these children.

Our aims are:

Determination of the caregivers' parenting styles in our center.

Assessing the influence of parenting styles on the evolution of children with cerebral palsy

Methods: Our studied group includes 100 parents who completed the parenting styles questionnaire (excessive protector, balanced, indifferent, authoritarian, inconsistent styles) and their children aged 10-18 years diagnosed with CP, receiving "Who am I" test and then "Family" test for correlation with parenting style.

Results: It is obvious that excessive protector parenting style is dominant in our study followed by indifferent, inconsistent, balanced, authoritative styles.

Children from families with excessive protector parenting style have difficulty acquiring basic skills, relating with others, they are lack of initiative and self-esteem, avoid or have a distorted contact with reality.

Conclusions: Detection of parenting style is required for the evolution of children with CP; approach of optimal style leads to harmonious development, preparing children for life.

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POSTER 20

ABSTRACT 571

EFFECTS OF HAND TAPING ON UPPER EXTREMITY FUNCTION IN CHILDREN WITH CEREBRAL PALSY

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Background and Aim: Hand position and sensorial imputs come from all proprioceptors are importent for normal upper extremity function. Cortical thumb sign effects normal upper extremity functions by preventing sensorial input, normal position and normal movement feelings. Cortical thumb signs is frequently seems in children with cerebral palsy. The aim of this study was to investigate the effects of thenar palmar hand taping, to confront cortical thumb, on upper extremity function in children with cerebral palsy.

Methods: This study included 30 children with good cooperation, who had spasticity in their hands and/ or wrists, no passive range of motion limitation of the upper extremities; who had not recently undergone surgery of the upper extremity and who didn't use upper extremity orthosis. Children were randomly allocated to the palmar thenar taping group or to the control group. Modified Modified Ashworth Scale; goniometric measurement of wrist, metacarpophalangeal extention and radial deviation; Quality of Upper Extremity Skill Test; nine hole peg test and nine parts puzzle test were used for evaluation. Study groups were

evaluated initially, with taping 20 minutes later and 20 minutes after taping was removed. The control group was evaluated initially, 20 minutes later and again after 20 minutes. During the evaluation period children received intensive therapy for their lower limbs only.

Results: The results of the study showed that; spasticity of wrist flexors decreased and there was an improvement in the timing of the nine hole peg test and nine part puzzle test($p<0,05$). There was a carry over effect 20 minutes after the taping was removed ($p<0,05$).

Conclusions: It was concluded that taping impoves upper extremity function by controlling the cortical thumb sign mechanically while enabling sensorial input. However; further studies are needed to investigate the long term effects of thenar palmar taping on upper extremity function.

POSTER 21

ABSTRACT 591

EFFECTIVENESS OF VIRTUAL REALITY USING WII GAMING IN THE TREATMENT OF CEREBRAL PALSY

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Background and Aims: The aim of this report is to evaluate and describe the feasibility and efficacy of using virtual reality system for individuals with cerebral palsy. Virtual reality is defined as an immersive, interactive, 3-dimensional computer experience occurring in real time. This system has been developed specifically for rehabilitation of upper-extremity use, lower-extremity training and gait retraining.

Methods: This is a longitudinal, randomized and single-blinded clinical trial. It were selected 20 patients with spastic diplegic cerebral palsy and a Gross Motor Function Classification System level II and III for this study, but only 14 patients could continue in study because the inclusion criteria. The 14 patients were randomized in two groups: 8 participated in the intervention group and 6 in the control group. During the study 5 patients were excluded due to therapeutic change. Thus 9 patients concluded the study, 6 in the intervention group and 3 in the control group (mean age 7.11 years). All patients were evaluated before and after using GMFM (Gross Motor Function Measure), SAPO (An Postural Assessment Software) and surface electromyography (EMG) of rectus femoris, biceps femoris and gluteus maximus. All patients were submitted to 20 sessions of 40 min 2x/week of stretching and strengthening the lower limbs. In the intervention group were added 20 minutes supervised of activities using the Nintendo Wii Fit (games: soccer, balance bubble, basic step, rowing squat and table tilde). A child in the study completed only 12 sessions due the application of botulinum toxin. This study was conducted at the rehabilitation center AACD.

Results: Bioestatic 5.0 was used for data analyses. The normality test sample and Wilcoxon test were used for statistical analysis. There was not statistical difference in both groups in the evaluation of GMFM. The Electromyography in the group using virtual reality presented significant improvement in the rectus femoris ($P= 0.05$) and a trend of improvement in the biceps femoris and gluteus maximus ($P= 0.08$). In the control group there was not statistical difference in the biceps femoris and gluteus maximus ($P= 0.31$) ($P= 0.18$), but the rectus femoris muscle showed a trend statistical difference to decrease in muscle activity ($P= 0.07$). The SAPO in the intervention group there was statistically significant improvement in knee popliteal angle variables R ($p=0.002$) and L ($p=0.053$) and alignment of anterior superior iliac spine ($p<0,001$). Meanwhile in the control group there was no statistically significant diference in the popliteal angle R ($p=0.34$) and L ($p=0.23$), but there was a trend of improvement in the alignment of anterior superior iliac spine and acromion ($p=0.08$).

Conclusion: The study suggests that for the sample studied the utilization of virtual reality with video game promoted a better muscular recruitment and postural pattern when compared with the child who did not use the feature. Despite the small sample size the study can show the benefits of using the virtual reality with video game – Nintendo Wii in therapy.

POSTER 22

ABSTRACT 285

VIEW OF AN INTEGRATED EBM-NBM MODEL FOR RESEARCH IN NEURO-REHABILITATION

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Background and Aims: Appropriate research programs are essential to develop advanced methods supporting specific treatment models in Neuro-rehabilitation but continuing methodological challenges, like physician's subjectivity, make research into NRB difficult. A new integrated practical and teorethical model could be helpful for a high-quality bio-psyco-social research and hence NRB practice.

Methods: Evidence Based Medicine model has been adopted in NRB, as in other Rehabilitation fields, to face methodological challenges. No longer based on subjectivity EBM implies a critical use of scientific evidences provided by RCTs to enhance appropriateness of rehabilitation actions. In neurological setting there are good evidences of rehab effectiveness in a lot of neurological diseases, such as Multiple Sclerosis, Parkinson's disease, children with Cerebral Palsy and Stroke.

Nonetheless a dissonance exists when trying to apply research findings to the clinical encounter since EBM does not provide a way for a depth examination of individual and contextual factors. Increasing need for understanding the complexity of socio-cultural setting where physician and patient co-operate has lead to Narrative Based Medicine approach which restores the role of patients' emotional experience of illness and its relevance within the relational context of care.

Results: Methodological issues and results from two different trials are presented and discussed.

Conclusions: Developing a Narrative Evidence-based Medicine could meaningfully fill the gap between research and clinical practice in NRB overcoming the dissonance between objective measurement and clinical judgment at scientific and clinical level.

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POSTER 23

ABSTRACT 474

COURAGE IN EUROPE PROJECT: AN ICF-BASED SURVEY ON AGEING IN EUROPE

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Background and Aims: In the framework of the ICF biopsychosocial model, Collaborative research on ageing in Europe (COURAGE in EUROPE), a EU funded project (Health-F2-2009-223071), developed a protocol to measure health, health-related outcomes and determinants of disability for an ageing population. The survey will provide objective and evidence-based prevalence trends and is being currently conducted in Finland, Poland and Spain.

Material and method: The protocol is composed of multiple sections and instruments addressing different aspects of health, built environment, social networks and quality of life in adult population. The survey is being administered to approximately 2500 persons aged 50+ years and 1000 aged 18-49 years in each country.

Result: COURAGE in EUROPE research developed a tool that will create a valid and reliable scientific evidence base on health, health related and determinants of disability in ageing populations, comparable across European countries. This methodology will produce comparable data on non-fatal physical and mental health outcomes, quality of life and well-being, social cohesion and built environment in an ageing population.

Conclusion: COURAGE in Europe is not proposing another ageing study, but the development of a tool to measure health and health-related outcomes, for an ageing population, that offers objective and evidence-based prevalence trends, and which related these to both quality of life and well-being outcomes as well as to the role of health determinants such as the built environment and social networks. Understanding ageing and its determinants will have a considerable impact on public health policies by identifying strategies for intervention.

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POSTER 24

ABSTRACT 70

AN ESSENTIAL TOOLBOX FOR THE MANAGEMENT OF A PAEDIATRIC ACQUIRED BRAIN INJURY AMBULATORY AND OUTREACH SERVICE

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The message from research and established Paediatric ABI programmes is that children and youth and their families have changing and ongoing support needs on their road to adulthood after an acquired brain injury (Gillett, J; Tonks et al; Galvin et al). Paediatric programmes are thus faced with providing long term follow-up despite the inequity of numbers accepted each year versus the number discharged.

The Queensland Paediatric Rehabilitation Service (QPRS) was established 14 years ago with the ambulatory arm of the service expanding from a fortnightly clinic at the outset, to four clinics per week in Brisbane, 18 outreach clinics per year plus a range of other services to support families throughout Queensland.

The toolbox consists of service model components that enable us to maintain connectivity, avoid over-servicing and dependency but prevent families being lost to follow-up.

The essential tools that will be discussed in this paper will include:

- Integrated interdisciplinary/transdisciplinary team
- Clinic coordinator position
- Pre and post clinic meetings
- Care coordinators
- Quarterly planning/prioritisation
- Teaching and training-within and to external agencies
- Comprehensive reports for stakeholders
- Networking with regional services
- Phone reviews/preclinic calls
- Newsletter
- Case management
- Telehealth
- Group programs

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POSTER 25

ABSTRACT 167

CONSTRAINT INDUCED MOVEMENT THERAPY (CIMT) FOR PATIENTS POST ACQUIRED BRAIN INJURY: QUANTITATIVE RESULTS FROM A CLINICAL FEASIBILITY RANDOMISED CONTROLLED TRIAL (RCT)

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Background and Aims: Constraint Induced Movement Therapy (CIMT) is an evidence–based multi-component intervention which aims to promote upper limb (UL) hemiparesis recovery. Translation of CIMT from the laboratory to the clinical setting is currently limited therefore this feasibility RCT aimed to explore CIMT delivery within the clinical setting for participants 6 months-5 years post acquired brain injury (ABI), in comparison to an interdisciplinary UL rehabilitation programme.

Methods: 21 participants (13 male: 8 female), 1 year 11 months (average) post ABI were recruited from an UL rehabilitation waiting list and randomly allocated into a CIMT or UL group. Main eligibility criteria ensured participants were aged ≥18 years with UL therapy as their main treatment goal. Both groups received therapy for 1.5 hours, 5 days/week for 3 weeks (45minutes occupational therapy and 45minutes physiotherapy). A masked assessor completed outcomes at 3 time points using 2 primary measures: Motor Activity Log (MAL) and the Graded Wolf Motor Function Test (GWMFT) plus a range of secondary measures. An ANOVA between and within group analysis was completed.

Results: Overall using CIMT clinically proved to be feasible when using an interdisciplinary approach. The amount and quality of UL movement in group 1 improved significantly by the MAL amount (p=0.024; median 1.79) and how well scales (p=0.099; median 1.78). Group 1 also displayed a trend towards a greater yet non significant improvement in the GWMFT, EuroQol health index and Stroke self efficacy questionnaire. Post 3 month results are currently being analysed.

Conclusions: Overall CIMT appears feasible in the clinical setting for patients 6 months to 5 years post ABI. Group 1 demonstrated that CIMT can significantly improve the amount and quality of the affected upper limb movement irrelevant of the time post injury. A larger scale clinical RCT should be completed to confirm results.

POSTER 26

ABSTRACT 397

INFLUENCES OF A SHORT-TERM LOW-FREQUENCY MOTOR FUNCTION IMPROVEMENT PROGRAM ON COGNITIVE AND PHYSICAL FUNCTIONS

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Background and aims: This study aimed to evaluate the influences of a short-term low-frequency motor function improvement program on cognitive and physical functions.

Methods: Twenty-five elderly inhabitants of a local community (11 males and 14 females, 73.64 ± 4.79 years of age) participated in a motor function improvement program, primarily involving muscle training, for 6 months (2 sessions/month, 90 minutes/session). Before and after intervention, each subject was evaluated for cognitive function (Yamaguchi kanji symbol substitution test; YKSST) and 6 indicators of physical function (grip, knee extensor muscle strength, standing on one leg with eyes open, Functional Reach, Timed up & go test and time for 5 m walk). Each parameter before intervention was compared with that after intervention, and correlations in the magnitudes of changes between YKSST and indicators of physical function were analyzed statistically.

Results: Of the 6 indicators of physical function, 5 other than grip improved significantly after intervention (p<.01-.05), while YKSST showed no significant change. There were no significant correlations between the magnitudes of changes in YKSST and indicators of physical function.

Conclusions: According to a previous study, long-term high-frequency intervention improved cognitive and physical functions, while short-term low-frequency intervention failed to improve either. The present study revealed improvement in cognitive function but no improvement in physical function. There were no correlations between changes in cognitive and physical functions. These results suggest that short-term low-frequency intervention with an appropriately designed motor function improvement program can improve physical function but it cannot be expected to improve cognitive function simultaneously.

POSTER 27

ABSTRACT 58

EVALUATION OF A TRUNK SWAY IN SIT-TO-STAND MOTION USING A PRESSURE DISTRIBUTION MEASUREMENT SYSTEM: LATERALITY OF FOOT PRESSURE IN SIT-TO-STAND MOTION

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Background and Aims: Ordinary motion analyses of sit-to-stand (STS) motion use 3-D motion analysis systems with video cameras and surface electromyogram examinations or force plates. These provide useful data, but have drawbacks in terms of time, effort, and cost. In this study, differences between standing from an ordinary seat and standing from a low-repulsion mat were examined using a pressure distribution measurement system (BIG-MAT), and parameters associated with sit-to-stand (STS) motion difficulty and trunk sway were identified.

Method: Ten healthy male volunteers (aged 30–38 years) participated. During STS motion from an ordinary seat and from a low-repulsion urethane mat, plantar surface pressure changes of both feet and the centre of pressure (COP) trajectory were recorded for 7 s. This series of tests was performed four times for each subject. Left and right pressure changes and COP changes were evaluated. Differences in the measurements between the low-repulsion mat and the ordinary seat were compared using the paired *t*-test, and the contribution of leg dominance to trunk sway was evaluated using the Wilcoxon *t*-test.

Results: COP changes were similar to those previously reported. Time from hindfoot peak to forefoot peak was significantly shorter with the ordinary chair than with the mat ($p<0.05$). Percent change in forefoot pressure at forefoot peak and hindfoot peak ($p<0.01$) and percent change in forefoot pressure at forefoot peak and stabilization ($p<0.05$) were significantly different. Leg dominance was not shown to have an effect, but the dominant leg tended to be preceding (odds ratio, 1.20; 95%CI, 0.55-2.63).

Conclusions: Time from hindfoot peak to forefoot peak and percent change in forefoot pressure at forefoot peak and hindfoot peak were the best indicators of STS motion difficulty. BIG-MAT appears to be an easy, new method for STS motion analysis.

POSTER 28

ABSTRACT 62

EVALUATION OF ROBOTICS-ASSISTED GAIT REHABILITATION USING INTEGRATED BIOFEEDBACK IN NEUROLOGIC DISORDERS

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Background: Neurological disorders lead to walking disabilities, which are nowadays often treated using robotics-assisted gait training (RAGT) devices such as the Lokomat®-system. A novel integrated biofeedback system was developed to facilitate therapeutic desirable activities during walking. Aim of this study was to evaluate the biofeedback system in a clinical setting for different neurological disorders. The main goal was to investigate changes in biofeedback values following robotic-assisted gait training to detect differences during RAGT in subjects with central neurological disorders.

Methods: Subjects were followed over eight session of regular RAGT using the Lokomat®-system. Outcome measures were biofeedback values as weighted averages of torques measured in the corresponding joint drives and independent parameters such as guidance force, walking speed, walking distance, patient coefficient, session duration, time between sessions and total treatment time. Tendencies in changes of biofeedback values were evaluated using trend tests for repeated measures with inner-subject contrasts and overriding factor 1 validation.

Results: Data of 84 subjects with central neurological disorders were analyzed into detail. Joint segmented analysis showed significant trends for decreasing hip biofeedback values (p=0.003) and increasing knee biofeedback values (p=0.001) only for swing phase over eight sessions with an intercorrelation coefficient of r=0.43 (p<.001). Independent parameter guidance force was negative associated to knee biofeedback values (r=0.24), and mean time between sessions was positive associated with hip biofeedback values (r=0.24). Further associations among independent variables were not significant.

Conclusion: This is the first study that evaluates the Lokomat® integrated biofeedback system in different neurological disorders in a clinical setting. These findings of decreasing hip activity and increasing knee activity following RAGT should take into account when refine existing or developing new biofeedback strategies in RAGT regarding the need of appropriate system to evaluate progress and support therapist feedback in clinical settings.

POSTER 29

ABSTRACT 67

LOWER LIMB TRAINING THROUGH MOTOR IMAGERY AND A ROBOTIC ORTHOSIS: A FMRI STUDY TO TEST NEUROPLASTICITY

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Background and aims: This work is part of a project which aims to design a new gait neurorehabilitation protocol comprising a robotic device for the passive movement of patients' limbs. In the case of brain injured subjects, robotic rehabilitation becomes more effective if combined with cognitive focalization on the movements it performs and/or with motor imagery tasks. This study addresses two main issues: (1) investigating whether cognitive focalization during robotic locomotor training affects motor performance and (2) investigating whether robotic locomotor training combined with focalization tasks on imposed movements modifies brain activation. To assess the occurrence of neuroplasticity following the training process, pre- and post-training fMRI examinations are compared.

Methods: The experiment was conducted on 13 healthy volunteers (aged 21-33) not involved in any sport at a professional level. The protocol was based on one training session, and pre- and post-training fMRI examinations. During training, the subjects performed cognitive and locomotor tasks using P.I.G.R.O. (Pneumatic Interactive Gait Rehabilitation Orthosis), a custom-designed robotic lower-limb orthosis. During fMRI, the subjects performed motor imagery tasks and motor tasks with the aid of Bra.Di.P.O. (Brain Discovery Pneumatic Orthosis), a custom-designed MR-compatible robotic device for ankle movement.

Results: The behavioral results demonstrate that cognitive focalization on robotic gait training does affect motor performance. fMRI data analysis shows a post-training cortical reorganization into motor areas such as Supplementary Motor Area (SMA), precuneus and cerebellum.

Conclusions: The combination of robotic and motor imagery training can lead to an increase of activation in motor control areas. This finding can be taken as a support to define a rehabilitation protocol for brain injured patients with motor impairment.

POSTER 30

ABSTRACT 388

PRELIMINARY REPORT OF BALANCE EXERCISE BY USING A PERSONAL TRANSPORT ASSISTANCE ROBOT FOR PATIENTS WITH CENTRAL NERVOUS SYSTEM DISORDER

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Background and aim: The aim of this research was to examine the efficacy of balance exercise by using Personal Transport Assistance Robot (PTAR) for patients with balance disorder.

Method: This study was guided pre-post design without comparison group. 9 subjects which had gait disturbance as the result of central nervous system disorder (mean age 53±14 yrs, male/female=6/3, mean time after onset 36±27 months) were recruited for this study. 2 method of balance exercise (exercise against perturbation and exercise moving center of gravity) using a PTAR were devised. The exercises were performed 2 times a week and its term was 4 weeks. Main outcome measures were preferred gait speeds, tandem gait speeds, Functional Reach Test (FRT), Functional base of support (FBOS), center of pressure (COP), muscle strengths of

lower extremities, and grip strength. They were measured before and after exercise. After exercise, enjoyment of exercise was investigated with questionnaire using VAS.

Results: There were statistical significances for tandem gait speeds (p=.003), FRT (p=.012), FBOS (p=.008), lower extremity muscle strengths (p<.001-.034). On the other hand, there were no statistical significances of preferred gait speeds (p=.159), COP (p=.304-.316), and grip power (p=.584). In the result of investigate of enjoyment was suggested that this exercise was more enjoyable than traditional balance exercise for the patients.

Conclusion: From the results, it was suggested the trial for keeping standing posture on the moving surface provided by PTAR improved the balance ability of patients with various neurological deficit and the effect of the task used in this study should be examined as compared with the other interventions that has been adopted in conventional treatment strategies.

POSTER 31

ABSTRACT 505

RELATIONSHIPS BETWEEN OBJECTIVELY AND SUBJECTIVELY ASSESSED GAIT PERFORMANCE IN PERSONS WITH POST-POLIO SYNDROME

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Background and aim: A common impairment in persons with post-polio syndrome (PPS) is muscle weakness in the lower limb, which often impedes on the ability to walk in various environments. In a rehabilitation perspective, it is of interest to assess gait performance not only objectively, but also subjectively to be able to evaluate if the interventions have had any impact on the person's ability to perform daily activities. Several instruments are used to assess gait performance, but our knowledge of the relationship between them is limited. The aim of this study was to assess the relationship between objectively and subjectively assessed gait performance in persons with PPS.

Method: Sixty persons (29 men, 31 women, mean age 61 years) with clinically verified PPS were included in the study. Gait performance was objectively assessed using the: i) Timed "Up & Go" (TUG); ii) 10 metres Comfortable Gait Speed (CGS); iii) 10 metres Fast Gait Speed (FGS); and iv) 6-Minute Walk test (6MWT). These tests have previously been shown, in our research group, to be highly reliable in individuals with PPS. Self-perceived walking ability was evaluated using the Swedish version of the "Walking Impact Scale" (Walk-12). The participants rated on a five-point Likert scale (from not at all to extremely) their self-perceived limitations when walking and performing ambulatory movements, over the past two weeks.

Results: The Pearson correlation coefficient revealed that there were significant correlations between Walk-12 and all the objective gait performance tests (r= 0.52 to 0.67; p<0.001).

Conclusions: This study indicates that objectively measured gait performance is associated with subjectively assessed gait performance and that subjectively assessed gait performance, using the Walk-12, can be used to evaluate walking ability in persons with PPS.

POSTER 32

ABTSRACT 510

RELATIONSHIPS BETWEEN MUSCLE STRENGTH AND GAIT PERFORMANCE IN PERSONS WITH POST-POLIO SYNDROME

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Background and aim: A common impairment in persons with post-polio syndrome (PPS) is muscle weakness in the lower limb, which often impedes on the ability to walk in various environments. For the planning of appropriate rehabilitation interventions, we need thorough understanding of the relationships between lower limb muscle function and walking ability in persons with PPS. The aim of this study was to determine the relationship between lower limb muscle strength and gait performance in persons with PPS.

Method: Fifty-six community-dwelling ambulant individuals with clinically verified PPS were included in the study (27 men and 29 women; mean age 62 years). Isokinetic concentric knee extension and flexion strength was measured at 60°/s and ankle dorsiflexor strength at 30°/s. Gait performance was assessed with the i) Timed "Up & Go" (TUG); ii) 10 metres Comfortable Gait Speed (CGS); iii) 10 metres Fast Gait Speed (FGS); and iv) 6-Minute Walk test (6MWT).

Results: There was a significant correlation (p<0.01) between knee muscle strength and gait performance for both the less-affected and the more affected lower limb. Knee muscle strength explained 15% to 55% of the variance in gait performance. For the less affected lower limb there was a significant correlation between ankle dorsiflexor strength and gait performance (p<0.01; n=51), but for the more affected lower limb only for Fast Gait Speed (p<0.05; n=30).

Conclusions: Knee extensor and flexor muscle strength are strong predictors of walking ability in persons with PPS whereas ankle dorsiflexor muscle strength is a more moderate predictor.

POSTER 33

ABSTRACT 547

THE ENERGY CONSUMPTION AND THE DISPLACEMENT OF THE CENTER OF GRAVITY BETWEEN PRIMEWALK AND WPAL

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Background and Aims: We developed a new orthosis for gait reconstruction in paraplegic patients named "Primewalk" in 1998.

Primewalk is a knee-ankle-foot orthosis with a sliding hip joint whose virtual axis corresponds to the anatomical hip joint. Primewalk has a merit in compatiblity with wheelchair because all joints are located between the lower legs, but the energy consumption in Primewalk was still high. We have developed a new gait-assist robot named "Wearable Power-Assist Locomotor" (WPAL) since 2005. The objective of this study is to compare the energy consumption and the displacement of the center of gravity (COG) between Primewalk and WPAL.

Methods: The paraplegic patients who could walk with no or little assistance by using Primewalk and WPAL were recruited. The subjects walked with Primewalk in their comfortable speed, and the walking velocity with WPAL was set at the same speed. This study was approved by the Institutional Review Board and a written informed consent was obtained from all patients.

Study 1: The walking distance, duration, heart rate, rate of perceived exertion, and electromyography of upper extremities between Primewalk and WPAL were compared in 3 paraplegic patients.

Study 2: The colored markers were put on the bilateral acromions, great trochanters of the femur, lateral epicondyles of the femur and lateral malleoli in 4 paraplegic patients. The locus of the virtual COG was calculated from the loci of the colored markers by using 3D motion analyzer with CCD cameras at a rate of 60Hz.

Results: The heart rate, rate of perceived exertion, and integral of electromyography of upper extremities of WPAL were lower than those of Primewalk. Lateral displacement of COG with WPAL was significantly less than that with Primewalk.

Conclusions: Energy consumption and the displacement of the COG in WPAL were better than those in Primewalk.

POSTER 34

ABSTRACT 625

NORDIC WALKING TECHNIQUE ASSESSMENT USING INERTIAL SENSORS

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Background and Aims: Cardiovascular rehabilitation (CVR) is essential during recovery to prevent relapse or chronic conditions. While Nordic Walking (NW) is a recognised and efficient training technique for CVR, NW requires learning and continuous practice for effective and safe performance. For safety reasons patients perform NW typically under therapist supervision, however NW skills and mistakes are not systematically assessed outside laboratories. This work investigates the feasibility of a body-worn NW technique classification system to identify mistakes and patient's NW skills development.

Methods: Inertial motion sensors (Xsens MTx) were attached to hip, right pole, left tight, ankle, and shoe of eight healthy participants (four females; mean age=57.5±4.7years; body height=173±9.6cm, BMI=25.9±1.9). Participants followed regular NW training for 4±1.7years. For classification algorithm training, one participant performed regular NW (~20 minutes) and eight typical mistakes (~2 minutes) on a wide treadmill. For evaluation, all participants performed accustomed NW twice on an outdoor 150m gravel walkway. A NW expert performed mistake annotations.

Trunk, limb, and pole orientation angles were computed. Gait cycle (GC) segmentation was performed using the foot sensor sagittal angular velocity. Per GC, 16 NW parameters were derived and evaluated using a naïve Bayes classifier.

Results: A total of 1252 and 4764 GCs were recorded for training and evaluation datasets respectively. Average evaluation dataset timings were 1.05s (SD5.89ms) for toe off and 1.05s (SD9.78ms) for pole strike. Considering eight error types and correcting for class imbalances between training and evaluation, classification accuracy was 87.8%. Using sequential forward selection, 4 highest ranked NW parameters yielded peak classification accuracies: leg GC, pole angle at push off, knee angle at toe off, trunk angle at pole strike.

Conclusions: The NW technique can be automatically assessed outdoors using inertial sensors and could support therapists in patient CVR. Selecting more than 4 NW parameters did not further improve classification accuracy.

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POSTER 35

ABSTRACT 272

FUNCTIONAL ELECTRICAL STIMULATION AND VOLUNTARY CONTRACTION INDUCED BRAIN ACTIVATION BY FMRI

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Background and Aims: To observe brain activations by functional electrical stimulation, voluntary contraction, electrical stimulation combined with voluntary contraction.

Methods: Thirteen healthy young volunteers enrolled for this study. We performed typical block design which consists of three sessions: 1st session; voluntary only contraction, 2nd session: functional electrical stimulation (FES)–induced wrist extension movement, 3rd session: simultaneous voluntary and FES-induced movement. Functional magnetic resonance imaging (fMRI) was performed at 3.0T MR system to investigate intersession variability; group analysis was applied using one-way ANOVA after correction of false discovery rate (FDR, $p < 0.05$).

Results: In voluntary only contraction, brain activations were observed at contralateral primary motor cortex (MI), primary sensory cortex (SI), supplementary motor area (SMA) and ipsilateral cerebellum and bilateral secondary sensory cortex (SII). During FES-induced wrist extension, brain activations were observed at contralateral MI, SI, SMA, cingulate and ipsilateral cerebellum and bilateral thalamus, SII. During FES-induced movement combined with voluntary contraction, brain activations were found at contralateral MI, SI, SMA, ipsilateral cerebellum, cingulate, thalamus, bilateral SII. Brain activation areas (number of voxels) and activation extents (maximum t-score) of MI, SI, SMA, cerebellum were largest with voluntary only contraction and smallest with FES only contraction. FES combined with voluntary contraction showed larger brain activation areas and activation extents of MI, SI, SMA, cerebellum than FES only contraction.

Conclusions: These findings suggest that voluntary contraction combined with FES is more effective for brain activation than FES only movements for rehabilitation therapy.

POSTER 36

ABSTRACT 280

IMPAIRED PROPRIOCEPTIVE PERCEPTION AFTER STROKE: A FUNCTIONAL MRI STUDY

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Background: Proprioception may be affected following stroke with or without motor deficits. Proprioceptive deficits are associated with poorer functional recovery probably due to the essential role proprioception plays in motor control, particularly for movement precision of the upper limbs. We aimed to characterize patterns of brain activation in individual stroke survivors with proprioceptive impairment relative to healthy controls.

Method: One ambidextrous and two right-handed participants with first chronic stroke were recruited (46, 65, 45 years). Participants demonstrated proprioceptive deficits on the Wrist Position Sense Test. Exclusion criteria included visuospatial neglect, and increased tone above 1^+ on the Modified Ashworth Scale. Participants underwent quantitative behavioral testing and a functional MRI during an event-related proprioceptive experimental design. Each proprioceptive event of passive wrist movement (affected wrist) was followed by a motor response event of mirror copying or not copying the passive movement with the other wrist.

Results: Anatomical scans revealed that the common lesion site for stroke participants was the posterior thalamus. The main deviation in the brain activation patterns of stroke participants relative to healthy participants was reduced activation in the right supramarginal gyrus (SMG). Laterality index calculations showed that right SMG activation was most reduced for the stroke participants with the most sever proprioceptive impairment.

Conclusion: These case studies illustrated that both anatomical integrity of the posterior thalamus and functional activation of the right SMG are important for proprioceptive perception after chronic strokes. These findings are consistent with those we have found in healthy participants, in whom the right SMG was shown to have a key role in proprioceptive perception regardless of the stimulated hand. Our results support he importance of the right SMG role in spatial perception of body segments.

POSTER 37

ABSTRACT 312

MOTOR CORTEX EXCITABILITY FOLLOWING FINGER EXTENSION EXERCISE WITH VOLITIONALLY DRIVED ELECTRICAL STIMULATION AND TRANSCRANIAL DIRECT CURRENT STIMULATION

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Background and Aim: In our previous study, we proved that hand function improvement and disinhibition in the affected hemisphere could occur after finger extension exercise augmented with integrated volitional electrical stimulation (IVES) in chronic hemiparetic stroke patients. In this study, we hypothesized that the effect of IVES on motor cortex

excitability would be strengthened by simultaneous application of transcranial direct current stimulation (tDCS).

Method: Ten neurologically intact male volunteers (29.9 ± 2.6 years in age) were recruited and underwent four sessions of simulated therapeutic training on different days with randomized order, with at least 24 hours between each session. Three sessions consisted of 10-min right side finger extension exercise with IVES for right extensor digitorum communis (EDC) muscle, and two of them were with simultaneous 10-min anodal or cathodal tDCS over the left side motor cortex hand area. The fourth session consisted of anodal tDCS only. Motor cortex excitability was evaluated by motor evoked potential recorded at right EDC muscle with paired pulse transcranial magnetic stimulation before, immediately after, and 10 min after the interventions.

Result: No adverse response were observed or reported. No increment of inhibition could be found after exercise with IVES and cathodal tDCS. Significant disinhibition at ISI of 2 and 3 ms could be observed after anodal tDCS, IVES, and combined stimulations. The disinhibition at ISI of 3 ms was most obvious 10 min after combined anodal tDCS and IVES.

Conclusion: It is safe to combine IVES and anodal tDCS in healthy subjects. IVES could counteract the inhibition effect of cathodal tDCS. Combining IVES and anodal tDCS might involve more changes of synaptic property in motor cortex possibly not only during but also after stimulations, which could provide a potential therapeutic option for rehabilitation of paretic hand after stroke.

POSTER 38

ABSTRACT 316

INFLUENCE OF BMI ON NERVE CONDUCTION STUDY PARAMETERS OF THE UPPER AND LOWER LIMB NERVES

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Background and Aims: Nerve conduction study (NCS) assesses peripheral nerve functions and its parameters are known to vary with anthropometric measurements. This cross sectional normative study was done in Electro-diagnosis Lab II of the Department of Basic and Clinical Physiology. It was aimed to study the effect of BMI on NCS variables of the peripheral nerves of upper and lower limbs.

Methods: The study was done in 34 consenting healthy adults of either sex. The anthropometric factors, compound muscle action potential (CMAP), and sensory nerve action potential (SNAP) were recorded using standard technique. The relation of BMI with NCS variables was analyzed using Pearson's correlation test.

Results: After the adjustment of other anthropometric factors, BMI (21.8 ± 2.11 kg/m^2) showed a negative correlation with the CMAP duration of most of the motor nerves: right median ($r = -0.388$, $p < 0.005$), left median ($r = -0.342$, $p < 0.05$), left ulnar ($r = -0.375$, $p < 0.005$), left tibial and right common peroneal ($r = -0.347$, $p < 0.05$). The CMAP amplitudes of the right median ($r = -0.341$, $p < 0.05$), left median ($r = -0.456$, $p < 0.01$) and right common peroneal ($r = -0.361$, $p < 0.05$); CMAP latencies of bilateral ulnar, left radial and right common peroneal were also negatively correlated. However, a positive correlation was seen with the SNAP amplitude of the right sural ($r = 0.441$, $p < 0.01$) and a negative correlation with conduction velocity of left median sensory nerve ($r = -0.420$, $p < 0.05$). The SNAP duration, latency and CMAP F-waves latency did not show any correlation.

Conclusion: BMI showed a significant correlation with the NCS parameters of most of the motor and few sensory nerves. Diagnostic conclusions made from the nerve conduction data without corrections for the BMI may be invalid in patients who are at its extreme. This must be also considered while developing standard/reference normative data for different nerves.

POSTER 39

ABSTRACT 320

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION AFTER ACUTE ISCHEMIC STROKE: A CASE STUDY

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Background and Aim(s): Repetitive Transcranial Magnetic Stimulation (rTMS) can induce long-term changes in excitability of the cerebral cortex. Recent small trials suggest that rTMS in combination with functional exercises may generate an improvement in motor function in stroke patients. The aim of the present case study is to report on changes that occurred following high-frequency rTMS of the arm/hand in combination with functional exercises in a patient with an acute ischemic stroke.

Method: Case study design. A 56-year-old, right-handed female, suffering from a first-ever left hemispheric acute stroke. rTMS was administered to the affected primary motor cortex and combined with functional exercises of the arm/hand during 12 treatment sessions divided over four weeks. rTMS consisted of thirty 10-second trains of 5 Hz with 30 seconds in between. Primary outcome measure constituted the Action Research Arm Test (ARAT). Secondary outcome measures were Stroke Impact Scale 3.0 (SIS), Fugl-Meyer Assessment (FMA), Barthel Index (BI), Motricity Index (MI), Nine Hole Peg Test (NHPT), Modified Nottingham Sensory Assessment (mNSA), Modified Asworth Scale (MAS). The patient was assessed before, immediately following treatment period and four and eight weeks after the final treatment took place.

Result(s): Compared to the pre-treatment score, the ARAT score improved with eight points immediately after the final rTMS treatment. In addition, this clinically relevant improvement progressed to an improvement of eleven points in total during the next two rTMS intervention free months. Improvements were also reported on SIS (hand function-, ADL/IADL-, mobility-, emotion-, memory and thinking-, communication-, participation- and recovery-items), FMA, BI, MI and NHPT.

Conclusion(s): This case-report showed that a change occurred in the function of the arm and hand in an acute stroke patient following rTMS, applied to the affected primary motor cortex, combined with functional exercises.

POSTER 41

ABSTRACT 362

NEURAL SUBSTRATE RESPONSIBLE FOR CROSSED APHASIA

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Background and Purpose: Crossed aphasia (CA) refers to language impairment secondary to right hemisphere lesion in dextrals. Previously, studies on symptoms, linguistic features and characteristic of CA have been published in many case reviews and articles, but imaging analysis on the lesion location of CA has not yet been reported in the literature. The objective is to analyze the brain magnetic resonance imaging (MRI) to find out the most commonly involved areas in crossed aphasia.

Method: Seven first ever stroke patients satisfying the criteria for CA underwent brain MRI during acute phase from which T1 and FLAIR views were spatially normalized using SPM 8. We used MRIcro to draw the lesion and define the regions of interest (ROIs) from FLAIR images, before overlaying the images to visualize the most overlapped area. Talairach coordinates for centre of the most overlapped areas and regions within 5 mm of it were recorded then converted to corresponding anatomical regions.

Results: The overlaid ROIs of 7 patients revealed the commonly involved areas as following: ROIs of 6 patients images overlapped at lentiform nucleus and putamen, 5 patients' images overlapped at limbic lobe, the parahippocampal gyrus and claustrum, 4 patients' images overlapped at frontal lobe and precentral gyrus and 3 patients' images overlapped at middle frontal gyrus and Brodmann area 6. The lentiform nucleus and putamen are observed as the most frequently involved areas in CA patients.

Conclusion: This is the first to demonstrate the areas involved in crossed aphasia by lesion mapping using brain MRI. Lentiform nucleus seems to be the most commonly involved region in crossed aphasia. More studies with larger number of cases and use of PET or functional MRI would further enhance our knowledge in the future.

POSTER 42

ABSTRACT 389

INCORPORATING SENSORY AWARENESS TRAINING IN NEURO-REHABILITATION

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Background and Aims: The role of sensory awareness in movement control is receiving increasing interest in clinical literature. Whilst the role of sensation in feedforward and feedback control is clear, how to improve the online and offline processing is not as clear. We have previously investigated individual forms of sensory training (passive and active) in clinical settings. This current study determined the feasibility and effect of a new group sensory awareness training paradigm on dexterity in healthy adults.

Methods: Randomised controlled trial. Twenty-nine healthy university students were randomly allocated to one of three groups: single group awareness lesson on the dominant hand, same awareness lesson on the non-dominant hand and a control group (relaxation session). Pre and post intervention dexterity measures included the Purdue pegboard, a grip/lift manipulandum, and perceived changes were investigated using a questionnaire.

Results: The awareness lesson on the dominant hand produced a significant improvement in dexterity compared to the control ($p = 0.013$) for both the pegboard tests and for maximum grip with the manipulandum. This represents a clinically useful effect in the speed and efficiency of fine hand control. A change in perceived body image was also reported in the intervention compared to control groups. The data failed to reach significance for the non-dominant hand compared to the control group, or between the non-dominant hand versus dominant hand groups.

Conclusions: Neuro-rehabilitation can be dominated by practice of motor outputs. We have shown that practicing sensory awareness (input) only, using a group paradigm is feasible and a single session can objectively improve dexterity in the dominant hand of healthy adults. This warrants further investigation in clinical settings and in light of our previous clinical findings with more intensive individual input.

POSTER 43

ABSTRACT 413

IS THIS NEUROPLASTICITY AT WORK? FIVE CASE STUDIES FROM A COMMUNITY-BASED REHABILITATION PROGRAMME

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Objective/Background: Brightwater Oats Street Rehabilitation Facility provides residential and community living rehabilitation for clients aged between 18 and 65 years with an acquired brain injury (ABI). Despite the wide variations in levels of disability and care needs, the Service Model promotes consistency in service delivery to improve the quality of life and day to day functioning of people with an ABI. Elements of the Service Model include graduated and structured purposeful activities; a cognitive therapy emphasis; adult learning principles; is community based and client goal directed. Neuroplasticity is the relatively new concept which disputes the older and more commonly held theory of "hard wiring" of the brain that was thought to begin in adults and hinder brain rehabilitation.

Method: A retrospective study of case notes was used to illustrate function and to calculate care hours on admission, on discharge and at current status for five clients with ABIs. The Oats St Service Model will be described and related to the concept of neuroplasticity.

Results: The five client case studies highlighted the diversity of the consequences of brain injury and how with specific rehabilitation, functioning in their daily lives was improved. Changes in care hour requirements per week ranged from 84 hours on admission to 0 and from 168 hours on admission to 7.

Conclusion: The five case studies established how the Oats Street Service Model works to increase daily functioning and decrease care hours for clients undertaking the rehabilitation programme at Oats Street. The synthesis of the service model components creates a unique rehabilitation programme which could be illustrative of neuroplasticity at work.

POSTER 44

ABSTRACT 444

THE DIFFERENT CONTRIBUTION OF PREMOTOR CORTEX IN BOTH HEMISPHERES TO CONTROLLING RESPONSE INHIBITION

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Background and Aim: Response inhibition is an ability to inhibit motor response that is inappropriate for a current motor context. Previous neuroimaging studies have showed that premotor cortex (PMC) plays a crucial role in the response inhibition and the PMC generally has a lateralized function, such that the left PMC is involved in selecting a movement in unimanual actions, on the other hand, right PMC involved in controlling

bimanual coordination. However, the functional lateralization of PMC on response inhibition is still unclear. We hypothesized that the left PMC controls response inhibition in either hand, whereas right PMC involves controlling response inhibition in both hands. The aim of present study is to investigate the role of PMC in both hemispheres to controlling response inhibition.

Method: A patient with left PMC damage (47 years, female), a patient with right PMC damage (32 years, female) and 15 age-, sex-, and handedness-matched control subjects (37 ± 10 years, females) participated in this study. We measured the ability of response inhibition in each hand by using the stimulus-response compatibility task (SRCT). SRCT can detect the ability of response inhibition by using reaction time paradigm. We investigated the role of PMC in both hemispheres on response inhibition by comparing the ability of left or right PMC damaged patients to that of control subjects.

Results: The results showed that the patient with left PMC damage had a lot of difficulty in inhibiting the right hand response, whereas the patient with right PMC damage had difficulty with the both hands. This suggests that left PMC is involved in controlling response inhibition of contralateral hand, whereas the right PMC plays an important role in controlling response inhibition of both hands.

Conclusion: In conclusion, the left PMC is involved in controlling response inhibition of contralateral hand, whereas the right PMC plays an important role in controlling response inhibition of both hands.

POSTER 45

ABSTRACT 484

FACILITATION OF CORTICOSPINAL EXCITABILITY OF VIRTUAL REALITY EXERCISE FOLLOWING ANODAL TDCS

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Objectives: As a preliminary study, we tested whether increased corticospinal excitability would be sustained after virtual reality (VR) wrist exercise following tDCS in healthy volunteer.

Methods: The participants consisted of 15 right handed healthy subjects. Transcranial Magnetic Stimulation (TMS) was applied at the nondominant (Rt) motor cortex and motor evoked potentials (MEPs) in the Lt extensor carpi radialis were provided as a measure of corticospinal excitability. Four different conditions were provided in random order on the separate day: 1) voluntary wrist exercise program (15min), 2) VR wrist exercise program (15min), 3) VR wrist exercise program (15min) following anodal tDCS (2 mA, 20 min), and 4) anodal tDCS without exercise. Mean MEP amplitudes were obtained in rest, immediately after tDCS, during exercise, immediately after exercise, 10 min after exercise and 20 min after exercise. Task speed and distance were recorded during exercise.

Results: There was immediate and sustained increase of percentage MEP (% amplitude at rest) amplitude in four conditions. However, the increment of MEP amplitude after tDCS-VR exercise was greater than other three conditions: 1) 130 ± 12%, 2) 138 ± 22%, 3) 151 ± 2%, 4) 130 ± 12%, $p < 0.001$. Furthermore, increment of amplitude of VR wrist exercise following anodal tDCS was sustained for 20 min after exercise compared to anodal tDCS without exercise condition (interaction effect: $p = 0.001$). There were no significant differences of task speed and distance between three exercise conditions.

Conclusion: The corticospinal facilitation effects of anodal tDCS and VR exercise were greater than exercise without tDCS and tDCS without exercise. Furthermore, these synergistic facilitations were sustained after exercise compared to anodal tDCS without exercise. The facilitation effects of VR motor training after tDCS indicate that a motor learning and retraining program can co-exist with tDCS-induced changes in corticospinal excitability, and support the concept of combining brain stimulation with VR motor training to promote recovery after stroke.

POSTER 46

ABSTRACT 1

USE OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH TO DESCRIBE PATIENT-REPORTED DISABILITY: COMPARING MOTOR NEURON DISEASE, GUILLAIN-BARRÉ SYNDROME AND MULTIPLE SCLEROSIS IN AN AUSTRALIAN COHORT

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Background and Aim: Motor neuron disease (MND), Guillain-Barré syndrome (GBS) and multiple sclerosis (MS) are long-term neurological conditions which have a significant impact on disability and quality of life. This study aims to compare patient-reported disability across the conditions using the International Classification of Functioning, Disability and Health (ICF).

Methods: A prospective cross-sectional survey of persons with MND (n = 44). Their MND-related problems were linked with ICF categories (second level) using open-ended questionnaires and 'linkage rules' and compared to similar data collected for GBS (n = 77) and MS (n = 101) participants.

Results: MND participants were older (mean age 61 years, GBS 55, MS 49) with a higher proportion of males (66%, GBS 59%, MS 29%). Seventy ICF categories in MND were identified (GBS 41, MS 63) in the domains of "body function" 15 (GBS 7; MS 18); "body structure" 5 (GBS 3, MS 5); "activities and participation" 40 (GBS 25, MS 30); "environmental factors" 10 (GBS 6, MS 10). The main areas linked in "activities and participation" were mobility, self care, general tasks and demands, domestic life, interpersonal interactions and relationships, major life areas and community, social and civic life; environmental factors included products and technology, natural environment, support and relationships, services, systems and policies.

Conclusions: The ICF appears adequate to describe patient-reported disability in MND, a condition with significant palliative care needs. It can also be used to compare three long-term neurological conditions, which will assist with development of a core set of categories to optimise consensus of care and communication amongst treating clinicians.

POSTER 47

ABSTRACT 2

USE OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH: COMPARING THE IMPACT OF MOTOR NEURON DISEASE ON PATIENTS AND THEIR CAREGIVERS

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Background and Aims: Motor neuron disease (MND) is an incurable, progressive and fatal neurodegenerative disease that places considerable burden upon patients and caregivers. This study aims to compare patient- and caregiver-reported disability in MND using the International Classification of Functioning, Disability and Health (ICF); and to describe the impact of MND on caregivers.

Methods: A prospective cross-sectional survey of MND patients (n = 44) and caregivers (n = 37). Their MND-related problems were linked with ICF categories (second level) using open-ended questionnaires and 'linkage rules'. Standardized assessments measured caregiver depression, anxiety and stress; caregiver strain and burden; caregiver quality of life; and caregiver coping strategies.

Results: MND patients were older (mean age 61, caregivers 57) with proportionally more males (66%, caregivers 27%). Most caregivers were spouses/partners (89%). MND patients identified 70 ICF categories and caregivers 8, in the following domains: *body function* 15 (caregivers 0); *body structure* 5 (caregivers 0); *activities and participation* 40 (caregivers 6); *environmental factors* 10 (caregivers 2). Main *activities and participation* linked were general tasks and demands, mobility, self-care, community, social and civic life. *Environmental factors* included support and relationships, services, systems and policies. Caregiver depression, anxiety and stress and burden were significant, but self-reported quality of life was good, possibly related to caregiver use of problem-focused coping strategies.

Conclusions: The ICF adequately incorporates perspectives of MND patients and caregivers, which may enable development of a 'core set' to optimise care. Interventions are necessary to reduce caregiver burden to improve outcomes for MND caregivers and patients.

POSTER 48

ABSTRACT 57

THE NEEDS AND PROVISIONS COMPLEXITY SCALE (NPCS): FACTOR STRUCTURE AND REPEATABILITY

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Background and Aims: The Needs and Provision Complexity Scale (NPCS) is a brief ordinal measure designed to evaluate an individual's needs for community care and rehabilitation and to assess provision against these needs. 'Needs' are normally rated by professionals. 'Provision' is rated by patients (and/or family/carer), based on services they have received in a given period. In this preliminary psychometric evaluation, we examine its factor structure and the repeatability of self-report assessment in a UK cohort of patients with complex neurological disability.

Methods: The 16-item NPCS comprises six subscales: healthcare, personal care, rehabilitation, social/family support, equipment and accommodation. Clinicians in nine specialist neurorehabilitation units in London rated a total of 423 inpatients shortly before discharge to the community. The internal structure and reliability of the NPCS was examined using principal components analysis and Cronbach's α. Four-weeks post-discharge, test-retest reliability of self-report assessment was tested in sub-sample of 45 patients, who completed the NPCS on two occasions approximately one week apart.

Results: The NPCS was easily understood and completed by both clinicians and patients. The first two components accounted for 66% of total variance. A scree test indicated 2 factors, reflecting respectively the needs for 'Health and Personal Care' and 'Social and Family Support', although 'equipment' and 'accommodation' loaded high on both. Full scale reliability was excellent with Cronbach's $\alpha = 0.94$. Test-retest reliability for self-report was encouraging with ICCs for the six subscales ranging from 0.61-0.85. Item-by-item agreement, rated by quadratic-weighted Cohen's kappa interpreted according to Landis & Koch, ranged from 0.60 (moderate) to 0.82 (excellent).

Conclusions: The NPCS is a promising measure of health and social care services with a clear two factor structure, good internal consistency and acceptable test-retest reliability. Further exploration is now warranted to evaluate its potential to describe gaps in service provision.

POSTER 49

ABSTRACT 131

THE NEEDS AND PROVISIONS COMPLEXITY SCALE: MEASURING MET AND UNMET NEEDS IN THE COMMUNITY FOR PATIENTS WITH COMPLEX NEUROLOGICAL DISABILITIES

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Background and Aims: The Needs and Provisions Complexity Scale (NPCS) is a brief ordinal measure designed to evaluate an individual's needs for community care and rehabilitation and to assess provision against these needs. The 16-item NPCS comprises two principal domains, each with three subscales: *Health/Care* (healthcare; personal care; and rehabilitation), and *Social Support* (social/family support; equipment; and accommodation). 'Needs' are normally rated by health professionals. 'Provision' is rated by patients (and/or family/carer), based on services received in a given period.

Methods: In a multi-centre study, clinicians in nine specialist neurorehabilitation units in London rated needs for community services using the NPCS for 423 inpatients, shortly before discharge to the community. 212 (50%) patients returned the NPCS by post at 6 months post-discharge. Differences between clinician-rated needs at discharge and patient/carer reports of services received after 6 months in the community were examined using the Wilcoxon Signed Rank Test.

Results: Domain scores were significantly different for both *Health/Care* ($Z = -4.79$, $p < .00$, Effect size = 0.24) and *Social Support* ($Z = -5.56$, $p < .00$, Effect size = 0.28), suggesting a significant level of unmet need in both health and social services. Item-by-item analysis revealed significant differences between 'needs' and 'provision' of services for Rehabilitation ($Z = -8.36$, $p < .00$, Effect size = 0.41), Social/Family Support ($Z = -5.60$, $p < .00$, Effect size = 0.28), and Equipment ($Z = -5.21$, $p < .00$, Effect size = 0.26). No significant differences were seen for Healthcare ($Z = -0.28$, $p = 0.78$), Personal care ($Z = -0.05$, $p = 0.96$), and Accommodation ($Z = -0.52$, $p = .60$).

Conclusions: The NPCS is a brief, practical tool designed to evaluate a person's needs for medical, rehabilitation and social services and also the extent to which services meet these needs. In this sample of patients with complex neurological disability it demonstrated significant gaps between needs and service provision, especially with respect to ongoing community rehabilitation, equipment and social support. By contrast, needs for medical, nursing and personal care were relatively well met.

POSTER 50

ABSTRACT 313

FUNCTIONING OF WORKERS WITH PARKINSON'S DISEASE: AN OBSERVATIONAL STUDY TO DEFINE A TAILORED ICF CHECKLIST

Giovannetti A, Cerniauskaite M, Koutsogeorgou E, Meucci P, Pagani M, Quintas R, Sattin D, Covelli V, Schiavolin S, Raggi A, Leonardi M

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Background and Aim: Parkinson's disease (PD) has a prevalence of 108-257/100,000 in Europe, with an estimated cost of 7577 € per person/year. High social impact and burden of the PD increase the importance of defining social and medical factors that allow people with PD to continue to work longer. Aim of this study was to develop a tailored checklist, to describe functioning profile of people with PD in working settings.

Method: Working PD patients were enrolled in a longitudinal study, with a follow-up at 6 months. The International Classification of Functioning Disability and Health (ICF) checklist was used to collect data in both time-points. ICF categories reported as problems in at least 20% of the sample were selected. They were compared with the 89 items of ICF-based checklist developed for the labour sector: common categories were included in a tailored checklist of PD workers.

Results: Twenty patients with Parkinson's disease were enrolled, and 14 completed the follow up. A total of 71 ICF categories were identified as problems by 20% of the sample: 26 categories from body functions, one category from body structures, 31 categories from activity and participation and 13 from environmental factors. An ICF-based checklist of 64 items tailored for workers with PD was developed: 21 categories from body functions, one category from body structures, 29 from activity and participation and 13 from environmental factors.

Conclusion: This tailored ICF-checklist could be useful to improve communication among health and social workers. Moreover it allows a more accurate and standardized assessment of patients with PD by reducing interviewer bias.

POSTER 51

ABSTRACT 314

USE OF ICF CATEGORIES IN PATIENTS WITH MYASTHENIA GRAVIS, MIGRAINE AND PARKINSON'S DISEASE: SIMILARITIES AND DIFFERENCES

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Background and Aims: The International Classification of Functioning, Disability and Health (ICF) is intended to describe functioning both at individual and population levels, making it possible to determine similarities and differences and, therefore, to plan person-based interventions and policy actions. Aim of this study is to report on similarities and differences in a sample of patients with Myasthenia Gravis (MG), Migraine and Parkinson's disease (PD).

Material and Method: Patients were consecutively enrolled from clinical samples, and ICF checklist was applied to identify relevant ICF categories, used in at least 30% of patients. Data were recoded in a dichotomous way to detect the presence/absence of problems. Cross-tabulation with Contingency Coefficient were used to report when ICF categories were specific to one or two diseases or when was common to the three diseases.

Result: 300 patients—102 with MG, 102 with Migraine, 96 with PD—were enrolled. 43 ICF categories were selected. Among Body Functions and Structures, some categories described disease-specific issues, such as pain in Migraine, immunological system impairment in MG and involuntary movements in PD. Similar results were achieved among Activities and Participation: problems with remunerative employment were specific to Migraine patients, drinking to MG and dressing to PD patients. Among Environmental Factors, majority of categories were commonly used, essentially as facilitators, in all the three conditions.

Conclusion: Results showed that it is possible to detect differences, mainly at the level of Body Functions and Structures and of Activities and Participation, thus supporting ICF's utility in planning person-centered interventions. They also show that it is possible to detect similarities, mainly in Environmental Factor, supporting ICF's utility for health and social policy actions.

POSTER 52

ABSTRACT 315

DESCRIBING FUNCTIONING OF STROKE PATIENTS WITH ICF

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Background and Aims: Stroke remains a major health issue that will increase in the future, despite the improvements in prevention and acute management of patients. This cross-sectional study aimed to demonstrate that stroke diagnosis alone does not explain variety in patients' functioning and disability and that ICF biopsychosocial model is essential to complement diagnostic information.

Material and Method: 111 adult patients with stroke were enrolled for this study conducted by Foundation IRCCS Neurological Institute Carlo Besta of Milan. Patients with psychiatric disorders and/or severe cognitive impairments were excluded. The ICF Brief Core Set for stroke was used to create patients' functioning profiles.

Result: Most frequently reported problems in Body Functions were in memory, muscle power and attention functions. In the Activity and Participation domain the main difficulties were in walking, speaking and understanding. Principal differences between capacity and performance qualifiers, representing the impact of environment on activities and participation, were found in self-care (washing oneself and dressing). The immediate family and health professionals are the main Environmental facilitators for our patients.

Conclusion: Functioning and disability after stroke are strictly related not only to disease but also to the presence or absence of environmental facilitators that increase persons' performance and social participation. ICF Classification, specifically the ICF Brief Core Set for stroke, helps to record accurately the main problematic areas in functioning and in the categories of the activity and participation domain of people after stroke.

ICF Classification derived instruments can be used as a preliminary data collection method to better define functioning and to plan interventions and organize services for patients after stroke.

POSTER 53
ABSTRACT 342

MOTOR TRAINING PROGRAMS OF ARM AND HAND ACCORDING TO DIFFERENT LEVELS OF THE ICF IN PATIENTS WITH MS: A SYSTEMATIC REVIEW

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Background: The upper extremity plays an important role in daily functioning of MS patients and may influence their quality of life. However, there is a lack of explicit overview of arm-hand training programs.

Objective: To investigate the training components and the outcome of motor training programs of arm and hand in MS.

Methods: A computerized systematic literature search in 5 databases (PubMed, CINAHL, EMBASE, PEDro and Cochrane) was performed using the following Mesh terms: Multiple Sclerosis, Rehabilitation, Physical Education and Training, Exercise, Patient-Centered Care, Upper Extremity, Activities of Daily Living, Motor Skills, Motor Activity, Intervention Studies and Clinical Trial. The methodological quality of the selected articles was scored with the Van Tulder Checklist. A descriptive analyses was performed using the PICO principle including scoring of training components with calculation of effect sizes.

Results: 11 studies were eligible (mean Van Tulder-score = 10.82(SD2.96)). Three studies displayed training at ICF function level; 4 at ICF activity level and 3 at function and activity level. Most studies reported improvements in arm-hand functioning at the level that was trained for. The mean number of training components was 5.5(SD2.8)). The components 'client-centered' and 'functional' were most frequently used, whereas 'distribution based practice', 'feedback' and 'random practice' were never used.

Conclusion: Motor training programs (both at the ICF function and activity level) have shown to improve arm and hand functioning in MS. Based on effect size analysis, a need was identified to develop a client-centred task-oriented training explicitly integrating training components supporting motor learning and training physiology.

POSTER 54
ABSTRACT 13

REHABILITATION FOR PARKINSON'S DISEASE: ANALYSIS OF THE AUSTRALIAN REHABILITATION OUTCOME DATASET

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Background and Aim: Parkinson's disease (PD) is a progressive and disabling degenerative disorder, placing a substantial burden upon patients and their caregivers. This study aims to examine the outcome of inpatient rehabilitation for PD, using the Australasian Rehabilitation Outcomes Center (AROC) database.

Methods: De-identified data from the AROC database was analyzed for all rehabilitation admissions during 2003-2008, using four classes for the functional level. The outcomes included: Functional Independence Measure (FIM) scores, FIM efficiency, hospital length of stay (LOS), and discharge destination.

Results: Of 3351 case episodes, 59% were male, mean age 75 years, 90% were discharged to the community and 59% (n = 1956) were in the lowest functional classes (217, 218 and 219). The majority of PD patients were treated in the private hospital system (74.6 versus 25.4%), and had a slightly shorter LOS compared with those treated in public facilities (16.3 versus 22.8 days, mean difference –6.5 days, 95% CI –7.3 to 5.6, $p < 0.001$). The FIM for all classes (216-219) showed significant functional improvement during the admission ($p < 0.001$). As expected those in the most functionally impaired classes showed most change (FIM change: 14.8 in class 217, 15.6 in class 218, 14.3 in class 219). FIM efficiency was highest in classes 217 and 218. The year-to-year trend was towards reducing hospital LOS; however, this was not significant ($p = 0.305$).

Conclusion: The AROC dataset is a valuable resource and research tool for describing rehabilitation outcomes. However, more specific information needs to be collected alongside the core AROC data, to allow a more meaningful evaluation of outcomes for PD rehabilitation.

POSTER 55
ABSTRACT 18

PHYSIOTHERAPEUTIC INTERVENTION ON PEOPLE WITH PARKINSON'S DISEASE, USING MANUAL THERAPEUTIC RESOURCES, AIMING TO IMPROVE NONMOTOR SYMPTOMS

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Introduction: With aging, there are morphological, functional and biopsychosocial changes. Alongside these changes, and the normal loss, the body becomes increasingly vulnerable to changes in health and may present some chronic diseases, like Parkinson's disease.

Aim: To analyze the effects of intervention through manual therapeutic resources in individuals with Parkinson's disease (PD) in relation to quality of life, insomnia, and functional characteristics of gut.

Material and Methods: A comparative study was performed between two groups (control group and intervention group) of PD patients with five participants in each group (age range 62.1 ± 7.37 years old) in stages II and III according to the Hoehn and Yahr Scale (time of lesion 10.6 ± 2.79 years). The program was carried out with a weekly therapy of classic Western massage of 50 min, totaling 15 sessions. We chose a clinical-qualitative approach, using as a data collection procedure an initial assessment and final one by SF36 and an evaluation of massage therapy in which the gut and sleep quality were assessed.

Results: We performed statistical analysis using the test of dual-factor ANOVA followed by post-hoc test Least Square Difference (LSD) and factorial ANOVA. With this study we were able to compare how the care protocol with the classic Western massage used by the researchers managed to obtain an improvement in sleep maintenance increasing time and decreasing the same disturbances. Regarding the constipation there

was an improvement over the performance of forces to evacuate and type of faeces. However these improvements were not statistically significant considering representation ($p > 0.05$).

Conclusion: We believe that the use of alternative methods associated with conventional physical therapy can help with overall relaxation and well-being especially of the autonomic nervous system manifestations of this pathology.

POSTER 56

ABSTRACT 63

DOES IN-PATIENT NEUROREHABILITATION LIVE UP TO THE EXPECTATIONS OF PATIENTS WITH PARKINSON'S DISEASE?

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Background: There are guidelines for the medical and non-medical treatment of patients with Parkinson's Disease (PD) (e.g. NICE, 2006, KNGF, 2006; www.wfneurology.org, 2011). However, it is not clear if and how personal wishes and expectations of clients with PD are reflected in such guidelines.

Aims: To find the relative importance of various aspects of in-patient neurorehabilitation and to shed light on their levels of fulfillment for clients with PD.

Methods: Questionnaires about expectations concerning 10 aspects of neurorehabilitation were sent to 136 patients with the ICD-10-diagnosis G20, PD who were treated between 01/2009 and 12/2010 at the clinic. These were analysed in terms of degree of importance and fulfillment. Rate of return 49.3%; of these: 70% male, 30% female, 58% under the age of 70, 39% aged 71 and above, 3% no answer.

Results: In chronological order of importance (i.e. % of clients rating with "very important"): "Illness-related patient-centered talks" 85%; "Fine-tuning of medical treatment" 78%; "Physiotherapy" 75%; "Parkinson discussion group" 57%, "Speech and language therapy" 53%, "Occupational therapy" 52%, "Supply of auxiliary aids" 50%, "Advice on auxiliary aids" 43%, "Recreational therapy" 37%. In addition, gender specific differences are found: "Fine-tuning of medical treatment" is "very important" for 82% males and 69% females. "Recreational therapy" is "very important" for 43% males and 20% females, "Advice on auxiliary aids" is of "little importance" for 9% males and 33% females. Age specific differences are noted in "Fine-tuning of medical treatment" and the aspects concerning "Auxiliary aids" which in general are considered more important by the older client group.

Conclusions: Highest priority is given to "Client-centered talks" in neurorehabilitation. Regardless of gender or age PD patients have a great need to talk about all aspects of their illness with the multidisciplinary team.

POSTER 57

ABSTRACT 22

COGNITIVE-BEHAVIORAL CLASSIFICATIONS OF CHRONIC PAIN IN PERSONS WITH MULTIPLE SCLEROSIS

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Background and Aim: Pain can be a significant problem for a substantial proportion of persons with Multiple Sclerosis (MS). The aim of this study was to replicate the three cluster cognitive-behavioral classification proposed by Turk and Rudy in patients with MS.

Methods: Sixty-two patients attending a tertiary MS rehabilitation centre completed the Pain Impact Rating (PIR) questionnaire measuring activity interference, pain intensity, social support and emotional distress. The General Health Questionnaire-28 (GHQ28) and Multiple Sclerosis Impact Scale-29 (MSIS29) assessed disability and restriction in participation.

Results: Pain intensity scores ranged from 1 to 9 (1 = mild, 10 = unbearable), with a median of 3.0 and mean of 3.6. The most affected activities due to pain were limitation with exercise, sleep, housework and socializing domains. The majority of respondents (85.5%) reported little or no interference with work activities. Cluster analysis classified patients into three cognitive-behavioral groups (40.4% 'adaptive copers', 36.5% 'dysfunctional' and 23.1% 'interpersonally distressed'). Patients in groups with higher levels of activity interference, emotional distress due to pain and lower perceived levels of social support had significantly higher levels of depression on the GHQ28 ($p < 0.003$) and reported a greater impact on their physical and psychological functioning on MSIS29 subscales ($p < 0.001$). Possible cut points were identified to aid clinicians in classifying patients into clusters for individualized treatment.

Conclusion: More research is needed to improve the understanding of pain and the potential use of cognitive-behavioral clusters in patients with MS. These may be useful in the development of tailored early intervention which may reduce pain related disability and contribute to patient's overall well-being.

POSTER 58

ABSTRACT 120

TREATMENT OF ARTICULATORY DYSFUNCTION IN PARKINSON'S DISEASE USING REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION

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Background and Aims: Neuroimaging has demonstrated that improved speech outcomes in Parkinson's Disease (PD) subsequent to behavioural treatment approaches is associated with increased activity in the motor and premotor cortex. High frequency repetitive transcranial magnetic stimulation (rTMS) is capable of modulating cortical activity and has been reported to have significant benefit to general motor function in PD. It is possible that high frequency rTMS may also have beneficial outcomes on speech production in PD. This research aimed to measure speech outcomes up to 12 months post stimulation.

Methods: High frequency (5 Hz) rTMS was applied to 10 active stimulation and 10 sham placebo patients for 10 min. per day (3000 pulses), for 10 days and speech outcome measures and lingual kinematic parameters recorded at baseline and 1 week, 2 months and 12 months post-stimulation.

Results: The findings demonstrated positive treatment-related changes observed in the active rTMS group when compared to the sham placebo control group at 2 months and 12 months post-stimulation in speech intelligibility, communication efficiency ratio, maximum velocity of tongue movements and distance of tongue movements.

Conclusion: The results support the use of high frequency rTMS as a therapeutic tool for the treatment of articulatory dysfunction in PD.

POSTER 59

ABSTRACT 132

THE ASSOCIATION BETWEEN SPINAL POSTURE AND TURNING IN PEOPLE WITH PARKINSON'S DISEASE (DWD)

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Background: People with Parkinson's disease (PwPD) have an adapted posture; the thoracic is held in an increased flexion position and the overall posture projected increasingly forward. In addition, PwPD experience difficulties when turning; turning among this population is a frequent cause of falls and fall-related injuries. The aim of this study was to examine the relation between spinal adaptation and turning difficulties in PwPD.

Methods: We recruited 37 PwPD, 20 males and 17 females with a mean (SD) age of 69 (8) years. Mean (SD) time with PD was 6 (4) years and their mean (SD) motor score on the Unified Parkinson's Disease Rating Scale was 17 (5) points. Spinal posture was evaluated with a reliable and validated hand-held device; the SpinalMouse. Turning was assessed clinically using the Standing Start 180 degrees turn test (SS180). We calculated Spearman rho correlation coefficients between variables of spinal posture (thoracic kyphosis and spinal inclination when standing upright and spinal inclination when extending backwards) and the SS180 (number of steps when turning, time to turn and quality of turning).

Results: Degree of thoracic kyphosis in standing did not correlate significantly with any of the SS180 parameters (correlation coefficients varied from –0.18 to 0.15). A more forward inclined spinal posture when standing upright was significantly correlated with taking more steps to turn and taking more time to turn with coefficients ranging from 0.35 to 0.43. A less backward inclined spinal posture when extending backward was significantly correlated with taking more steps to turn, taking more time to turn, and less quality of the turn; values ranging from –0.33 to 0.37.

Conclusion: Our findings suggest that spinal inclination is related to turning difficulties in PwPD. These results warrant further investigation and potential implementation in the clinical setting when dealing with PwPD who experience turning difficulties.

POSTER 60

ABSTRACT 238

A SYSTEMATIC REVIEW OF PARTICIPANT CHARACTERISTICS, INTERVENTION DELIVERY, RETENTION RATES, ADHERENCE AND ADVERSE EVENTS IN CLINICAL TRIALS OF EXERCISE AND MOTOR TRAINING IN PEOPLE WITH PARKINSON'S DISEASE

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Background and Aims: Research evidence demonstrates that exercise and motor training are beneficial for people with Parkinson's disease (PD). Implementing research protocols into clinical practice however, can be difficult. The aim of this systematic review was to examine the reporting of trials of exercise and/or motor training for people with PD in order to provide information to assist in the translation of this research into clinical practice.

Methods: Seven electronic databases were systematically searched for randomised controlled trials for people with PD where at least one intervention was exercise and/or motor training. Information regarding the disease severity and cognitive status of included participants, the duration, supervision, delivery and location of the interventions along with rates of retention, adherence and adverse events were collected.

Results: Fifty-three trials with 90 interventions were included. Seventy-five percent of trials only included participants with mild to moderate PD and 81% stipulated that participants had to have reasonable cognition. Interventions were implemented for an average of 8.3 (SD 4.2) weeks. Most interventions were fully supervised (74%) and conducted at a facility (79%). Retention rates were high with 69% of interventions retaining ≥85% of their participants, however adherence was infrequently reported, and adverse events were reported to be monitored in only 28% of trials.

Conclusions: Most of the interventions tested in these trials were labour-intensive, and adherence and adverse events were sparsely reported. These factors coupled with the tendency to include only cognitively intact participants with mild to moderate disease are likely to pose difficulties for therapists attempting to translate research into sustainable clinical practice for people with PD.

POSTER 61

ABSTRACT 251

MINIMALLY-SUPERVISED TREADMILL TRAINING FOR INDIVIDUALS WITH PARKINSON'S DISEASE: A RANDOMIZED CONTROLLED TRIAL

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Background and Aims: Studies of the effectiveness of treadmill training in treating gait disturbance in people with Parkinson's disease have produced promising results. However, research to date has been conducted in a hospital or research facility with treadmill training fully supervised. The aim of this study was to investigate the feasibility and effectiveness of minimally-supervised, home-based treadmill training in people with mild Parkinson's disease.

Methods: A pilot randomized controlled trial of a six-week intervention followed by a further six weeks follow-up was undertaken. Twenty (11 male, 9 female) cognitively intact participants with mild Parkinson's disease and gait disturbance were randomized into a treadmill training or a control group. The treadmill training group undertook a minimally-supervised home-based program of treadmill walking for 20-40 minutes, 4 times a week for 6 weeks. The control group received usual care. The feasibility of the intervention was assessed by recording exercise adherence

and acceptability, exercise intensity, fatigue, muscle soreness and adverse events. The primary outcome measure of efficacy was walking capacity (6 minute walk distance); secondary outcomes included fatigue and quality of life. To test for between group effects of the intervention, analysis of covariance was performed using multiple linear regression. Analysis was by "intention-to-treat".

Results: Minimally-supervised, home-based treadmill training was feasible, acceptable and safe with participants completing 78% (SD 36) of the prescribed sessions. The treadmill training group did not improve their walking capacity compared to the control group. The treadmill training group showed a greater improvement than the control group in fatigue at post-test ($p = 0.04$) and in quality of life at 6 weeks follow-up testing ($p = 0.02$).

Conclusions: Minimally-supervised home-based treadmill training is a feasible and safe form of exercise for cognitively-intact people with mild Parkinson's disease. Further investigation regarding the effectiveness of minimally-supervised treadmill training is warranted.

POSTER 62

ABSTRACT 279

EFFICACY OF A MULTIFACETED INTERVENTION PROGRAM TO INCREASE PHYSICAL ACTIVITY IN PATIENTS WITH PD: THE PARKFIT TRIAL

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Background and Aims: Many patients with Parkinson's disease (PD) lead a sedentary lifestyle. Simply informing patients about the health benefits of physical activity is insufficient to change their sedentary lifestyle. We developed and evaluated a multifaceted behavioural program (ParkFit) aiming to increase the level of physical activity undertaken by patients with PD.

Methods: 586 PD patients were randomly assigned to the ParkFit Program or an active control group (ParkSafe Program). The level of physical activity was measured at baseline and at 6 months using a standardized interview-based 7-day recall (LAPAQ, primary endpoint), an ambulatory activity monitor (secondary endpoint) and an activity diary (secondary endpoint). Results were analysed according to the intention to treat concept.

Results: 562 patients (96%) completed both baseline and 6 months assessments. In the ParkFit group, patients increased their time spent to physical activities with 7% as assessed with the LAPAQ; patients in the control group became 1% less active. The difference between both groups was not statistically significant. When we specified the nature of the activities, patients in the ParkFit group increased their 'outdoor and sports activities' (+32%), while their time spent to household activities decreased (−14%). In the control group these differences were less than 4%.

Conclusions: This short term outcome of the ParkFit trial suggests that patients with PD can increase their outdoor activities with a specific multifaceted program. This increase seems to be accompanied by a decrease in time spent to household activities. At the congress we will present the results of the ParkFit trial after 24 months intervention and the potential health consequences of a change in lifestyle.

POSTER 63

ABSTRACT 287

EFFICACY OF INTEGRATED MULTIDISCIPLINARY CARE IN PARKINSON'S DISEASE

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Background and Aims: Parkinson's disease (PD) is a complex disorder, with motor and non-motor symptoms. A multidisciplinary team approach is considered to be the optimal model to treat PD, but the evidence on effectiveness is limited. We designed a controlled trial to evaluate the clinical effectiveness of multidisciplinary care in PD compared to usual PD care.

Method: Patients in the intervention group were offered an individually tailored 3-day multidisciplinary assessment, resulting in therapeutic recommendations, including referrals to specifically trained physiotherapists, occupational therapists and speech-language therapists working within the direct vicinity of the patient (ParkinsonNet). Patients in the control group received usual care. Inclusion criteria were idiopathic PD, HY-stage ≤4, age 20-80 years, living independently in the community, no severe co-morbidity and no dementia. Primary outcome measures were the averages of the scores after 4, 6 and 8 months on PDQL (Parkinson-specific quality of life scale) and ALDS (generic disability rating scale with 30 activities of daily living). The analyses were adjusted for baseline (ANCOVA) and were by intention-to-treat.

Results: 301 patients participated, 150 in the intervention group and 151 in the control group. For the intervention group and control group respectively, mean age (years) was 66.5 and 69.3, average disease duration (years) 5.8 and 6.8, and percentage men 64% and 61%. In total, 101 patients within the intervention group used the opportunity to receive a multidisciplinary assessment. Adjusted for baseline, average PDQL scores over the months 4, 6 and 8 were significantly higher in the intervention group compared to the control group (difference 3.0, 95% CI 0.4-5.6). ALDS scores were not significantly different between the groups (difference 1.3, 95% CI −0.2-2.8).

Conclusion: Integrated multidisciplinary care was significantly more effective compared to usual care. This study confirms our hypothesis that integrated multidisciplinary care has beneficial effects for patients with PD.

POSTER 64

ABSTRACT 411

PREDICTORS OF HEALTH-RELATED QUALITY OF LIFE IN AUSTRALIANS WITH PARKINSON'S DISEASE

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Background and Aims: Parkinson's disease (PD) is a chronic and progressive neurological condition that has been shown to have a negative impact on health-related quality of life (HRQOL). Despite extensive research on HRQOL, it remains unclear which factors predict life quality in Australians with PD. This study aims to identify the demographic factors, PD impairments and activity limitations that contribute to the HRQOL of Australians with PD.

Method: 210 individuals with idiopathic PD who participated in the baseline assessment of an existing clinical trial were included. The Parkinson's Disease Questionnaire-39 summary index (PDQ-39 SI) was used to quantify HRQOL. The PD impairments, activity limitations and demographic factors that potentially contribute to HRQOL were examined in relation to the functioning and disability framework of the International Classification of Functioning (ICF) model. In order to extend current knowledge from multiple regression analysis, path analysis was used to quantify the relationships between predictor variables. Using path analysis allowed a more accurate modelling of the inter-relationships between demographic factors, PD impairments and activity limitations with HRQOL.

Results: Several factors were found to contribute to the HRQOL when the inter-relationships between predictor variables were taken into account. Limitations in performing self-care activities ($\beta = 0.38$; $p < 0.0005$) were the strongest predictor of HRQOL in people with PD. Impairments in mental function ($\beta = 0.37$; $p < 0.0005$) and disease duration ($\beta = 0.26$; $p < 0.0005$) were also significant predictors but the contribution of these variables was mediated by other factors such as mobility and self-care limitations.

Conclusion: This study has illustrated that it was the complex interaction between activity limitations, impairments in motor and non-motor function and personal factors such as disease duration that determined the HRQOL of an individual with PD living in Australia. Understanding how these factors are inter-related may enable clinicians to optimise therapy outcomes.

POSTER 65

ABSTRACT 464

OPPORTUNITIES OF HARMONIOUS COLLABORATION BETWEEN CONDUCTIVE EDUCATION AND MEDICAL REHABILITATION IN PATIENTS WITH PARKINSON'S DISEASE

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Our study introduces a pedagogy-based method originated in Hungary offering a new opportunity to supplement medical rehabilitation, adding its special comprehensive education programme. Complex rehabilitation for Parkinson's patients comprises medication, physio- and occupational therapy and possibly speech therapy and mental hygiene support. Beyond motor, somatic, vegetative and psychic symptoms, Parkinson's disease causes not merely loss or disturbance but also disintegration of the particular functions. The conductive programme defines the personality as a unitary whole; rather than dividing it into parts, it uses education for consistent and uniform development, approaches the individual integratively, influencing each affected area simultaneously. The primary aim and duty of the conductive education specialists, the conductors, is to relaunch activity in the dysfunctioning person i.e. to evoke motivated active behaviour and coordinated movement, to promote communication, intention, emotional and cognitive development. In our study, started in 2001 and continuously upgraded since, the Webster Rating Scale, the Mini-mental State Examination and the Nottingham extended ADL Test were employed for appraising changes in our patients' condition in the conductive education system. Parallel with the periodic tests observation diaries were kept and completed by the minutes of interviews with patients and their families. Our study presents totalised and evaluated data of 46 persons. Our research verified that the principles and elements of the Pető method e.g. the active daily routine, task execution with the group, rhythmical intention and algorithmically constructed task series develop the affected functions jointly. In patients regularly attending conductive sessions, functions and communication, psychic and social indicators soon improved. Positive interpersonal relationships eased the psychic burden which often worsens to depression. Following provisional improvement the patients' motor and other functions stagnated in the medium term. In the long term their quality of life was kept which is significant success in a deteriorating disease.

POSTER 66

ABSTRACT 496

AUSTRALIAN CLINICAL GUIDELINES FOR PHYSIOTHERAPY MANAGEMENT OF PARKINSON'S DISEASE

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Background and Aims: Although the Royal Dutch Society for Physical Therapy has published guidelines for physiotherapy management of people with Parkinson's disease in 2004, there appears to have been partial uptake in countries outside Europe. Moreover there is a need for new guidelines tailored to the needs of people in the Asia-pacific region, including Australia.

Methods: Methods used to used to develop clinical guidelines (including those by the National Health and Medical Research Council of Australia, BMJ, Cochrane Centre and others) were reviewed and considered with respect to their application to clinical practice in Australia and the Asia-pacific region. A steering committee, writing committees and translation committees were established to oversee the project implementation, to write the content, validate the content and then ensure knowledge transfer to clinicians and consumer groups. A partnership between The University of Melbourne, Northern Health and the Victorian State Government was established to facilitate this process. An international expert provided guidance and mentoring throughout the process.

Results: The needs of Australians living with Parkinson's disease were evaluated and used as the basis for developing guidelines that referenced movement disorders such as hypokinesia, freezing, tremor, rigidity, postural instability, and activity limitations (gait, balance, hand function, transfers, other functions), taking into account task conditions such as task complexity, the environment, level of assistance and speed. Systematic reviews of the literature provided the evidence for the guidelines and theoretical models were also considered as the basis for validity. One written and validated, a series of workshops was held to translate the guidelines to physiotherapy clinicians across the northwest region of Melbourne.

Conclusions: Providing access to tailor designed clinical guidelines that are readily accessible and feasible has enabled clinicians in the Australia Pacific region to provide evidence based practice and a consistent approach to the management of people with this progressive neurological condition. The extent to which uptake of guidelines is improving quality of life and physical activity in people with Parkinson's disease is now under investigation.

POSTER 67

ABSTRACT 520

EFFECTS OF MUSIC BASED MOVEMENT THERAPY ON WALKING ABILITY, BALANCE AND QUALITY OF LIFE IN PATIENTS WITH PARKINSON'S DISEASE: A META ANALYSIS

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Background and Aims: Recent evidence suggests that music based movement (MbM) therapy may be a promising intervention to improve gait and gait-related activities in Parkinson's Disease (PD) patients, because it naturally combines cognitive movements strategies, cueing techniques, balance exercises and physical activity while focussing on the enjoyment of moving on music instead of the current mobility limitations of the patient. This review aims to summarize current literature.

Methods: A meta-analysis of Randomized Controlled Trials on the efficacy of MbM-therapy, including individual rhythmic music training and partnered dance classes, was performed. Identified studies (K = 6) were evaluated on methodological quality and effects pooled using Mean Difference (MD) scores and visualized with forest plots.

Results: Studies were generally small (total N = 167). Significant homogeneous MDs were found for the Berg Balance Scale (MD: 4.1; 95% CI: 2.117-6.137; Z = 4.02; P < 0.01; I^2 = 0%), Timed Up and Go test (MD = 2.2; 95% CI: 1.115-3.288; Z = 4.08; P < 0.01; I^2 = 0) and stride length (MD = 0.11; 95% CI: 0.032-0.194; Z = 2.83; P < 0.01; I2 = 7%). A sensitivity analysis on type of MbM-therapy (dance-or gait-related interventions) revealed a significant improvement in walking velocity for gait-related MbM-therapy (MD = 0.13; 95% CI: –0.020-0.240; Z = 2.31; P = 0.02; I^2 = 39%), but not for dance-related MbM-therapy (MD = –0.007; 95% CI: –0.074-0.061; Z = –0.19; P = 0.85; I^2 = 0). No significant MDs were found for UPDRS-motor score, Freezing of Gait and Quality of Life.

Conclusion: Overall, MbM-therapy appears promising for the improvement of gait and gait related activities in PD. Future studies should incorporate larger groups and focus on long-term compliance and follow-up.

POSTER 68

ABSTRACT 545

CHARACTERISATION AND REHABILITATION OF PISA SYNDROME IN PARKINSON'S DISEASE

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Background and Aims: Abnormal postures of the trunk represent a typical feature of Parkinson's disease (PD). These include Pisa syndrome (PS), a tonic lateral flexion of the trunk associated with slight rotation along the sagittal plane. In this study we describe the clinical and instrumental features of PS, together with the effect of rehabilitation in a representative group of PD patients.

Methods: All patients with trunk deviation underwent EMG and radiological (RX and CAT scan) investigations. Clinical characteristics of patients with PS were compared with a control group of PD without trunk deviation. The rehabilitative program consisted in a 4-week standard approach associated with a specific protocol for core muscles strengthening.

Results: PD with PS showed a significantly higher score of disease asymmetry when compared with the control group. In the majority of patients with PS, trunk bending was contralateral to the side of symptom onset. EMG showed an abnormal tonic hyperactivity on the side of the deviation in the paravertebral thoracic muscles and in the abdominal oblique muscles. CT of the lumbar paraspinal muscles showed muscular hypotrophy more marked on the side of the deviation, with a cranio-caudal gradient. Rehabilitation induced an improvement in the range of motion and the posture of all subjects.

Conclusions: PS may represent a complication of advanced PD in a subgroup of patients that show a more marked asymmetry of disease and who have a detectable hyperactivity of the dorsal paravertebral muscles on the less affected side. This postural abnormality deserves attention and proper early treatment to prevent comorbidities and pain.

POSTER 69

ABSTRACT 549

VALIDITY OF FULLERTON ADVANCED BALANCE SCALE IN PARKINSON'S DISEASE: PRELIMINARY RESULTS

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Background and Aim: Parkinson's disease (PD) is progressive and chronic disease which has prevalence of 2% at age 60 and over population. Postural instability is one of the symptoms of Parkinson's disease that is causing the most disability. This case requires a comprehensive evaluation of Parkinson patients functional balance abilities. Fullerton

Advanced Balance (FAB) Scale was developed for elderly people. It has some advantage to evaluate balance because it includes static and dynamic balance activities performed in different sensory environments. The aim of this study is to investigate the effectiveness of FAB Scale to assess balance in PD.

Methods: For this purpose, 28 Parkinson's patients in Hacettepe Adult Hospital Neurology Services were included study. The patients disease grade was determined by using Unified Parkinson's Disease Rating Scale (UPDRS) scores were recorded. Berg Balance Scale (BBS) and UPDRS were elected as gold standards.

Results: Age of patients was 69.07 ± 8.86 years, duration of disease was 5.17 ± 2.80 years. 9 women (32.1%) 19 males (67.9%) of patients total scores UPDRS were determined as meanly 37.75 ± 11.75 and also the mean BBS and FAB Scale scores were determined as 43.85 ± 12.92 and 22.26 ± 11.79. When the results were analyzed, there were significantly correlations between FAB Scale and UPDRS motor subscale ($r = 0.50$, $p = 0.008$), and BBS ($r = 0.88$, $p = 0.001$). No correlation was found between UPDRS total score and FAB Scale.

Conclusions: The results came from this small patient group show that FAB scale is a suitable scale to evaluate functional balance abilities in PD.

POSTER 70

ABSTRACT 585

QUANTITATIVE ANALYSIS OF MOVEMENT SMOOTHNESS IN PARKINSON'S DISEASE: A PRELIMINARY STUDY

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Background: Parkinson's Disease (PD) is characterized by a decrease of movement velocity associated with a degradation of smoothness. These two features are difficult to quantify in clinical routine. Specific markers of movement smoothness in PD might provide PD diagnosis indication in contrast with other causes of bradykinesia. This study aimed to develop a robust quantification of movement smoothness in PD.

Methods: Eight PD patients and twelve controls performed alternating elbow flexion-extension movements over small (40°) and large (150°) ranges at maximal velocity. Six controls were also instructed to perform slow movements with the average speed measured in PD patients (speed-matched controls). Were analyzed: (1) Normalized Average Rectified Jerk (NARJ), evaluating the rate of change in acceleration; (2) Fourier power spectrum of the acceleration profile. The ratio of the power at frequencies faster than the movement frequency to the power at the movement frequency (FF/MF ratio) was also calculated, as that reflects the acceleration variability.

Results: The mean elbow speed in PD patients was 34% of that in controls for large movements (two-tailed t-test, $p < 0.001$), and 45% for small movements ($p < 0.001$). The NARJ in the more affected limb was 151% of controls in speed-matched condition for large movements ($p = 0.007$) and 139% for small movements ($p = 0.012$). It was 189% of controls in rapid condition for large movements ($p = 0.003$) and 146% for small movements ($p = 0.0011$). The FF/MF ratio was 200% of controls in speed-matched condition for large movements ($p = 0.032$) and 246% for small movements ($p < 0.001$). It was 277% of controls in rapid condition for large movements ($p = 0.028$) and 613% for small movements ($p < 0.001$).

Conclusion: NARJ and FF/MF ratio discriminated parkinsonian from normal movements. These parameters might be useful to characterize various forms of bradykinesia.

POSTER 71

ABSTRACT 597

EUROPEAN GUIDELINE FOR PHYSIOTHERAPY IN PARKINSON'S DISEASE

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Background and Aims: Parkinson's disease (PD) is a complex disorder, characterised by a wide array of motor and non-motor problems for which medical care alone is insufficient. Many allied healthcare professionals are involved in PD care, of which physiotherapy is the most applied. The Parkinson's guideline of the Royal Dutch society for Physical Therapy (KNGF; 2004) is unique in its field, but now needs an update. Following a request from the Association of Physiotherapists in Parkinson's disease Europe (APPDE), the guideline will be updated and adapted into the 1st European guideline for physiotherapy in PD. Initiated by the KNGF, 19 member organisations of the European Region of the World Confederation for Physical Therapy (ER-WCPT) are collaborating. The future guideline can be used in any country, but also be tailored to the country specific possibilities and constraints (e.g. concerning healthcare organisation).

Methods: The guideline is being developed according to international standards for guideline development (e.g. AGREE and GRADE). Barriers in delivering optimal care are identified though a survey (N = 9,646; see other abstract). These will be transformed into key questions for which conclusions will be drafted based on systematic literature search. Other considerations to the conclusions (e.g. on availability) will be collected, to finally create the recommendations. In addition, patient information and information on the adaptation procedure will be developed. Patients are being involved at all stages throughout the development process.

Results: The guideline will be ready in August 2012. At the 7th World Congress for Neurorehabilitation, the first results concerning the guideline's recommendations will be presented.

Conclusions: Through unique collaboration among 19 national professional organisations, the first European physiotherapy guideline for Parkinson's is being developed.

POSTER 72

ABSTRACT 598

PARKINSON'S CARE: INSIGHT INTO PHYSIOTHERAPY WITHIN EUROPE

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Background and Aims: Parkinson's disease (PD) is a very complex disorder for which physiotherapy is often applied. Currently, in collaboration among 19 national professional physiotherapy organizations throughout Europe, the 1st European physiotherapy guideline Parkinson's is being developed (see other abstract). As a starting point for the development, insight was gained into the current delivery of care, as well as the barriers and facilitators for optimal care.

Methods: Of each participating physiotherapy organisation, 600 randomly selected members (or all members, if the total number of members did not reach 600) were invited to participate in a web-based survey, translated into 11 languages.

Results: Of the 9,646 physiotherapists invited, 3284 participated (35%; *status 11 Oct 2011*). Responses show that most of the therapists treating Parkinson patients see less than 5 patients a year, providing them limited opportunity to increase and retain expertise. Not surprisingly, over one third of the therapist reported that their PD specific expertise was (very) low. According to the therapists, the optimum treatment volume would be 10. Twenty-five percent of patients were treated in a group. Most common reported barriers to provide optimal care were limited time for each session, limited availability of local exercise groups and limited opportunity to discuss with other health professionals. Throughout our European population, of all therapists treating more than 5 persons with Parkinson's each year, only just over a half used measurement tools, whereas over 40% reported problems in using measurement tools. However, large variations were seen between countries. Specific barriers were reported in the use of several tools.

Conclusions: The results of the European survey show that there are differences in physiotherapeutic PD care throughout Europe. Still, many of the barriers identified are the equal. These barriers are being used to develop key questions for the European physiotherapy guideline for PD.

POSTER 73

ABSTRACT 632

THE RELATIONSHIP BETWEEN CAREGIVER STRAIN AND HEALTH-RELATED QUALITY OF LIFE IN CAREGIVERS AND PEOPLE WITH PARKINSON'S DISEASE

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Background and Aims: Parkinson's disease (PD) accounts for significant impact on the quality of life (QOL) of those affected by the disease. However there has been relatively little research regarding the impact on caregivers of those with PD. The aims of this study were to determine whether there is a relationship (1) between caregiver strain and health related quality of life of caregivers of people living with Parkinson's disease, (2) between caregiver strain and the health-related quality of life of people living with Parkinson's disease, (3) between caregiver health related quality of life of caregivers and disease severity.

Method: A cross sectional observational study was undertaken with a sample of caregivers and the Australian adults with Parkinson's disease they cared for from an ongoing rehabilitations trial (n = 97). Health-related quality of life data were obtained from caregivers using the EuroQol-5D. Health-related quality of life data were also obtained for care recipients using the Parkinson's Disease Questionnaire 39 as well as the EuroQol-5D. Caregiver strain was determined using the Modified Caregiver Strain Index. Disease severity was evaluated using the Modified Hoehn & Yahr score.

Results: A weak statistically significant negative correlation was found between caregiver strain and care recipient health-related quality of life ($r_s = –0.18$, $p = 0.042$) with the EuroQol-5D. A moderate correlation was found between care-recipient health-related quality of life using the Parkinson's Disease Questionnaire 39 and caregiver strain ($r_s = 0.43$, $p < 0.001$). Caregiver health related quality of life using the EurQol-5D (with UK weights) and disease severity approached significance ($r_s = –0.15$, $p < 0.071$). No significant relationship was found between care giver health-related quality of life using the EuroQol-5D and caregiver strain.

Conclusion: Caregiver strain showed a significant association with reduced health related quality of life of care recipients living with Parkinson's disease. Additional investigations are suggested to more closely examine these relationships.

POSTER 74

ABTSRACT 21

OUTCOMES OF BLADDER REHABILITATION IN PERSONS WITH MULTIPLE SCLEROSIS: A RANDOMISED CONTROLLED TRIAL

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Background and Aim: Urinary dysfunction produces significant morbidity and psychosocial burden for persons with multiple sclerosis (pwMS). A stratified, randomised, waitlist controlled study over 12 months assessed the effectiveness of a 6-week bladder rehabilitation programme in pwMS in an Australian community cohort.

Methods: Patients with definite MS and bladder issues (n = 74) recruited from a tertiary hospital database, were randomised to a treatment group (n = 40) for an individualised bladder rehabilitation programme or to a control waitlist group (n = 34). The Urogenital Distress Inventory (UDI6), Neurological Disability Scale (NDS) and the American Urological Association Symptom Index (AUA) assessed bladder impairment and 'activity limitation'; a single Quality of life (QoL) item in the AUA and the Incontinence Impact Questionnaire (IIQ7) measured restriction in 'participation'. Primary outcome measures were assessed at baseline and at 12 months.

Results: Analysis of per protocol data from 58 patients (treatment n = 24, control n = 34) showed reduced disability in the treatment group, with significant differences ($p < 0.001$) and large effect sizes (> 0.5) in post-treatment UDI6, NDS, AUA total, AUA QoL and IIQ7 scores for the two groups. The treatment group compared with the control group showed improvement: 78% versus 27% for UDI6 and 59% versus 17% for IIQ7. More patients in the control group deteriorated over the study period on the UDI6 (30% vs 0%; $p < 0.001$) and IIQ7 (39 vs. 0%; $p = 0.001$).

Conclusion: A multifaceted, individualised bladder rehabilitation programme reduces disability and improves QoL in pwMS compared with no intervention after 12 months of follow-up. Information on specific

interventions in different bladder types in MS and the impact on QoL need further evaluation.

POSTER 75

ABSTRACT 322

IDENTIFICATION OF GAIT PATTERNS IN MULTIPLE SCLEROSIS PATIENTS

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Background and Aims: To date, physicians use a variety of methods to diagnose Multiple Sclerosis (MS) by ruling out other possibilities and perform a series of laboratory tests which, if positive, confirm the diagnosis. This paper intends to investigate the hypothesis that gait dynamics have meaning and may be useful in providing insight into the neural control of locomotion.

Methods: In this study, we recruited six pilot data from early diagnosed relapsing-remitting multiple sclerosis (RRMS) patients who exhibited mild to moderate gait difficulty with expanded disability status scale (EDSS) score were 6.0 or less. Twenty healthy subjects were also recruited as a control group. A cluster of data relating to the kinematics, kinetic, and muscle activities was acquired using an array of inertial sensors, instrumented treadmill, and electromyographic (EMG) device during normal walking tasks. A computational intelligence methodology based on the fuzzy relation matrix and fuzzy similarity was applied for assessing the RRMS based functional impairments in the locomotion.

Results: This study has found that the vertical GRF of the MS patients did not depict the reference M-shaped pattern, and the lower magnitudes of the anterior-posterior forces appear in most of the MS patients. It also found some significant patterns of muscle activities and dynamic acceleration compared with normal subjects.

Conclusions: This quantitative gait analysis aids to illuminate a better understanding of the mobility-related disease characteristics. An outcome of this study might help therapists make reliable and differentiable diagnosis, design a tailored therapeutic strategy, and evaluate the follow-ups on patient's functional recovery.

POSTER 76

ABSTRACT 463

CHANGES OVER 10 YEARS IN FUNCTIONING AND HEALTH RELATED QUALITY OF LIFE IN PEOPLE WITH MULTIPLE SCLEROSIS

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Background: Multiple Sclerosis (MS) is a neurologic, chronic and progressive disease. Since there is yet no improving or curing treatment for MS, progressive disability will remain the characteristic experience of most people with MS for decades. To be able to provide health care services that can meet the needs of people with MS in the long run, detailed knowledge is required on functioning and health related quality of life (HRQL) in a broad and longitudinal perspective.

Aim: The aim is to describe changes in functioning and HRQL over time—10 years—in a population-based sample of people with MS.

Method: From 1998 to 2001 a random sample (n = 166) representing 15% of all people diagnosed with MS in Stockholm County were recruited. In this follow-up about 80% of the sample is estimated to be available. The same tests and questionnaires as in the baseline study is used for data collection in the follow-up and the results presented are based on data collected from n = 87.

Results: In the 10 year follow-up about 50% had an overall disease severity over 6.5 points according to the Expanded Disability Status Scale. There was an increase over time in impaired function and in activity limitation but not in participation restriction. HRQL and depressive symptoms remained stable over the 10 years.

Conclusion: Longitudinal changes in people with MS show that overall disease severity as well as motor function and cognitive function deteriorate and dependence in activities of daily living increase. However, HRQL, depressive symptoms and participation remain stable. These results may indicate that over time there is an acceptance to the disease and its consequences.

POSTER 77

ABSTRACT 498

IDENTIFYING TREATMENT GOALS IN STROKE AND MS: WHAT METHOD TO USE?

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Background/Aim: Client-centred care and goal setting have emerged as important components in neurological rehabilitation with many advantages. Currently, different methods, like (semi-)structured interviews or questionnaires, are used to extract individual treatment goals. Also in many hospitals just a simple question is used to find out patient's rehabilitation goals. Each method has advantages and disadvantages. The present study aims to assess to what extent patients with stroke or MS are able to identify attainable treatment goals using different methods.

Methods: Cross-sectional survey study in which 2 structured interviews were taken within 10 days, using 1) a key question (KQ), asking patients what their 5 most important treatment goals are, and 2) the Canadian Occupational Performance Measure (COPM) and 3) either the Motor Activity Log (MAL) or the Assessment of Motor Process Skills (AMPS). Z-test statistics were used on normalised data.

Results: 51 patients (24 stroke and 27 MS; mean age of 59 years; in the subacute or chronic stage) participated in the study. There was a significant difference ($p < 0.025$) in the number of goals patients were able to identify between the KQ (mean = 3.4 (SD = 1.6) and COPM (mean = 4 (SD = 1.2)), the KQ and MAL (mean = 4.5 (SD = 1.2)), but not between KQ and AMPS (mean = 3.6 (SD = 1.8)). Preliminary results show that the content of the treatment goals identified is also different using different methods.

Conclusion: Patients with stroke or MS are able to identify more treatment goals using a client-centred instrument, like the COPM or the MAL than by asking a key question to identify patient's treatment goals. Preliminary results indicate that in goal setting and client-centered rehabilitation approaches, the explicit use of a client-centred instrument has an added value regarding number and content of treatment goals.

POSTER 78

ABSTRACT 542

INVESTIGATION OF MUSCULOSKELETAL PAIN IN TURKISH MULTIPLE SCLEROSIS POPULATION

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Background and Aim: Musculoskeletal pain arises with combination of various symptoms in multiple sclerosis (MS). The purpose of this study was to determine the causes of musculoskeletal pain and to disclose the distribution of pain locations.

Methods: Total of 51 patients who had musculoskeletal pain was included in the study. Demographic data, the disease duration, EDSS, pyramidal functional system scores (PFSS) and total scores were recorded. Spasticity was assessed with Modified Ashworth Scale (MAS) while spasms were assessed with Penn Spasm Scale (PSS). Mc Gill pain questionnaire was performed for pain.

Results: Mean age of patients was 37.72 ± 10.01. Mean of total EDSS scores was 4.34 ± 1.77 while mean disease duration was 8.03 ± 6.74. Mean of PFSS and PSS score was 2.64 ± 1.29 and 0.72 ± 1.13 respectively and mean spasticity score was 4.33 ± 4.82% of patients had arm, calf and sacrum pain, 4% of patients had shoulder, back, elbow and ankle pain, 14% of patients had thigh pain. 16% of patients had neck pain, 31.6% of patients had knee pain and 45.5% of patient had low back pain. 64.7% patient had deep pain, %11.8 had superficial pain and 23.5% patient had both superficial and deep pain. When the pain intensity was assessed, 37.3% of patients had mild, 35.3% patient had disturbing 9.8% patient had severe and 2% patient had very severe and unbearable pain. Correlation tests showed that PFSS and age had higher correlation with pain intensity (respectively r: 0.288 r: 0.279).

Conclusions: According to our evaluations musculoskeletal pain was especially seen in lower extremities of MS patient. Pain increases with ageing. PFSS had higher correlation with pain intensity. PFSS includes muscle strength, reflexes and spasticity but it is more affected by the muscle strength than the other parameters. Therefore it is considered that musculoskeletal pain is more associated with muscle strength loss.

POSTER 79

ABSTRACT 544

CONCURRENT VALIDITY OF BERG BALANCE SCALE IN MULTIPLE SCLEROSIS PATIENTS

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Background and Aim: Cerebellar, sensory and vestibular balance problems are common symptoms in patients with multiple sclerosis (MS). Although Berg Balance Scale has been used to assess balance problems, it is not known whether it is appropriate for ataxic MS patients. The aim of this study is to test the concurrent validity of the Berg Balance Scale in ataxic MS patients.

Methods: A total of 43 MS patients attending the Hacettepe University Hospitals Neurologic Rehabilitation Unit were included. Demographic information, MS duration, functional systemic EDSS scores and total scores, Berg Balance Scale (BBS) scores were recorded. To be eligible for the study, the patients had to meet the following inclusion criteria: ability to walk even with an assistive device, presence of cerebellar ataxia, to have EDSS pyramidal functional system score ≤3a. The patients divided into two groups according to the cerebellar system scores (group I: ≤2, group II : >2).

Results: Group I consisted of 9 males 8 females, the mean age was 35.00 ± 9.6 years. Total EDSS scores were between 1.5 and 5.5. Group II consisted of 11 females, 15 males; mean age was 32.34 ± 9.23 years. Total EDSS scores were between 3 and 6. Disease duration for the first group was 6.00 ± 7.08 and 8.19 ± 7.36 years for the second group. There were no significant difference in demographic data and disease duration between the two groups ($p > 0.05$). Significant correlation has been detected between cerebellar functional system score >2 (group 2) and BBS while there was no correlation for group I (Pearson correlation r: –0.227, r = –0.697).

Discussion: Our study shows that BBS has acceptable concurrent validity in MS patients that have > 2 score in cerebellar functional system. Thus BBS is more appropriate and sensitive particularly for MS patients with moderate truncal and gait ataxia not for mild ataxia.

POSTER 80

ABSTRACT 15

NEUROPSYCHOLOGICAL SEQUELAE IN MOTOR NEURON DISEASE: OUTCOMES OF A PEER SUPPORT (LIFEMOVES) PROGRAM

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Background and Aims: Motor neuron disease is an incurable, progressive and fatal neurodegenerative disease. The focus of management is on achieving the best quality of life for patients and their families. Peer support has been proposed as an effective means of coping with a stressful life experience although data on efficacy are mixed. This is the first preliminary study on the effectiveness of a six-week face-to-face peer support program (Lifemoves) in motor neuron disease.

Methods: A pre-post design was used (n = 7) to determine the effects of the peer support program on patient satisfaction with the program, anxiety, depression, stress, quality of life, coping strategies and caregiver burden using standardized assessments at baseline, 6 weeks post program and 12 months.

Results: Of the 7 participants, 1 was deceased at 6 weeks post program and 2 more were deceased at 12 months. The mean age was 62 years (SD 12) and male: female ratio was 5:2. The level of disability was high and 2 participants had severe verbal communication difficulties. There was high participant satisfaction and a trend towards improved psychological coping (especially anxiety and stress) six-weeks post program. However, depression, anxiety, stress had worsened again at 12 months whilst quality of life, coping strategies and caregiver burden remained unchanged.

Conclusions: Although participant numbers were too small to be conclusive, it is suggested that group face-to-face peer support is a feasible form of support in motor neuron disease and should be considered even in patients who are severely disabled and/or have severe verbal communication.

POSTER 81

ABSTRACT 21

OUTCOMES OF BLADDER REHABILITATION IN PERSONS WITH MULTIPLE SCLEROSIS: A RANDOMISED CONTROLLED TRIAL

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Background and Aim: Urinary dysfunction produces significant morbidity and psychosocial burden for persons with multiple sclerosis (pwMS). A stratified, randomised, waitlist controlled study over 12 months assessed the effectiveness of a 6 week bladder rehabilitation programme in pwMS in an Australian community cohort.

Methods: Patients with definite MS and bladder issues (n = 74) recruited from a tertiary hospital database, were randomised to a treatment group (n = 40) for an individualised bladder rehabilitation programme or to a control waitlist group (n = 34). The Urogenital Distress Inventory (UDI6), Neurological Disability Scale (NDS) and the American Urological Association Symptom Index (AUA) assessed bladder impairment and 'activity limitation'; a single Quality of life (QoL) item in the AUA and the Incontinence Impact Questionnaire (IIQ7) measured restriction in 'participation'. Primary outcome measures were assessed at baseline and at 12 months.

Results: Analysis of per protocol data from 58 patients (treatment n = 24, control n = 34) showed reduced disability in the treatment group, with significant differences ($p < 0.001$) and large effect sizes (> 0.5) in post-treatment UDI6, NDS, AUA total, AUA QoL and IIQ7 scores for the two groups. The treatment group compared with the control group showed improvement: 78% versus 27% for UDI6 and 59% versus 17% for IIQ7. More patients in the control group deteriorated over the study period on the UDI6 (30% vs 0%; $p < 0.001$) and IIQ7 (39 vs. 0%; $p = 0.001$).

Conclusion: A multifaceted, individualised bladder rehabilitation programme reduces disability and improves QoL in pwMS compared with no intervention after 12 months of follow-up. Information on specific interventions in different bladder types in MS and the impact on QoL need further evaluation.

POSTER 82

ABSTRACT 42

KNOWLEDGE OF DYSPHAGIA AMONGST HEALTHCARE WORKERS IN MALAYSIA

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Background: Dysphagia is a common complication following a stroke, which may lead to aspiration pneumonia and death.

Aim: To assess the knowledge base of dysphagia amongst healthcare workers in the southern state of Malaysia.

Method: A survey was conducted during a Rehabilitation Awareness Week Programme from 19/1/09 to 23/1/09. Participants were given six true/false statements related to dysphagia and aspiration prior to and after a series of lectures and video presentations by two Speech Therapists and a Dietician.

Results: A total of 382 participants completed the survey. Participants included: nurses (54.7%), allied health staff (22.5%), therapists (9.0%), doctors (8.1%) and pharmacists (5.0%).Two thirds of the participants (pre-test 60.3%, post-test 63.2%) believed that patients should be allowed to consume food orally as soon as possible, prior to swallowing tests. Only 24.4% (cf post-test 41.2%) participants were aware that the absence of coughing or choking while eating did not preclude aspiration. Half of them knew that recurrent chest infections may be related to dysphagia (pre test 50.4%, post-test 12.3%), while only 29.8% correctly identified the signs and symptoms of dysphagia (cf. post test 90.0%). Forty-two percent of participants believed that nasogastric tube feeding can be given while the patient is supine, but only 12% changed their answers after the intervention. Most participants (pre-test 93.1% cf post-test 93.9%) were aware of modifications to food consistency for people with dysphagia.

Conclusions: More emphasis and training should be given to Malaysian healthcare workers to improve their understanding and management of dysphagia.

POSTER 83

ABSTRACT 117

REHABILITATION AWARENESS WEEK AS A TOOL TO ASSESS THE AWARENESS OF REHABILITATION IN A DEVELOPING COUNTRY

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Background: Rehabilitation is a relatively 'new' field in a developing country with limited resources and expertise. The first step to bridge the gap between the 'skilled' and 'unskilled' healthcare worker is to create awareness in rehabilitation.

Aims: To assess the level of awareness and knowledge in various aspects of rehabilitation amongst healthcare workers in Malaysia, and to provide basic demonstration in stroke rehabilitation.

Method: A workshop entitled 'Rehabilitation Awareness Week' was organised by the Department of Rehabilitation Medicine, Hospital Sultanah Aminah, Malaysia from the 19/1/09 to 23/1/09. Health centres and hospitals in the state were required to send five different representatives each day to participate in a one-day workshop for five consecutive days. Participants were given 18 true/false statements regarding: rehabilitation, dysphagia, silent aspiration, activities of daily living (ADL), types of diet in various medical/surgical conditions, skincare and positioning for stroke patients. This was followed by a series of lectures, video presentations and hands-on demonstrations by a multidisciplinary team. Participants were required to answer the same questions after attending the workshop. Feedback forms were also distributed and collected at the end of the sessions to assess the level of satisfaction and suggestions for future programs.

Results: A total of 389 healthcare workers attended the workshop. Participants included: Nurses (54.7%), Medical Officers/House Officers (8.1%), Pharmacists (5.0%), Therapists (9.0%) and Allied Health staff (22.5%). Most of the participants (97.9%) were aware of the 'definition of rehabilitation' and the 'role of a social worker'. Fewer participants understood the 'signs and symptoms of dysphagia' (pre-test 18.6%, cf post-test 10.0%) and signs of 'silent aspiration' (pre-test 24.5%, cf post-test 41.2%). Overall, 324 participants (86.9%) reported that the objectives of the workshop were fully achieved by the end of the sessions. Suggestions for

further improvement included: similar workshops to be conducted biannually across the states in Malaysia, a longer duration of training and more 'bed-side teachings'.

Conclusions: Rehabilitation Awareness Week may be used as a tool to create awareness in rehabilitation and to identify issues least understood by healthcare workers. More education and training should be given to Malaysian healthcare workers to improve their level of understanding, knowledge and skills in rehabilitation.

POSTER 84

ABSTRACT 118

CHALLENGES IN REHABILITATING OVERWEIGHT AND OBESE SPINAL CORD INJURED PATIENTS: AN EXPERIENCE FROM MALAYSIA

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Background: Obesity can be considered to be a factor which can contribute to impaired functional outcome in spinal cord injured (SCI) patients compared with those of a similar neurological injury level without obesity.

Aim: To determine factors which affect the rehabilitation programme in overweight and obese SCI patients.

Methods: A descriptive cross-sectional study was performed in two rehabilitation wards in Hospital Kuala Lumpur from 15/9/08 to 15/10/08. Overweight and obese SCI patients were identified by using Body Mass Index and waist circumference as defined by the WHO and ATP III Guidelines. Issues and challenges encountered during the rehabilitation of obese and overweight SCI patients were identified and appropriate interventions were given.

Results: Out of 27 SCI patients, nine were identified as either obese or overweight. Factors that affected the rehabilitation programme were issues related to medical, psychosocial, equipment and limited functional independence. They required additional resources such as increased length of stay, longer therapy sessions and higher staff to patient ratio.

Conclusions: Obese and overweight SCI patients face many medical, functional and psychosocial challenges. Additional considerations are necessary to achieve the rehabilitation goals as they have special needs.

POSTER 85

ABSTRACT 119

THE COSTS OF BOWEL CARE IN SPINAL CORD INJURED PATIENTS: AN EXPERIENCE FROM MALAYSIA

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Background: Bowel care following spinal cord injury (SCI) is a source of distress in SCI patients and often occupies a large portion of the day. It interferes with social participation and requires a lifetime commitment and considerable resources.

Aim: To estimate the annual direct costs of bowel care of SCI patients in a rehabilitation centre in Malaysia.

Methods: A cross-sectional study was performed in two rehabilitation wards in Hospital Kuala Lumpur from 15/9/08 to 15/10/08. Data on the direst costs of pharmacotherapy, consumables, colostomy surgery and nurses' wages were analysed. The costs of human resources other than nurses' wages, hospital charges, dietary changes and investigations related to bowel problems were not included. The estimated annual costs of bowel management in paraplegic and tetraplegic patients were calculated based on the annual hospital admission of SCI patients in this hospital.

Results: Data on 21 SCI patients was analysed. The estimated costs of bowel care were: RM 2,569 (AUD 856) per patient/year for consumables, RM 4,337 (AUD 1,446) per patient/year for pharmacotherapy and RM 3,004 (AUD 1,001) per patient/year if a patient had a colostomy. The estimated annual cost of bowel care for a paraplegic and a tetraplegic patient was RM 2,821 (AUD 940) and RM 4,444 (AUD 1,481) respectively.

Conclusions: The estimated annual direct costs of bowel care for an SCI patient range between RM 3,354 to RM 5,379 (AUD 1,118 to 1,793). This estimate did not include the costs of human resources other than nurses' wages, hospital charges, dietary changes and investigations related to bowel problems. The total cost for a tetraplegic patient is almost one and a half times greater than for a paraplegic patient.

POSTER 86

ABSTRACT 338

THE EXPERIENCE OF TRAUMATIC BRAIN INJURY IN BOTSWANA

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Background and Aims: Traumatic Brain Injury (TBI) is associated with physical, cognitive and behavioral changes which have a significant long term impact on the patients' lives. Cultural beliefs also affect the persons' response to injury. The outcomes of TBI have been well documented in Western cultures, however there are issues unique to Botswana which have not received research attention. Individuals in Botswana commonly use traditional healthcare services before consulting Western style health care. This study aims to: 1) Investigate knowledge, attitudes and beliefs about TBI among patients, family caregivers and health care professionals involved in care of individuals with TBI in Botswana; 2) Describe the treatment which individuals with TBI receive and their caregivers experience within the healthcare system and local community; 3) To identify post-injury changes and difficulties which individuals with TBI and their caregivers confront in Botswana.

Methodology: This study has employed qualitative research methods using a focused ethnographic approach. To date, 8 people with moderate to severe TBI (aged 25-34 years), 6 caregivers and 11 health care workers have been recruited from Gabarone and Francistown Hospitals in Botswana and interviewed 2-5 years post-injury at home.

Results: Themes arising from interviews include common perceptions of the etiology of TBI as being associated with supernatural forces or witchcraft; limited knowledge and information about TBI; lack of or stunted communication between doctors and patients due to language barriers; inadequate hospital services such as lack of contact with doctors; and post injury cognitive, behavioral and emotional changes having had a significant impact on patients' daily function, capacity for work, and social relationships.

Conclusions: The study findings will provide the basis for development of culturally sensitive educational resources for people with TBI, their families and health professionals in Botswana.

POSTER 131
ABSTRACT 5

THE PSYCHOMETRIC PROPERTIES OF A NEW STANDARDISED AUSTRALIAN OCCUPATIONAL THERAPY SCREENING TOOL FOR VISUAL PERCEPTION AND PRAXIS

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Background and Aims: Early and accurate identification of problems of visual perception and praxis following stroke enables occupational therapists to choose rehabilitation intervention strategies appropriate for remediating specific problems or compensating for limitations in daily function. Clinical practice guidelines in rehabilitation around the world are recommending the use of standardised and validated tools to be used for screening for visual perception and cognitive impairments following stroke. A new, brief screening test, the Occupational Therapy Adult Perceptual Screening Test (OT-APST) was developed in response to the limitations of existing screening and assessment tools.

Method: 208 people following stroke and 356 healthy participants were recruited for research relating to the psychometric properties of the OT-APST.

Results: The OT-APST was shown to have high levels of inter-rater, intra-rater and test-retest reliability for individuals with stroke. The construct validity and concurrent criterion validity of the OT-APST were demonstrated through correlation of the performance of people following stroke with their performance on a 'gold standard' reference tool. The ecological validity of the new tool was supported through correlation of the performance of people with stroke on the OT-APST with a measure of their functional independence. Age-stratified Australian normative data were developed for OT-APST interpretation for adults aged 16 to 97 years. The process of developing and standardising a new clinical instrument including normative data collection will be presented.

Conclusions: The OT-APST is a brief but comprehensive, reliable and validated systematic screening tool for visual perception and praxis for use by occupational therapists in meeting best practice guidelines for rehabilitation.

POSTER 132
ABSTRACT 336

A CONCEPTS REVIEW OF THE THERAPEUTIC ALLIANCE IN BRAIN INJURY REHABILITATION

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Background and Aims: The therapeutic alliance originated in psychotherapy and refers to the process of collaboration between clinician and client to address the difficulties that the client experiences. The aim of this paper is to review the different concepts of the alliance and identify the impairments, clinician variability and features of the client's social system that may influence the alliance in brain injury rehabilitation.

Method: A systematic approach was used to apply the search terms 'therapeutic alliance' or 'working alliance' and 'outcome' or 'brain injur*' to the EBSCO and PsychINFO databases to identify relevant literature. A manual search of reference lists identified further relevant articles. Studies were included that 1) reported the 'alliance' (or related term) as a key finding or 2) utilised alliance outcome measures in interventional studies and 3) were published in English. Thirty seven articles met the inclusion criteria.

Results: Despite the evidence from psychotherapy demonstrating the influence of the alliance on outcomes, challenges exist when applying these findings and methodology to clients with brain injury due to: a) the inconsistent application and evaluation of the alliance concepts; b) the client's cognitive changes; and c) variance in clinical skills and attributes. Family members play an important role in rehabilitation and findings suggest they may enhance or undermine the alliance as a result of their perceptions of the client's abilities, family discord and/or their expectations of outcome. Recommendations are made around how clinicians may forge alliances with clients and interact with family members to augment this process.

Conclusions: Application of alliance principles as well as early and frequent assessments of the alliance from the clinician and client perspectives may promote engagement and re-engagement in rehabilitation programs. Assessment of family characteristics that may impact on the alliance could form part of the diagnostic phase to identify pertinent family-based interventions that may support rehabilitation initiatives.

POSTER 133
ABSTRACT 351

INTERDISCIPLINARY INPATIENT ASSESSMENTS AND MANAGEMENT FOR HUNTINGTON DISEASE: A SHARED CARE ARRANGEMENT

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Background and Aims: Huntington disease (HD) is an autosomal dominant neurodegenerative disorder that can result in multiple impairments including motor, cognitive, behavioural and psychiatric symptoms. Motor impairment is not limited to characteristic chorea but also includes falls, dysphagia and difficulty with speech production. There is emerging evidence that multidisciplinary intensive inpatient rehabilitation in early and middle stages of HD can result in highly significant improvement in motor performance. The aim of the current study is to look at the spectrum of impairments and the effect of inpatient interdisciplinary care in a group of individuals with HD admitted to a rehabilitation ward under shared care of a neurologist and rehabilitation physician.

Methods: A retrospective review of the files of 5 patients who were admitted over a 3 month period from the time the shared care arrangement began was done. Data was collected as to their age, sex, time from diagnosis and motor performance according to the Unified Huntington's disease rating scale (UHDRS-motor subset). Cognitive function was screened using the Montreal Cognitive Assessment Test and assessed using standard neuropsychological instruments. Psychosocial issues and the major impairments relating to mobility, swallow, communication and activities of daily living were identified.

Result: The mean age of the subjects was 45 (32-61) with moderate motor and cognitive impairment. Falls was the major issue that improved with the interdisciplinary management. Swallow and communication assessments resulted in change in dietary recommendations and use of Assistive

Augmentative Communication devices. Formal care arrangements were organized to assist carers. Medications were modified to assist with therapy and nursing care. One patient had clear motor performance improvement with therapy.

Conclusion: The sample size was quite small; however the study shows that the range of impairment from HD can be well managed by a short inpatient stay and interdisciplinary team input.

POSTER 134

ABSTRACT 420

PRACTICE CHANGE: RESPECTING THE BARRIERS

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Background and Aims: Urinary incontinence (UI) is a common consequence of stroke and the most significant indicator of poor outcome, yet continence management in many settings remains suboptimal. The stroke continence assessment and management program (SCAMP) sought to improve continence management by addressing potential barriers to practice change.

Methods: We used a retrospective medical record audit to evaluate current continence practice across three acute rehabilitation centres, and to define any evidence/practice gaps. A staff focus group was also used to help identify nurse attitudes and beliefs about urinary incontinence. Identified barriers and three sixty degree feedback loop also informed the development of SCAMP.

Findings: Barriers to quality continence care were culturally influenced and included a lack of local protocols and guidelines on continence management, an extensive failure of nurses to diagnose, a disproportionate use of indwelling catheters and pads, and a tendency not to treat the underlying problem. Barriers reported by clinical staff included the complex nature of urinary incontinence, limited continence knowledge, a lack of time, and the ongoing frustration of failed attempts to improve the situation, and a lack of interdisciplinary responsibility for continence management. Centre effect also proved a barrier with a significant difference in compliance at two of the three study sites.

Conclusion: Implementing complex practice change that addresses evidence practice gaps relies on solutions that are multifaceted and targeted at specific obstacles or barriers. The opportunity for change can be challenged by workforce design and local culture.

POSTER 135

ABSTRACT 426

CONCEPTUALISING INTENSIVE NEUROREHABILITATION AS LEARNING THE DEVELOPMENT OF A DIDACTIC MODEL

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Background: In Denmark, annually about 120 people need highly specialized neurorehabilitation after a severe traumatic brain injury (TBI). The group of patients is inhomogeneous involving physical and cognitive changes. Patient involvement may be important for the patient's opportunities for living a dignified life after a brain injury. However studies indicate that the patient's situation is estimated through the perspectives of the professionals. Given that patients with severe TBI have changed abilities to learn two levels of pedagogical challenges exist: Conducting learning conditions to meet the patient's changed learning abilities in order to facilitate participation and supporting the patient in learning or compensating for lost competencies.

Aim: To understand the impact that different cognitive and physical changes can have on the patient's participation and learning. Moreover to develop and conduct an initial testing of a didactic method to support the professional reflections needed to create conditions that facilitate the patient's participation during the rehabilitation process.

Methods: A hermeneutic approach inspired by action research. The iteratively developed theoretical content implicates conceptions from the theory of situated learning by Lave and Wenger, neurophysiological and neuropsychological knowledge as well as the didactic relations model developed by Himm and Hippe.

Results/Conclusion: The findings of the study indicate that patients with a severe traumatic brain injury have major challenges in relation to participation and learning during rehabilitation. The study argues that even during early organization of rehabilitations, initiatives with applied facilitation of the patient's learning must focus on and reflect the patient's specific requirements. The theoretically founded didactic method for rehabilitation contributes a conceptual method that creates conditions for critical analytic discussions and knowledge sharing between rehabilitation professionals.

POSTER 136

ABSTRACT 529

KINEMATIC ANALYSIS OF LARYNGEAL ELEVATION WITH POWER-ASSISTED FUNCTIONAL ELECTRICAL STIMULATION

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Background and Aims: Recently, laryngeal elevation by functional electrical stimulation has been reported for patients with reduced laryngeal elevation. However, it is still difficult to decide the timing of electrical stimulation in accordance with the swallowing reflex. The purpose of this study is to investigate the possibility of using the power-assisted functional electrical stimulation system (PAS system: OG Giken Co., Ltd, Japan) to increase the laryngeal elevation in normal subjects.

Methods: This study was approved by the Institutional Review Board and a written informed consent was obtained from all subjects. The surface electrodes were put on the suprahyoid muscles in 10 healthy subjects. They swallowed 3 ml and 10 ml of water with and without the power-assisted functional electrical stimulation of the suprahyoid muscles. The colored marker was put on the surface of the thyroid cartilage and the laryngeal elevation was measured by using the 3-dimensional motion analysis system (KinemaTracer: KISSEI COMTEC, Japan).

Results: Without the electrical stimulation, the larynx moved 0.6 cm superior and 0.5 cm anterior on average during swallowing reflex. On the

other hand, the larynx moved 1.1 cm superior and 0.5 cm anterior on average with power-assisted functional electrical stimulation. The stimulation voltage increased in accordance with the increase in the movement of the larynx during the swallowing reflex.

Conclusion: The power-assisted functional electrical stimulation has a possibility of increasing the laryngeal elevation in accordance with the swallowing reflex.

POSTER 137

ABSTRACT 459

DELIVERING THERAPY AT HOME: A PRELIMINARY RESULT

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Background and Aim: There has been a great interest in delivering rehabilitation program at the community or home. Studies showed that early supported discharge does not result in functional deterioration, and is a cheaper alternative. The aim of this study is to evaluate the effectiveness of home-based rehabilitation using video in stroke patients.

Methodology: This study was conducted in a tertiary hospital; inclusion criteria include patients with first time stroke who has definite caregiver and were discharged home. Computerized randomization divided the sample into 2 groups; 1st group were given video to guide home therapy and forthnightly hospital therapy while the 2nd group continue with the usual weekly outpatient therapy. Severity of stroke and independence level were measured using the National Institute of Health Stroke Severity scale and modified barthel index at admission, before discharged and at 3-month. We also measured the caregivers' stress level and the frequency of complications.

Result: Result from the first 61 patients (28 in the video group and 33 in the control group). The baseline characteristics of both groups were comparable. At 3 months, 19 (67.9%) and 27 (81.8%) patients from video and control group respectively recovered to mildly dependent ($p = 0.207$). High stress noted in control group: 11 (33.3%) compared to 8 (28.5%) in the video group. No significance difference in frequency complication noted.

Conclusion: Home-based therapy using video is as effective as the hospital-based therapy.

POSTER 138

ABSTRACT 615

BENEFITS AND PROBLEMS OF USING SURFACE FUNCTIONAL ELECTRIC STIMULATOR: PATIENTS' PERCEPTIONS

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Background and Aims: To determine the perceived benefit and problems of use Surface Functional Electric Stimulator (FES) for droop foot as result of stroke, multiple sclerosis, traumatic brain injury or operated brain tumor and the users' opinion of the service provided.

Method: Clinical assessments and comparison with a patient completed questionnaire.

Inclusion Criteria: Dropped foot resulting from an upper motor neuron lesion; drooped foot correctable by electrical stimulation; able to walk at least 10 m with or without aids; beyond acute stage and medically stable; able to understand use of stimulator; current or past user of surface FES.

Results: Benefits: positive effect on walking: increased walking distance as a result of increase endurance and reduced effort, improved stability and independence with reduced risk of tripping, not evidence of a perceived improvement in walking speed. Problems: positioning of electrodes and need of set-up by a specialist, unreliable equipment, skin allergy, unable to tolerate stimulations.

Conclusions: From the patients' perspective the surface FES was perceived to be of considerable benefit but the trouble with the positioning of electrodes and the skin allergy lead some users to discontinuing use of the surface FES; some users now evaluate the use of an implanted drop-foot stimulator system.

POSTER 139

ABSTRACT 25

ASSESSMENT OF A PORTABLE DEVICE FOR THE QUANTITATIVE MEASUREMENT OF ANKLE JOINT STIFFNESS IN SPASTIC SUBJECTS

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Background and Aims: Spasticity is a common complication with neurological diseases and CNS lesions. Instrumented systems to evaluate spasticity often cannot provide an immediate result, thus limiting their clinical usefulness. In this study we investigated the reliability and of the Neurokinetics RA1 Ridgidity Analyzer and mean difference between the groups in 46 controls, 14 spinal cord injury (SCI) and in 23 multiple sclerosis (MS) participants.

Methods: Ankle stiffness measures were made twice by two raters, at speeds above and below the expected stretch reflex threshold. Ankle torque was measured with the portable device and a stationary torque motor. Inter- and intra-rater reliability was assessed with the intra-class correlation coefficient (ICC).

Results: Stiffness measures with the portable and stationary devices were significantly correlated for controls and MS participants ($p < 0.01$). Intra-rater reliability was 0.60-0.89 (SCI) and 0.63-0.67 (control). Inter-rater reliability was 0.70-0.73 (SCI) and 0.61-0.77 (control). Joint stiffness measures in SCI and MS participants were significantly larger than in controls for slow ($p < 0.05$) and fast ($p < 0.01$) movements. Stiffness measures for fast movements were greater than for slow movements in SCI and MS ($p < 0.05$), but not in controls ($p = 0.5$).

Conclusions: The portable device may not have provided an accurate measure of stiffness when the leg was moved rapidly; and the shape of the air-filled pads did not provide a good interface with the leg or foot.

However, the device correlated well with measures obtained by a torque motor, showed high intra- and inter-rater reliability for the SCI participants, and could easily distinguish between spastic and control participants. This study demonstrates that a portable device can be a useful diagnostic tool to obtain reliable information of passive and active stiffness for the ankle joint.

POSTER 140

ABSTRACT 52

ULTRASOUND GUIDED LOCALISATION OF INTRATHECAL PUMP REFILL PORT: A CASE STUDY

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Background: Implantable intrathecal pumps are used in the management of spasticiy and neuropathic pain in patients with spinal cord injuries. Difficulty to access refill port (DAP) is described in the literature. DAP does occur in our centre, but it is managed by multiple punctures to localise the port. Occasionally, when multiple needle passes fail to localise the port, fluoroscopy is used. Fluoroscopy in patients with spinal cord injury is labour intense and increases long term collective radiation exposure. Ultrasound allows to localise the refill port in DAP with added advantages of easy access, low cost and no radiation.

Aims: To prevent multiple punctures in DAP and to raise the healthcare professionals awareness of the ultrasound guided localisation of DAP.

Methods: A prospective case study.

Case Study: An obese male tetraplegic's spasticity is managed with intrathecal baclofen through an implanted pump delivery system. We had difficulty to access his entry port to refill on several occasions and they were managed by multiple punctures and occasional fluoroscopy. On the last occasion we used high resolution ultrasonography to identify the access port to refill.

Results: Refill performed with single pass. Patient satisfaction with this procedure compared to his previous refills was very high.

Conclusions: Ultrasound guided localisation of DAP is a simple technique which could improve patient's safety and comfort by avoiding multiple punctures and need for fluoroscopy to localise the intrathecal pump refill port.

POSTER 141

ABSTRACT 87

THE EFFECTIVENESS OF OUTPATIENT REHABILITATION FOLLOWING BOTULINUM TOXIN TYPE A (BONT-A) TREATMENT FOR UPPER AND LOWER LIMB SPASTICITY IN PERSONS WITH STROKE

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Background: BoNT-A in conjunction with a multidisciplinary neurorehabilitation program is the recommended management for problematic post-stroke spasticity. The optimal timing, type, duration and intensity of therapy remains poorly define, and the relationship with patient outcomes is not known.

Aims: To assess whether high intensity outpatient (OP) rehabilitation programs following BONT-A injections are more effective than lower intensity programs in reducing upper and/or lower limb spasticity and improving function in stroke survivors.

Methods: In a prospective quasi-controlled, observer-blinded trial with 3 month follow up, 40 adult stroke survivors requiring BONT-A injections for upper and/ or lower limb spasticity received a high or lower intensity OP rehabilitation program. A high intensity multidisciplinary OP program consisted of ≥3, 60 minute, sessions per week for 10 weeks (intervention group). Lower intensity programs, based on routinely available services in participant's area of residence, consisted of ≤2, 60 minute, sessions per week. The primary outcome assessed spasticity on the Modified Ashworth Scale. Secondary outcomes assessed: activity limitations (Functional Independence Measure (FIM), Action Research Arm Test and Motor Activity Log-28 for upper limb function, Six Minute Walk Test and Timed Up and Go for mobility, and Goal Attainment Scaling process for goal achievement); participation restrictions (WHOQOL-BREF for quality of life); and carer burden and patient satisfaction. Treating therapists recorded the components and intensity of therapy sessions using standardised documentation forms.

Results: Data has been collected and is currently being analysed. Results will be available by 12th December 2011.

Conclusions: Conclusions will be made based on the results.

POSTER 142

ABSTRACT 88

DESCRIBING THE 'BLACK BOX' OF REHABILITATION FOLLOWING BOTULINUM TOXIN TYPE A (BONT-A) TREATMENT FOR UPPER AND LOWER LIMB SPASTICITY IN PERSONS WITH STROKE

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Background: BoNT-A in conjunction with a multidisciplinary neurorehabilitation program is the recommended management for problematic post-stroke spasticity. Trials investigating post-stroke spasticity management have focussed on effectiveness of BoNT-A injections or single treatment modalities such as stretching or electrical stimulation, and rarely describe concomitant therapy in any detail. Whilst rehabilitation practices may be routine, they are often based on trial-and-error as they are difficult to characterise and standardise.

Aims: To assess the specific components of multidisciplinary spasticity management in order to explore the 'black box' of rehabilitation (types, intensity and modalities of rehabilitation interventions).

Methods: In a prospective quasi-controlled, observer-blinded trial with 3 month follow up, 40 stroke survivors requiring BONT-A injections for

upper and/or lower limb spasticity received a high or lower intensity outpatient (OP) rehabilitation program. Treating therapists recorded the components and intensity of therapy sessions using standardised documentation forms.

Results: Data has been collected and is currently being analysed. Results will be available by 12th December 2011.

Conclusions: Conclusions will be made based on the results.

POSTER 143

ABSTRACT 90

EXPERIENCE WITH IMMEDIATE EFFECT OF ELECTRICAL NERVE STIMULATION GUIDED BOTULINUM TOXIN TYPE A INJECTION FOR ADULT SPASTICITY

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Background and Aims: Spasticity is a common complication associated with an upper motor neuron lesion and can have a detrimental impact on quality of life. There are evidences to show that the administration of Botulinum Toxin Type A (BoNT A) intramuscular injection can be accurately performed using electrical nerve stimulator guidance. The main objective of this retrospective review was to specifically evaluate the efficacy of electrical nerve stimulation guided BoNT A injection for the treatment of focal spasticity in adults.

Methods: We retrospectively reviewed all available treatment records of patients undergoing treatment with BoNT A from January 2004 to April 2011. From this sampling group, we were able to identify a total of 86 consecutive injection series. We had however, excluded 12 cases due to the extent of incomplete documentation. This makes a total of 74 BoNT A injection series with acceptable required amount of information for analyses in this study.

Results: The majority of the injections 51 (68.9%) involved spasticity of cortical origin while 23 (31.1%) involved spasticity of spinal origin. From this sample, 30 (40.5%) has problematic spasticity of the upper limb, while 40 (54.1%) had significant involvement of the lower limb spasticity requiring BoNT A treatment. A total of 49 (66.2%) injections involved single treatment while 25 (33.8%) involved multiple treatment sessions. Amongst those requiring multiple injections, the average time frame between injections was 5.96 months with range of repeat treatment from 2 to 4 times. All of the injections were performed with electrical nerve stimulation guidance. Overall, the clinical decision for BoNT A treatment involved severe focal spasticity with a mean Modified Ashworth Scale (MAS) of 3.50 ± 0.50. Subset analyses involving 42 cases (31 of cortical origin, 11 of spinal origin) with consistent documentation of MAS at baseline, immediate, 4 weeks and 12 weeks post injection showed a significant reduction of spasticity of 3.50 ± 0.50, 2.48 ± 0.55, 2.24 ± 0.48 and 2.31 ± 0.56 respectively. Analysis using the Friedman test showed that the results are statistically significant with p value of <0.005. This interesting finding of an immediate reduction of spasticity by one MAS scale has high prediction value for subsequent clinical benefits.

Conclusions: This study adds to the existing evidence of significant reduction of spasticity with BoNT A treatment. However, the findings on immediate reduction of spasticity following electrical nerve stimulator guidance BoNT A treatment is anticipated to create interest amongst clinicians to explore further evidence associated with this phenomenon. The actual mechanism is not known, but could possibly be related to the local anesthetic effect of BoNT A, needling effect or electrical nerve stimulation effect.

POSTER 144

ABSTRACT 134

DESIGN AND FEASIBILITY OF A RANDOMIZED CLINICAL TRIAL TO EVALUATE THE EFFECT OF INTENSIVE REHABILITATION FOLLOWING BOTULINUM TOXIN INJECTIONS IN NEUROLOGICAL PATIENTS WITH SPASTICITY

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Background and Aims: Current treatment for neurological spasticity includes botulinum toxin-A (BoNT-A) injections. While evidence exists to support the use of BoNT-A, all studies recommend that BoNT-A be provided in conjunction with rehabilitation. However, little direct evidence exists for optimum type, dosage and timing of rehabilitation. The aim of this study was to design a feasible clinical trial to evaluate the effectiveness and cost benefit of providing rehabilitation after BoNT-A injections for spasticity management.

Method: A randomised, assessor-blinded controlled study was designed. All adults who attended a rehabilitation hospital spasticity clinic between February and August 2011 were screened for inclusion (n = 89 screened). Of these, 36 participants were randomly assigned to either the 1. InTENSE rehabilitation group (n = 13), or 2. Botulinum toxin-A injection group (n = 11), or 3. InTENSE plus botulinum toxin-A injection group (n = 12). InTENSE rehabilitation consisted of 2 weeks of serial casting (as appropriate) plus movement training for at least 14 hours over the 8 week study. Outcome measures included improvement in function (Box and Block Test for upper limb, 6 minute walk test for lower limb), range of movement, and personal goal achievement (Goal Attainment Scale) in addition to measures for cost efficacy including SF36 and EQ5D.

Results: The feasibility and burden of the assessment battery was evaluated; time for baseline assessment ranged from 45 to 90 minutes. Refusal for follow up assessment was low (n = 1/36, 2%) with no participants reporting respondent burden. In terms of Goal Attainment Scale, therapy alone (Gp 1) increased participants' scores by 9.1 points more than BoNT-A (Gp 2) while therapy plus BoNT-A (Gp 3) increased the score by 11.8 points more than BoNT-A (Gp 2).

Conclusions: Results demonstrate both the feasibility and need for a larger trial, since BoNT-A is currently provided free to stroke sufferers while therapy remains unfunded.

POSTER 145

ABSTRACT 277

INTRA- AND INTERRATER RELIABILTIY OF THE TARDIEU SCALE FOR ADULT LOWER LIMB SPASTICITY ASSESSMENT

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Background: The Tardieu Scale is considered the gold standard for spasticity assessment, and is frequently used to guide treatment choices. However, its reliability for assessing adults with neurological injuries is uncertain. We aimed to determine the intra and inter-rate reliability of the Tardieu Scale, for lower limb assessment in the adult neurological population.

Method: Thirty participants with chronic brain or spinal cord injuries were recruited. Average participants' age was 54.1 years (SD 12.5, 12 female). Two physiotherapists used a standard protocol for assessing participants on the same day. One physiotherapist administered an additional assessment 1-3 days earlier or later. Testers were blinded to results, and angle measurements were taken by a third physiotherapist. Hip adductors, hamstrings, gastrocnemius, tibialis anterior, rectus femoris, soleus, tibilis posterior and quadriceps were tested bilaterally.

Results: High levels of reliability were observed for the: intra-rater reliability of the affected soleus, affected and unaffected rectus femoris, inter rater realiability of the unaffected rectus femoris, and adductors (Intraclass Correlation Coefficients (ICCs) $\geq$0.74, and limits of agreement $<$20°). Quadriceps assessments were unreliable during slow and fast movements (ICCs 0.12-0.37). Low ICCs ($\leq$0.55) were observed for: slow movements of the unaffected Gastrocnemius, Soleus, affected adductors (intra-rater) and fast movement of the unaffected rectus femoris (inter-rate). Spasticity angles were reliable only for a few affected muscles. Spasticity ratings were reliable for 59% of the muscles tested, with greater reliability on intra-rater compared to inter-rater assessments.

Conclusion: The Tardieu Scale is reliable for assessing spasticity in the majority of the lower limb muscles of adults with neurological injuries. However, decisions will be best based on comparisons of slow and fast movements ranges rather than changes in the magnitude of the spasticity angles or qualitative spasticity ratings. To maximise reliability across testing occasions, Tardieu Scale measurements should be undertaken by the same therapist.

POSTER 146

ABSTRACT 318

TREATMENT WITH BOTULINUM TOXIN IN ISAACS' SYNDROME

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Objective: To determine the benefit of Botulinum Toxin treatment in Isaacs' syndrome.

Background: Isaac's syndrome is rare neuromuscular disorder characterized by peripheral nerve hyperexcitability. The three causes of neuromyotonia are: acquired, hereditary and paraneoplastic. The acquired form is most common and associated with antibodies to voltage gated potassium channels. Symptoms include progressive muscle stiffness and cramping. Stiffness is most prominent in trunk and limb muscles. Treatments include: anticonvulsants, plasma exchange, immunosuppressive and immunoglobulin therapy. However, some patients do not respond to such treatments.

Methods: This case report describes a 53 year old male who noticed early symptoms of stiffness in his thighs in 2009. He had difficulties with mountain biking, driving and climbing stairs. Right knee was placed in hyperextension; range of motion on the left knee was limited to 5 degree of flexion. Gait was characterized by decreased hip flexion and absence of knee flexion. EMG findings were consistent with Isaac's syndrome. He had trials with: carbamazepine, prednisone, intravenous immunoglobulin and plasmapheresis. He was referred to rehabilitation clinic for trial with Botulinum Toxin. There is some evidence about the efficacy of Botulinum Toxin in the treatment of neuromyotonia. Initially the patient received 150 U of Botulinum Toxin Type A into each quadriceps muscle divided equally in all muscle groups with no side effects, but no significant improvement. Subsequently, the dose was increased to 300 U/per leg with improved knee flexion of 25 degrees. The patient received a third injection 300 U/leg, with a good response.

Results: The patient reported that he feels more comfortable and his walking is "more normal."

Conclusion: Despite the "off label use," treatment with Botulinum Toxin should be considered as an option in an Isaacs' syndrome patient who is unresponsive to other available treatments.

POSTER 147

ABTSRACT 385

PSYCHOMETRIC PROPERTIES OF FUNCTIONAL MOBILITY TOOLS IN HEREDITARY SPASTIC PARAPLEGIA AND OTHER CHILDHOOD NEUROLOGICAL CONDITIONS

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Background and Aims: There is currently a lack of consensus about the best way to quantify functional mobility in children with Hereditary Spastic Paraplegia (HSP). The aim of this systematic review was to critically appraise studies on the psychometric properties of tools used to measure functional mobility in children with HSP and other childhood neurological conditions.

Methods: Tools used to quantify functional mobility in people with HSP were identified by two independent reviewers. The reliability, validity and responsiveness of the tools were investigated in children with HSP and other neurological conditions. Other conditions were included due to the small amount of literature on HSP and to help enhance the generalisability of the study. Data extraction and analysis of methodological quality was performed using a customized data extraction and quality assessment form and the COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN).

Results: The Functional Mobility Scale (FMS), the Functional Assessment Questionnaire (FAQ), the Gross Motor Function Measure (GMFM), the Rivermead Motor Assessment (RMA) and the Walking Index for Spinal Cord Injury II (WISCI II) have been used by clinicians to quantify functional mobility in people with HSP. The psychometric properties of the WISCI II and RMA had not been investigated in children. The FMS, FAQ and GMFM were found to be reliable and valid across a range of childhood neurological conditions. The FMS and GMFM were also found to be responsive to change in similar populations.

Conclusions: The FMS, FAQ and GMFM are reliable, valid and responsive tools to quantify functional mobility in children with a range of neurological conditions. The paucity of other functional mobility measures in HSP suggests that clinicians consider the FMS, FAQ and GMFM when assessing children with HSP.

POSTER 149

ABSTRACT 548

APPLICATION OF AN INERTIAL SENSOR TO PERFORM PENDULUM TEST ON SPASTIC VEGETATIVE STATE PATIENTS: A VALIDATION STUDY

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Background and Aims: Spasticity is a crucial problem in patients in a vegetative state (VS) since the early clinical phases with a major assessment difficulty. The use of clinical scales (typically Ashworth-modified scale or spasms scale) alone in these patients may be difficult, in particular for repetitive testing. Spasticity of the quadriceps femoris muscle can be assessed using a biomechanical test, the pendulum test, but little observations are available in VS patients. The measurement of pendular kinematic patterns assessed with inertial sensor has not been studied among VS, despite the potential utility to measure response to treatments of spasticity. Aim of our study is to describe the test-retest reliability in VS patients and in healthy people of the pendulum test with inertial sensors.

Methods: We performed pendulum tests on 5 healthy people and on 4 VS patients with the use of inertial sensors and with a tracking system, at both legs. Time of evaluation was: T0 (first recording), T1 (recording after 1 day). Each test was performed twice at both legs, with and without a 2.2 kg cuff weight at the ankle. Ashworth-modified scores (grades 0-4) of quadriceps femoris muscles were assessed.

Results: Preliminary results show that measurements obtained from pendular traces in healthy subjects were reliable, considering the intraclass correlation coefficient. Similar results on first observation in VS patients, despite validity, are still to be confirmed.

Conclusions: Pendulum test measures obtained with the inertial sensor in healthy patients and in VS patients have good test-retest reliability and convergent validity, despite a need to enlarge the sample of our observations.

POSTER 150

ABSTRACT 561

INVESTIGATION OF ACUTE EFFECTS OF FOOT MOBILIZATION, DEEP FOOT MASSAGE AND KINESIOTAPING ON GASTROSOLEUS SPASTICITY AND BALANCE: A PILOT STUDY

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Background and Aim: In neurological disorders with upper motor neuron lesions, gastrosoleus spasticity is frequently encountered and causes difficulty in walking. If severity of spasticity increases, falling risks increase. Another factor that increases falling is imbalance because of inadequate deep proprioceptive inputs. The study was planned for investigating the effect of foot mobilization, deep massage and kinesiotaping on gastrosoleus spasticity and balance.

Methods: This study included 10 outpatients with MS Diagnosed for mobilization and massage group (MMG), 8 outpatients with MS Diagnosed for kinesiotaping group (KG). For each group's demographic information, MS types, duration were recorded. Spasticity was evaluated using Modified Ashworth Spasticity Scale and goniometric ankle dorsiflexion. Balance was evaluated by recording time eyes open and eyes closed in these positions: Feet adjacent stance, tandem stance, single leg stance. In MMG, deep foot massage (10 minutes), Achilles traction, deep gastrosoleus massage (10 minutes), deep friction massage on achilles tendon was performed. In KG, kinesiotaping was used for inhibition technique for gastrosoleus spasticity and activation technique for preventing drop foot. Evaluations were made before treatment (1), after treatment (2) and 30 minutes after treatment (3) for each group.

Results: First and second evaluation of all tests results were significantly different in group I ($p < 0.05$). There were no differences in any values pre-post treatment results in group II ($p > 0.05$) Comparison of two groups showed that there were no differences in any values ($p > 0.05$).

Conclusion: Although inter-group comparison results were not different, improved balance and reduced spasticity in MMG show that the mobilization and deep massage could be effective for MS patients to manage muscle tone. So this application should be included in a physiotherapy program.

POSTER 151

ABSTRACT 563

INDIVIDUALISED ASSESSMENT AND BOTULINUM TOXIN INJECTION AT THE SHOULDER AND HAND FOR ADULTS WITH BRAIN INJURY

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Background and Aims: The combined effects of spasticity, contracture, weakness and limited active control are recognised as leading to common patterns of upper limb presentation and behaviour following acquired brain injury. A 'clenched fist' is one commonly described pattern, although this generalised description does not clarify the muscles that may require intervention. The aim of this presentation is to describe the shoulder and finger muscles most often identified as being suitable for Botulinum toxin injection in the Princess Alexandra Hospital's (PAH) Hypertonicity Service.

Method: Single-case experimental design in a clinical setting incorporating multiple evaluation points (baseline, 6 week, 3 and 6 month post-intervention). Consecutive recruitment of all clients with traumatic brain injury or stroke who attend the PAH Hypertonicity Service (N = 91). Age range 16 to 87 years. Outcome measures include the Modified Tardieu Scale (MTS) to determine spasticity, the Modified Ashworth Scale (MAS) to determine stiffness, a visual analogue pain scale and Goal Attainment Scaling.

Results: Results indicate that when shoulder pain is indicated as a problem, muscles involved in internal rotation (Subscapularis and Teres Major) are most likely to be selected for injection with Botulinum toxin (N = 10, 11.6%). Similarly, when a 'clenched hand' is a problem, Flexor Digitorum Superficialis is the finger muscle most likely to be affected by overactivity, and most commonly injected (N = 38, 41.7%).

Conclusion: Individualised assessment of hypertonic muscles is required to ensure that relevant shoulder and finger muscles are injected with Botulinum toxin rather than 'anticipated' muscle groups identified on the basis of commonly recognised upper limb patterns. Randomised research designs that compare protocol- or pattern-driven injecting and individualised-injecting are required.

POSTER 152

ABSTRACT 40

THE COSTS OF BOWEL CARE IN SPINAL CORD INJURED PATIENTS: AN EXPERIENCE FROM MALAYSIA

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Background: Bowel care following spinal cord injury (SCI) is a source of distress in SCI patients and often occupies a relatively large portion of the day. It interferes with social participation and requires a lifetime commitment and considerable resources.

Aim: To estimate the cost of bowel care for spinal cord injured patients in Malaysia.

Methods: A cross sectional study was performed in the rehabilitation wards of Hospital Kuala Lumpur, Malaysia from 15/9/08 to 15/10/08. Data on the direct costs of pharmacotherapy, consumables (gloves, apron, swabs, lubricant), colostomy surgery and nurses' wages were analysed. The estimated annual costs of bowel management in paraplegic and tetraplegic patients were calculated based on the annual admission of SCI patients in this hospital.

Results: Twenty one SCI patients were recruited for the study. The estimated costs of bowel care were: RM 2,586 (AUD 862) per patient/year for pharmacotherapy and consumables, RM 3,757 (AUD 1,252) per patient/year if a patient had a colostomy. The estimated annual cost of bowel care (including nurses' wages) for a paraplegic and a tetraplegic patient was RM 3,983 (AUD 1,328) and RM 5,379 (AUD 1,793) respectively.

Conclusion: The estimated annual out-of-pocket costs of bowel care for an SCI patient range between RM 2,586 (AUD 862) to RM 5,379 (AUD 1,793). This estimate did not include the costs of the human resources other than nurses' wages, hospital charges, dietary changes and investigations related to bowel problems. The total cost for a tetraplegic patient is almost one and a half times greater than for a paraplegic patient.

POSTER 153

ABSTRACT 68

NEW MINIMAL INVASIVE TECHNIQUES IN THE TREATMENT OF INTRAMEDULLARY PATHOLOGIES TO PREVENT DESTRUCTION AND DEFORMITIES OF THE DORSAL SPINAL STRUCTURES: THE SPLIT LAMINOTOMY AND THE PARASPLIT TECHNIQUE

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Background and Aims: Multilevel laminectomy for exploring the spinal canal to remove spinal cord lesions has been widely used in spine surgery. According the literature multilevel laminectomy may lead to spinal deformities, instability and spinal cord injuries. With the aim of preserving and reconstructing the mechanically relevant posterior structures the authors developed a novel minimal invasive multilevel spinous process splitting and distraction laminotomy approach and the additional parasplit technique.

Methods: These novel techniques were used in 48 adult patients with midline intramedullary pathologies of the cervical, thoracic and thoracolumbar spine. The patients were followed with regular MRI, CT scans, fluoroscopy and neurological examinations.

Results: The approach used did not affect the extent of resection or neurological outcome. The numbers of splitted laminae were 3 to 10. The incidence of postoperative local pain was lower, within acceptable limits (VAS: 2 to 5), and early mobilization was allowed. The average length of hospital stay was shorter also. Average follow-up was 42 months. The postoperative follow-up CT scans demonstrated bony healing between the osteotomized faces. Instability and deformity was detected in none of the patients on the flexion-extension lateral radiographs during the follow up period.

Conclusion: These surgical approaches suitable for exploring and removing different intramedullary pathologies, help in preventing damage to crucial posterior stabilizers of the spine. Its major advantage is that unnecessary exposure and tissue trauma is reduced, and structures not directly involved in the pathologic process are preserved. In contrast to conventional spinal canal approaches, leaves the muscle attachments on the spinous processes intact, disintegration of vertebral arches and facet joints is reduced. Furthermore, these techniques for exposure and decompression of the spinal canal is a suitable method for all spinal segments, the cervical, thoracic and the lumbar spine in all age group.

POSTER 154

ABSTRACT 412

AN FMRI STUDY OF THE MOTOR CORTEX ABOUT A PREDICTION OF A TIMING RELATED TO THE MOVEMENTS OF FINGERS AND TOES IN PATIENTS WITH CHRONIC SPINAL CORD INJURY

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Objective: Our previous studies suggest that spinal cord injury (SCI) patients show a decreased representation of activation in the primary motor area during toes' movements. But these representations of the premotor area (PM) and supplementary motor area (SMA) after SCI are largely unknown. The purpose of this study is to determine the premotor cortical representations during movements of toes in patients with SCI using functional Magnetic Resonance Imaging (fMRI).

Subjects and Methods: We enrolled 10 SCI patients and 10 healthy, age-matched controls, and they signed consent forms. All patients were

diagnosed chronic complete SCI at the level of TH4-L1. fMRI of 1.5T was used to map cortical representations associated with motor tasks of the right fingers and toes in two groups. The subjects predicted a timing when a ball that is vanished from sight reaches an end on a PC game, and they flexed toes. Patients were just required to make efforts to move toes. We used SPM 2 for analysis.

Results: We compared SCI patients with controls at fMRI maps. During toes' movements, patients showed a decreased representation of activation in SMA. However patients showed an increased representation of activation in right PM. Especially, during movement of toes and fingers, patients showed an increased representation of activation in right frontal eye field.

Conclusions: Our results suggest that some functional changes in the motor command of SCI patients occur. When spinal cord regenerative medicine starts in the future, reeducation of the brain itself may be necessary.

POSTER 155

ABSTRACT 504

EFFECT OF CLINICAL PRACTICE GUIDELINES ON QUALITY OF CARE FOR PATIENT WITH NEUROGENIC BLADDER: ROUTINE TO RESEARCH

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Background and Aims: Neurogenic bladder leads to devastating complications such as upper tract deterioration and urinary tract infection (UTI). To prevent complications, annual urological check, which includes urodynamic study, renal ultrasound and voiding cystourethrogram (VCUG) should be performed. In 2007, incidence of UTI was 2.3% (4 of 174), one of these developed septicemia. New guideline for VCUG was proposed after reviewing care process by rehabilitation team. Our objective was to evaluate urinary tract infection rate following clinical practice guideline implementation.

Methods: Prospective cohort study was conducted in rehabilitation ward during October 2008–September 2010. All patients with neurogenic bladder using indwelling catheterization, who scheduled for VCUG, were recruited. Foley catheter was changed prior to VCUG study according to new guideline. All subjects were observed for UTI at least 24 hours after procedure.

Results: Of 408 patients, 322 (79%) were enrolled. Most of them were spinal cord injured patient. Incidence of VCUG associated UTI was 0.31% (1 of 322 patients). When comparing to those during using old guideline, there was significantly reduction in risk of UTI (ARR = 1.99%). Moreover there was no incidence of septicemia after using the new guideline.

Conclusions: Changing Foley catheter prior to VCUG reduced VCUG associated UTI incidence. Although there was significantly UTI risk reduction cost of treatment was increased (about 7 Dollars). To estimate the cost-effectiveness, further study is required.

POSTER 156

ABSTRACT 308

THE EXCITABILITY OF SPINAL NEURAL FUNCTION DURING SEVERAL MOTOR IMAGERY TASKS ABOUT ISOMETRIC OPPONENS POLLICIS ACTIVITY

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Background and Aims: To study the spinal neural function during motor imagery tasks about 50% MVC isometric contraction of opponens pollicis without overt motor output, we analyzed the F-wave of thenar muscles after stimulating the median nerve during motor imagery conditions.

Methods: A total of 14 healthy volunteers (7 males and 7 females) with mean age of 30.8 years participated in the study after signing an informed consent. We tested F-wave of left thenar muscles after stimulating the left median nerve at the wrist at rest and under hold and motor imagery conditions. In the rest condition, we tested the F-wave during relaxation. The hold condition is defined as holding the sensor of the pinch meter between the thumb and index finger. For the motor imagery condition, at first, subjects learn 50% MVC of isometrically contracting the opponens pollicis muscle with pinch meter and the next, the subjects were asked to imagine the contraction holding the sensor between the thumb and index finger (motor imagery with the sensor condition) and not holding the sensor at the other day (motor imagery without the sensor condition).

Results: Persistence during the touch, motor imagery with the sensor condition and without sensor condition was significantly higher than that observed at rest (Friedman test; $P < 0.01$) and hold condition (Friedman test; $P < 0.05$). The amplitude ratio of F/M during the motor imagery with the sensor condition was significantly higher than that observed at rest (Friedman test; $P < 0.05$). The amplitude ratio of F/M during the motor imagery with the sensor condition was same as that observed at hold condition. The amplitude ratio of F/M during the motor imagery without the sensor condition was not significantly higher than that observed at rest and hold condition. There were no significant differences in the findings among these four conditions in the latency.

Conclusions: It is suggested that the motor imagery with sensor and without sensor about 50% MVC isometric contraction of opponens pollicis without overt motor output increases the excitability of spinal neural function to thenar muscles. As grade of excitability of spinal neural function during the motor imagery with sensor is high, the position with preparation of movement for a motor imagery task of isometric contraction of opponens pollicis at 50% MVC is very important.

POSTER 157

ABSTRACT 19

PATIENT CENTRED CARE: INCORPORATING THE PATIENT'S PERSPECTIVE IN GOAL SETTING ON THE REHABILITATION UNIT

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Background: Rehabilitation is a goal-based 'problem solving educational process aimed at reducing disability and increasing participation experienced by someone as a result of disease or injury'. Active participation by patients in the rehabilitation process is crucial to a successful program. There is a strong culture of person-centred care in the rehabilitation unit and one aspect of this, is the integration of patients in their goal-setting process to facilitate incorporation of their perspectives (which may differ to those of their physicians or therapists) into the rehabilitation program.

Aim: To refine the person-centred nature of a pre-existing goal-setting process in an inpatient rehabilitation unit in a metropolitan tertiary public hospital.

Method: A 2-stage process was used: i) A prospective cross sectional survey of patients on the rehabilitation unit discharged over a period of

4 weeks (n = 34) was conducted to determine gaps in the pre-existing goal-setting process. ii) Based on the results, a new goal-setting form was drafted by members of a "goal-setting working party" (therapists and medical staff) and refined following comments sought from a patient focus group (n = 7).

Results: From the 1st stage, patients felt generally well informed about their goals during their inpatient rehabilitation program. Goals tended to be therapist-driven and patients' preferred the term "achievements" to "goals." Patients were keen to have more input into the goal-setting process and to follow the progress of their goals more easily. From the second stage, patients commented that they preferred the form in landscape format with minimal wording and a greater focus on achievements.

Conclusions: It is important to incorporate patient perspectives to optimize the process of person-centered care and the aim of active rehabilitation. Patients can assist with identifying gaps in these processes and collaboration is crucial for improved consensus of care and communication amongst treating clinicians and their patients.

POSTER 159

ABSTRACT 37

CHANGES IN ENDPOINT KINEMATICS CHARACTERIZE POST-STROKE RECOVERY AFTER ROBOT-AIDED ARM TRAINING

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Background and Aims: Upper-limb (UE) paresis is an important issue because it plays a critical role in daily activities. Movement impairments after stroke can be assessed by changes of UE endpoint kinematics and used for clinical applications. The research is aimed to investigate UE endpoint kinematics for characterizing post-stroke recovery after robot-aided training for a subject after stroke.

Methods: A 58-year-old man with left hemiparesis, 3 months post-stroke, participated in the study. The subject received both conventional therapy and movement training by using a robotic-aided system to provide interactive motor activities for the UE. Robot-aided training consisted of two 40-min sessions per week for 6 months. Changes in clinical scale (Fugl-Meyer test) and endpoint kinematics were obtained at the start (T_1) and per month during intervention (T_2~T_6). Robot-aided measures were calculated from averaged absolute deviation of path (AAD) and normalized jerk cost (NJC). Spearman's correlation test was used to discover the association between clinical scale and robotic-aided measures.

Results: Increased movement accuracy and decreased NJC were shown during recovery. Results of Spearman's correlation test revealed strong relationships between clinical scale and robotic-aided measures ($p < 0.01$).

Conclusions: Motor recovery after stroke can be assessed through integrated neuromuscular control and robot-aided technology. Robot-aided measures are highly associated with clinical scale and may be significant to fundamental movement sciences and clinical applications for stroke rehabilitation.

POSTER 160

ABSTRACT 39

BODY REPRESENTATION BIASES OF NEGLECT PATIENTS

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Background and Aims: Patients with spatial neglect show an ipsilesional bias of the subjective body midline (subjective straight ahead). Here, we explored the deviations of the representation of lateral and central body points of the other anterior and posterior faces of the trunk.

Methods: Patients suffered a right hemisphere stroke. Nine neglect patients (N+) were compared with six non-neglect patients (N-) and 13 healthy controls (C). They had to designate on a mannequin the body site which has been stimulated by a blunt spike. Stimulations points were located on horizontal lines placed at shoulder and navel levels, on the anterior and posterior body surfaces. There were five equidistant points on each line, from the left to right positions (L4, L2, C0, R2, R4), and eleven points which could be designated on the mannequin (L5, L4, L3, L2, L1, C0, R1, R2, R3, R4, R5), with five trials at each point.

Results: The lateral deviation of the stimulation point depended ($p < 0.05$) on the group, location, and group x location interaction. The estimate was fair in N- and C subjects, N+ patients showed a rightward deviation of the representation of the left (L4) and midpoint (C0), and a leftward deviation of the right point (R4). These errors did not depend on the body face (anterior, posterior) and line (shoulder, navel). Variability (SD) depended on the group x location interaction, and was increased on both sides in the N+ group. In addition, the lateral body width (L4-C0, C0-R4) was narrowed in the N+ group, more so on the neglected side.

Conclusions: In N+ patients, biases of body representations extend to lateral body points and not only to the midline, with a left to right gradient. This is associated to decreased accuracy of measures and a bilateral narrowing of subjective lateral body width.

POSTER 161

ABSTRACT 44

SIX-DAY COURSE OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION PLUS INTENSIVE SWALLOWING REHABILITATION FOR POST-STROKE DYSPHAGIA: A CASE SERIES STUDY

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Background and Aims: The usefulness of repetitive transcranial magnetic stimulation (rTMS) for post-stroke dysphagia has been reported. However, no report about combined therapeutic intervention with rTMS for both hemispheres and dysphagia rehabilitation has been published. In this study, the combination therapy was applied for post-stroke dysphagia.The purpose of this study is to clarify the safety and feasibility of a 6-day protocol of rTMS combined with intensive swallowing rehabilitation for post-stroke dysphagia.

Method: In-hospital combination treatment was provided for 4 post-stroke patients (age at treatment: 56-80 years; interval between onset of stroke and treatment: 6-37 months; two are cerebral infarction and two are brainstem infarction) with dyshagia after more than 6 months of the onset of stroke. Over 6 consecutive days, each patient received 10 sessions of combination treatment with 3 Hz rTMS (an intensity of 130% resting motor threshold) of the laryngeal motor cortex in both hemispheres and

intensive rehabilitation (one-on-one training and self-training). rTMS was performed for 10 minutes twice a day. Swallowing function was evaluated by videofluorography at admission and discharge.

Results: All patients completed the 6-day treatment protocol and none showed any adverse effects throughout the treatment. At the end of treatment, improvements in the Penetration Aspiration Scale (PAS) and Laryngeal Elevation Delay Time (LEDT) were found in all patients. Simultaneously, Modified Mann Assessment of Swallowing Ability (MMASA) and Repetitive Saliva Swallowing Test (RSST) also improved.

Conclusions: Our proposed protocol of combination treatment seems to be safe and feasible for post-stroke dysphagic patients, although the efficacy of the protocol needs to be confirmed in a large number of patients.

POSTER 162

ABSTRACT 45

SPOUSES' INCREASED USE OF PASSIVE COPING STYLES AFTER STROKE IS MALADAPTIVE

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Background and Aims: Stroke is a life-changing event, not only for the patient but also for the spouse. The way spouses cope with the cognitive, emotional and social sequelae is suggested to influence their psychosocial functioning. The objectives of this study were to examine the changes in spouses' coping styles that occur in the first year after a patient's stroke, and the influence of these changes on the spouses' psychosocial functioning.

Methods: A total of 211 spouses of patients with stroke were assessed at two different time points using self-reported questionnaires (Utrecht Coping List, Life Satisfaction Questionnaire, Goldberg Depression Scale, Caregiver Strain Index), viz., at the time of the patient's admission to inpatient rehabilitation and one year post-stroke. We used linear mixed model and multiple linear regression analyses to analyse the data.

Results: Spouses' use of an active coping style decreased significantly in the first year post-stroke. There were no significant overall changes in the use of a passive coping style. The use of a passive coping style at admission and increases in passive coping style in the first year post-stroke predicted worse psychosocial functioning one year post-stroke. The models explained between 32% and 50% of the variance in quality of life, depressive symptoms, and strain.

Conclusions: The present study indicates that spouses' passive coping style is maladaptive post-stroke when used in the acute as well as in the chronic phase. It might be possible to use information about spouses' coping styles to identify those at risk for poor long-term adjustment. Moreover, spouses who are more likely to suffer from psychosocial dysfunctioning in the long term, i.e., those who report a high use of a passive coping style in the acute phase, might benefit from programmes in which these maladaptive coping styles are unlearned.

POSTER 163

ABSTRACT 49

COMBINED APPLICATION OF ROBOT-ASSISTED TRAINING AND FUNCTIONAL ELECTRICAL STIMULATION AT THE PATIENTS IN ACUTE STROKE

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The purpose of the research was the estimation of effectiveness of combined application functional electrical stimulation (FES) and robotic tilt-table Erigo.

Material/Methods: Forty patients with hemiparesis in acute stroke have been examined and divided into 2 groups. All the patients got complex medicine and rehabilitation treatment of acute stroke for 20 days. Besides the standard rehabilitation course the patients of the 1st main group ($n = 20$) were trained on robotic tilt-table Erigo in combination with dynamic FES applying module MOTIONSTIM 8 (Medel); the patient's of the 2nd control group ($n = 20$) were only trained on robotic device Erigo. To estimate the effectiveness of combined therapy we used six-marks paresis degree scale and Bartel ADL index. Hemodynamic monitoring was performed with the help of impedance cardiography and transcranial Doppler ultrasonography in damaged middle cerebral artery.

Results: At the end of rehabilitation course the decreasing of paresis degree was revealed in both researched groups, but statistically significant differences were at the 1st patients group ($p < 0.05$). For the time of rehabilitation therapy average growth of marks of Bartel index amounted to 27.4 marks for the patients of the 1st group ($p < 0.05$) and 14.8 marks for the patients of the 2nd group ($p > 0.05$). By dates of Transcranial Doppler ultrasonography on the 20th day of rehabilitation treatment we revealed the elevating of cerebral blood flow velocity and decreasing of peripheral vascular resistance, i.e. the magnification of blood flow in the damaged middle cerebral artery in all patients groups, but the statistically significant results were revealed in the 1st patient's groups. At the time of combined robotic device session and dynamic FES systolic blood pressure was increased in average on 15-25%, diastolic blood pressure was increased on 5-15% from the basic level. Systolic velocity of blood flow in damaged middle cerebral artery had a growth from the 1st minute of verticalization on 5-10% from the basic level. On the 1st minute of verticalization of the 2nd patients group we revealed the decreasing of systolic velocity of blood flow in damaged middle cerebral artery less than 10% from the basic velocity. At the time of verticalization systolic velocity of blood flow was insignificantly increased.

Conclusion: Patients who receive robot-assisted training in combination with FES after stroke are more likely to achieve better motor function than patients trained only robotic tilt-table Erigo. The combined usage of robotic tilt-table Erigo and dynamic FES is safety for cerebral circulation and can be used in early stroke stage with the hemiparetic patients.

POSTER 164

ABSTRACT 50

ROBOT-ASSISTED LOCOMOTOR TRAINING: THE INFLUENCE ON CENTRAL AND CEREBRAL HEMODYNAMICS

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The aim of the research—to estimate central and cerebral blood flow of patients in acute stroke applying rehabilitation robotics.

Materials/Method: One hundred patients with hemiparesis in acute stroke (59 male and 41 female) were examined and divided into two groups. Patients of the 1st main group had 10 days trainings on robotic tilt-table "Erigo" and 20 days trainings on robotic device "Lokomat." Patients of the 2nd control group were verticalised on the usual tilt-table for 10 days and were trained on treadmill with body weight support for

20 days. For hemodynamic monitoring impedance cardiography and transcranial Doppler ultrasonography were performed.

Results: On the 30th day of rehabilitation treatment we noticed the moderate decreasing of the systolic and diastolic blood pressure in both groups of patients. Performing of control Doppler ultrasonography after the end of rehabilitation course with the 1st group patients revealed the increasing of maximum systolic velocity on 18.2% ($p < 0.05$) and decreasing of Pulsatility Index on 15.7% ($p < 0.05$). The patients of the 2nd group were also achieved the increasing of maximum systolic velocity on 6% and decreasing of Pulsatility Index on 2% but the differences were not statistically significant. At the time of robotic device session indexes of systolic and diastolic blood pressure were not lower than basic level. On the 1st minute of "Erigo" verticalization session was revealed the decreasing of systolic velocity of blood flow (V systolic) in damaged middle cerebral artery less than 10% from the basic velocity. From the 6th minute of verticalization session V systolic was increased on 29-32% from the basic level. At the time of "Lokomat" session V systolic in damaged middle cerebral artery was increased in average 5-7%. At the time of tilt-table verticalization session was revealed the reduction of systolic velocity of cerebral blood flow on the 1st minute of verticalization more than 10% from the basic level.

Conclusion: Inclusion of robotic device in rehabilitation therapy makes positive influence on the cerebral blood flow.

POSTER 166

ABSTRACT 59

CONFIDENCE IN DRIVING POST STROKE AND ITS EFFECTS ON DRIVING HABITS

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Background and Aims: Returning to driving post stroke is an important step towards independence, however, less than 50% of stroke survivors return to driving. There have been few studies that look at what factors contribute to returning to driving post stroke and subsequent driving habits. The aim of this study is to examine whether driver's confidence post stroke affects driving habits once they return to driving.

Method: A telephone interview was carried out with 40 stroke survivors (25 men) all over 18 years with a mean age of 65 years. The Adelaide Driving Self Efficacy Scale (ADSES) was use to collect self reported confidence in driving tasks and the Driving Habits Questionnaire (DHQ) was completed to record post stroke driving habits. Participants were recruited via the telephone and were all stroke survivors who had been assessed at the Driving Assessment Unit at the Repatriation General Hospital, Adelaide within the last 3 years.

Results: Recorded data from both questionnaires was entered into the SPSS database and were then analysed to explore findings. Results were statistically analysed and significance in comparisons between participants reported driving confidence and limiting of driving to local area and driving during the day time only, number of kilometres driven, time since stroke and self rating of driving ability were examined.

Conclusion: It is important to understand and identify what factors might contribute to certain driving habits post stroke. Findings from this study suggest confidence does influence specific aspects of driving post stroke. A better understanding of these factors will help to inform health care professionals in how best to discuss the difficult topic of driving post stroke and how best to support stroke survivors returning to driving post stroke.

POSTER 167

ABSTRACT 61

EXERCISE TESTING EARLY AFTER STROKE USING FEEDBACK-CONTROLLED ROBOTICS-ASSISTED TREADMILL EXERCISE: A PILOT STUDY

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Background: Around 75% of post-stroke patients have cardiac disease. Most of these have low exercise endurance due to the cerebrovascular event, and as secondary reaction to immobility. The aim of this study was to evaluate the feasibility of using feedback-controlled robotics-assisted treadmill exercise (RATE) to influence and assess aerobic capacity early after stroke. We were interested in gaining preliminary evidence on the clinical efficacy of the method and focussed on retention rates, suitability of inclusion/exclusion criteria, data processing, and ability to process subjects with available resources.

Methods: In-patients after stroke underwent constant load and incremental exercise testing using a human-in-the-loop feedback system in automated robotic gait orthoses integrated with a treadmill and a dynamic body-weight unloading system (Lokomat, Hocoma AG, CH). Inclusion criteria were stable medical condition, appropriate cognitive function and moderate control of the lower limbs to voluntary produce forces within the exoskeleton. Exercise capacity was measured using breath-by-breath gas exchange monitoring and heart rate telemetry. Outcome measures were oxygen uptake kinetics, peak oxygen uptake (VO2peak), peak work rate (WRpeak), peak heart rate (HRpeak), gas exchange threshold (GET), and work rate variability. Additionally, adherence and data processing were evaluated.

Results: Five patients (63.4 ± 14.7 years, BMI 28.0 ± 2.8) after first-ever stroke (range 16-42 days post event) were included. Retention rate was excellent with no refusals to participate, whereas successful data processing was achieved in 74%. For constant load exercise (40% of 80.0 ± 45.7 W), the time constant of oxygen uptake kinetics was 47.6 ± 8.6 s, whereas work rate variability was 10.9 ± 12.8W. Incremental exercise testing showed a VO2peak of 22.8 ± 5.2 ml/kg^{-1}/min^{-1}, a GET of 11.2 ± 1.4 ml/kg^{-1}/min^{-1}, and a HRpeak of 137.0 ± 23.3 b/min. WRpeak was 65.7 ± 38.7 W and work rate variability was 6.0 ± 2.0 W.

Conclusion: Our findings confirm the feasibility of using feedback-controlled RATE to evaluate aerobic capacity early after stroke. Further studies should confirm validity in patients showing different levels of motor function.

POSTER 168

ABSTRACT 64

TRISMUS IN LOCKED-IN SYNDROME

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Objectives: To evaluate treatment and to determine efficacy of Botulinum Toxin A (BTX A) for trismus in a patient diagnosed with Locked-in Syndrome. To improve patient care and quality of life.

Method: Case description: Locked-in syndrome is caused by ventral pons lesion and is characterized by quadriplegia, anarthria, paralysis of lower cranial nerves, bilateral paresis of horizontal gaze, preserved consciousness and preserved vertical eye movements. Bilateral ventral pontine lesions involving corticospinal and corticobulbar tracts lead to quadriplegia. Damage to the corticobulbar tracts leads to inability to speak, to produce facial movement. Lesion of bilateral CN VI nuclei leads to impairment in horizontal eye movement. The tegmentum of the pons is spared, so the consciousness is preserved. The condition has been described as "the closest thing to being buried alive." In French the common term is "maladie de l'emmuré vivant," literally translated as walled-in alive disease. It is estimated that several thousand patients each year survive. This case report describes 49-year-old female with past medical history significant for hypertension who collapsed suddenly and MRI revealed extensive infarct involving the pontomedullary junction and the left hemipons. MRA showed absent flow in the midportion of the basilar artery and diminished flow in the distal basilar and proximal PCA consistent with basilar artery occlusion. Physical exam was consistent with classical locked-in syndrome. The patient had preserved vertical eye movements up for "yes" and down for "no." At the time of the transfer to the rehabilitation hospital, trismus was present and bruxism was also noted. The patient sustained a laceration to the left lateral aspect of her tongue. The patient was seen by an oral maxillofacial surgeon, and recommendation was made that an oral airway be inserted to prevent additional injury. The patient found the use of oral airway uncomfortable and wished to pursue the option of oral orthotics (bite plate) or any other treatment. The decision was made to proceed with Botulinum Toxin A injection in order to relieve the spasm.

Results: The patient received injection at the masseter muscle bilaterally and initially had a modest improvement with incomplete relaxation. At subsequent treatment she received injection at bilateral masseters and temporalis muscle group. She had significant improvement, and no further tongue injuries were noted. She did not require a bite plate.

Implications and Impact on Rehabilitation Medicine: This was example of "off-label use" of Botulinum Toxin Type A, but the treatment had significant impact on patient care and quality of life. Trismus and bruxism were reported in patients with altered states of consciousness, including acquired brain injury. This case report demonstrated that Botulinum Toxin type A was a safe and effective treatment for patients with severe trismus and associated bruxism, caused by locked-in syndrome.

POSTER 169

ABSTRACT 66

CIAT DURING MULTIDISCIPLINARY IN-PATIENT NEUROREHABILITATION FOR A PATIENT WITH CHRONIC APHASIA

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Background: In-patient neurorehabilitation takes place between the conflicting priorities and expectations from patients and carers, the demands of a multi-disciplinary rehabilitation team and the regulations of health insurance institutions.

Aim: To reconcile the different expectations while ensuring that some clients with chronic aphasia can benefit from constraint-induced aphasia therapy (CIAT) during in-patient neurorehabilitation.

Methods: (a) Single case study: i) 45 year old male; severe chronic aphasia after left middle cerebral artery stroke 2,5 years ago; ii) daily neurorehabilitation setting: speech language therapy (SLT), physio therapy, occupational therapy, recreational therapy, training on exercise bike, swimming. b) Organisation: i) patient had already benefitted from 2 weeks constraint induced movement therapy (CIMT), little change of chronic aphasia with standard SLT; ii) therefore trial with CIAT (4 times/day for 2 weeks); reduced other therapies. iii) tests: comparison of naming subtest of *Aachener Aphasie Test* (AAT) and measuring meaningful words per minute (wpm) during language production samples pre/post-CIAT.

Results: a) Language output: AAT naming test: significant improvement from 64 to 95 points; average number of wpm from 5.5 to 8. b) Team procedures: allocating resources for CIAT for one patient possible if SLT team simultaneously increases focus for other patients on everyday communication activities in small groups and interdisciplinary team supports with combined movement-language tasks.

Conclusion: It is feasible to offer CIAT to in-patients with chronic aphasia providing patient understands that s/he receives virtually no other therapy during this time and staff resources intra- and interdisciplinary get re-allocated to ensure that all patients receive sufficient communication opportunities. Changes can be monitored by administering sub-parts of a well-established aphasia test and measuring verbal output (wpm), which means the burden of testing is kept to a minimum for therapists and patients alike.

POSTER 170

ABSTRACT 73

THE MONTREAL COGNITIVE ASSESSMENT IS VALID IN STROKE BUT SO IS THE MINI-MENTAL STATE EXAMINATION

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Background and Aims: Cognitive screening tools that are valid in stroke are needed. The Montreal Cognitive Assessment (MoCA) has been proposed as a more sensitive measure of cognitive impairment than the Mini-Mental State Examination (MMSE). We aimed to examine performance of the MoCA and MMSE against a full neuropsychological battery after stroke.

Methods: Patients with confirmed stroke completed 2 separate testing sessions at 3 months post-stroke. The MMSE and MoCA, each scored out of 30 and taking approximately 10 minutes, were administered in session 1. In session 2, a neuropsychological battery was administered. Patients were classified as cognitively impaired if they scored >1 SD below the mean on 2 or more of the 6 cognitive domains (visuospatial, attention, executive, memory, language, neglect).

Results: Sixty patients participated in the study [mean age 72.1 years (SD = 13.9), mean education 10.5 years (SD = 3.9), mean NIHSS stroke severity 5.8 (SD = 4.0)]. The MoCA yielded lower scores (mean = 20.0, SD = 5.4; median = 21, IQR = 17-24) than the MMSE (mean = 24.2, SD = 4.5; median = 26, IQR = 22-27). MMSE data were more skewed towards ceiling than MoCA data (skewness = –1.09 versus –0.73). Thirty-nine patients (65%) were classified as cognitively impaired according to the neuropsychological testing. Against this classification, the area under the receiver-operator curve for the MoCA was slightly higher than that for the MMSE (0.87 versus 0.84). At their optimal cut-offs, the MoCA had better sensitivity than the MMSE (0.92 versus 0.82) but poorer specificity (0.67 versus 0.76).

Conclusions: The MoCA is a valid screening tool for post-stroke cognitive impairment, and is typically more sensitive but less specific than the MMSE. Contrary to the prevailing view, the MMSE also exhibited acceptable validity in this setting.

POSTER 171

ABSTRACT 74

MOTOR IMAGERY EXPERIENCES AND USE: ASKING PATIENTS AFTER STROKE WHERE, WHEN, WHAT, WHY, AND HOW THEY USE IMAGERY—A QUALITATIVE INVESTIGATION

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Background and Aims: It is essential to determine MI understanding and ability in stroke patients, in order to design tailored MI interventions. The framework on where, when, what, why, and how to use imagery was explored in patients after stroke.

Methods: Semi-structured interviews were conducted before and after a two week MI intervention period with six MI training sessions. Information was obtained regarding the patients' experiences and knowledge of MI and their evaluation of a practical example of MI. All recorded interviews were transcribed verbatim. The coding scheme was based on an imagery framework and a hierarchical categorisation. Patients' qualitative data were triangulated with results of the KVIQ and diary entries.

Results: Eleven patients after stroke (age range 31-85, 3 females, 1.3-6.4 years after stroke onset) were interviewed twice while two patients were interviewed before the MI intervention only. The concept and method of MI was not established in patients. All questions regarding domains where, when, what, why, and how to use imagery were addressed. Patients imagined themselves as healthy individuals without impairment. They did not focus on surroundings during MI practice, and reported to use positive imagery only. After MI training, patients became more flexible regarding their location and position during MI practice. MI became an automatic process and patients did not need specific concentration and quietness. Patients recommended a daily MI training and began to transfer the MI technique into practice for movements that were affected by the stroke.

Conclusions: MI use is clearly under-researched in stroke rehabilitation. Future MI intervention studies should include evaluation of patients' MI ability, a MI familiarisation session to learn essential MITS elements, and interventions should start with simple MTs and less MI trials repetitions. After a consolidation phase, MI trials repetition could be increased and more complex MTs could be imagined.

POSTER 172

ABSTRACT 75

COMPARISON OF EMBEDDED AND ADDED MOTOR IMAGERY TRAINING IN PATIENTS AFTER STROKE: RESULTS OF A RANDOMISED CONTROLLED PILOT TRIAL

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Background and Aims: Motor imagery (MI) combined with physiotherapy (PT) offers functional benefits after stroke. Two MI strategies exist: added and embedded MI. Both approaches were compared when learning a complex motor task (MT): 'Going down, laying on the floor, getting up again'.

Methods: A single-blinded RCT with MI embedded into PT (EG1), MI added to PT (EG2), and a control group (CG) was conducted. All groups participated in six PT sessions. Primary study outcome: time (sec) to perform MT at pre and post-intervention. Secondary outcomes: level of help needed, stages of MT completion, independence, balance, fear of falling (FOF), MI ability. Data were collected four times: twice during 1-week baseline (BL, T0), once following the 2-week intervention (T1), once after two week follow-up (FU). Analysis of variance was performed.

Results: 39 outpatients after stroke participated (12 females; 29 ischemia; mean age = 63.4 ± 10 years; time since stroke = 3.5 ± 2 years; EBI = 61.0 ± 4; MMSE = 26.6 ± 2). All completed the MT using the standardised 7-step procedure and reduced FOF at T0, T1, and FU. Times to perform the MT at baseline were 44.2 ± 22 s, 64.6 ± 50 s, and 118.3 ± 93 s for EG1 (N = 13), EG2 (N = 12), and CG (N = 14). All groups showed significant improvement in time ($p > 0.001$) and degree of help needed: minimal assistance to supervision (CG) and independent performance (EG1+2). No between group differences were found. EG1 demonstrated changes in MI ability. Patients indicated to value the MI training and continued using MI for other difficult-to-perform tasks.

Conclusions: Embedded or added MI training combined with PT seems to be feasible and beneficial to learn the MT with emphasis on getting up independently. Based on their baseline level CG had the highest potential to improve their outcomes, in particular, MT performance. A patient study with 35 patients per group could give a conclusive answer of a superior MI strategy. The study was registered with ClinicalTrials.gov: NCT00858910.

POSTER 173

ABSTRACT 77

WALKING FUNCTION AT 1 YEAR AFTER STROKE REHABILITATION: A MULTICENTER STUDY

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Background and Aims: To study the walking ability of stroke patients at 1 year after discharge from inpatient stroke rehabilitation. The factors associated with walking ability at 1 year were also explored.

Material and Methods: Three hundred and twenty seven stroke patients from the Thai Stroke Rehabilitation Registry were followed up at 1 year after discharge from inpatient rehabilitation. The walking function was classified as ambulatory and non-ambulator according to the Modified Barthel Index.

Results: One hundred and ninety-two patients (62.7%) came for follow up. The number of ambulators increased from 95 (49.5%) at discharge to

151 (78.6%) at 1 year. Among these, 101, 86 and 9 patients showed improvement, sustained and declined in their walking respectively. The factors associated with the walking ability at 1 year were Brunnstrom motor recovery stage of the affected leg at discharge with OR being 20.4 [95%CI: 3.9, 104.2], having no diabetes mellitus with OR being 3.3 [95%CI: 1.4, 7.7], being married with OR being 2.8 [95%CI: 1.2, 6.5], and being able to change position from supine to sitting on admission with OR being 2.7 [95%CI: 1.2, 6.1].

Conclusions: Most of the stroke patients improved walking ability after being discharged from inpatient stroke rehabilitation. Motor power of the affected leg at discharge, having no diabetes mellitus, being married and being able to change position from supine to sitting on admission were factors associated with walking ability at 1 year after inpatient stroke rehabilitation.

POSTER 174

ABSTRACT 82

PATTERNED SENSORY ENHANCEMENT: AN INNOVATIVE NEUROLOGIC MUSIC THERAPY INTERVENTION FOR OLDER ADULTS DURING REHABILITATION

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Background and Aim: Patterned sensory enhancement (PSE) is a neurorehabilitation music therapy technique that involves translation of musical elements into the spatial, temporal and force components of functional movement. Live-PSE offers promise as an innovative intervention for older adults during rehabilitation. This study aimed to examine the effects of live-PSE on exercise outcome measures with older adult rehabilitation inpatients attending group physiotherapy.

Method: Outcome measures for exercise adherence, exercise repetitions, and perceived exertion were gathered from a convenience sample of 24 older adult inpatients aged 65 years and older with functional hearing. Using a within-subjects design, comparisons between conditions with exercise instruction and live-PSE (experimental) and exercise instruction alone (control) were calculated using paired sample t-tests. Clinician and participant perceptions were documented in a logbook.

Results: There were no significant between condition differences for exercise adherence (M diff = –0.21, 95% CI = –1.1 to 0.6, $p = .615$), exercise repetitions (M diff = –0.63, 95% CI = –2.7 to 1.5, $p = .543$), or ratings of exertion (M diff = –0.21, 95% CI = –1.3 to 0.9, $p = .689$). Logbook records indicated that all physiotherapists and 21 participants perceived live-PSE positively.

Conclusions: Live-PSE did not facilitate measurable improvements and these results support similar research. However, the logbook indicated benefits during sessions with live-PSE including improved exercise timing and participant enjoyment, and these findings are consistent with the aims of PSE. Given these discrepant conclusions, further research with mixed qualitative and quantitative designs is warranted.

POSTER 176

ABSTRACT 86

STROKE REHABILITATION: BENEFITS OF CARRYOVER PROGRAMME IN SUBACUTE CARE

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Introduction: In sub acute stroke rehabilitation emphasis is put on acquisition and not application of skills. This study attempts to show the effectiveness of carry over effect from ward practice.

Methods: Twenty five sub acute stroke patients were met the selection criteria and randomly assigned to control and intervention wards. Same amount of therapist time were given to the two groups of patients. Nursing team from the intervention ward will hand over bathing, transferring, feeding, grooming or toileting tasks to the therapy assistant to practice the new skill daily. Data were collected at baseline and week three.

Results: From T-test, intervention group has shown significant difference after three weeks of therapy intervention from Motor Activity Log Amount Scale ($p = 0.000$), Motor Activity Log How Well ($p = 0.001$), Action Research Arm Test ($p = 0.05$), Physiotherapy Clinical Outcome Variables ($p = 0.000$), Berg Balance Scale ($p = 0.000$) and Modified Barthel Index ($p = 0.000$). However, there is no significant difference in the control group in all the areas except Modified Barthel Index ($p = 0.05$).

Conclusion: Although both groups shows significant improvement in Modified Barthel Index (basic activity of daily living), intervention group achieved far more improvement (improved 17.32%) then control group (improved 9.8%). Focusing on the carry over practice for inpatient rehab could achieve better result from stroke arm usage, mobility, balance and activity of daily living.

POSTER 177

ABSTRACT 93

DOES PHYSIOTHERAPY BASED ON THE BOBATH CONCEPT ACHIEVE GREATER IMPROVEMENT IN WALKING ABILITY IN PEOPLE WITH STROKE COMPARED TO STRUCTURED TASK PRACTICE? A PILOT RANDOMISED CONTROLLED TRIAL

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Background and Aims: The Bobath concept is a widely utilised physiotherapy approach. However, there is little evidence to support the efficacy of the approach and further research is warranted. The aim of the study was to compare the short-term effects of two physiotherapy approaches for improving ability to walk in different environments following stroke: (i) interventions based on the Bobath concept, in conjunction with task practice, compared to (ii) structured task practice alone.

Method: The study design is a randomised controlled trial conducted in two rehabilitation centres, in Melbourne Australia and Gailingen Germany. Twenty six participants between four and twenty weeks post stroke, able to walk with supervision indoors, were randomly allocated to two groups. Both groups received six one hour physiotherapy sessions over a two week period. One group received physiotherapy based on the Bobath concept, including one hour of structured task practice. The other group received six hours of structured task practice. The primary outcome measure was an adapted six minute walk test, incorporating a step, ramp and uneven surface. Secondary measures were gait velocity and the Berg Balance Scale. Measures were assessed before and after the intervention period.

Results: Following the intervention, there was no significant difference in improvement between the two groups for the adapted Six Minute Walk Test (89.9 (SD 73.1)m Bobath versus 41 (40.7)m task practice, p = .07). However, walking velocity showed significantly greater increases in the Bobath group (26.2 (SD 17.2) m/min versus 9.9 (SD = 12.9)m/min, p = .01). No significant differences between groups were recorded for the Berg Balance Scale (p = .2).

Conclusion: This pilot study indicates short-term benefit for using interventions based on the Bobath concept for improving walking velocity in people with stroke.

POSTER 178

ABSTRACT 94

REHABILITATION FOR SEVERE STROKE IN VICTORIA: IS THERE EQUITY OF ACCESS?

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Background and Aims: Previous studies have shown evidence of variations in practice with regard to access to rehabilitation for people with stroke. This study investigated whether there are variations in practice in acceptance of patients with severe stroke into subacute care in Victoria. The aim of the study was to establish if there is a difference in the representation of patients with severe stroke in Rehabilitation and GEM Units across Health Services in Victoria.

Method: Retrospective audit of the Victorian Admitted Episodes Database, Department of Health, Victoria from 2005/2006 to 2009/2010.

Results: 12,499 cases were admitted to Rehabilitation or GEM with stroke from 18 health services. Fifty five percent were classified as severe stroke. Significant variation due to health service/ region was observed for proportion of mild (BI >59), moderate (BI 46-59) and severe (BI <46) strokes admitted to subacute services (Pearson $\chi^2(34) = 455.1248$, p-value < 0.001) and for the proportion of cases admitted to Rehabilitation Units versus GEM units (Pearson $\chi^2(17) = 861.4794$, p-value < 0.001). For prediction of admission to Rehabilitation or GEM, a comparatively large fraction of the variation was attributable to health service/ region (Rho = 0.25, 95%CI: 0.14, 0.43; p < .001) after taking admission severity, age and gender into account. The median difference in change in BI score between Rehabilitation and GEM was 22 points ((95%CI: 20.1, 23.3; p < 0.001), adjusting for admission BI and age.

Conclusion: The study showed evidence of variations in practice regarding access to rehabilitation in Victoria, including both access to subacute services as a whole and access to Rehabilitation Units versus GEM units, with GEM units having poorer outcomes after adjusting for initial level of function and age.

POSTER 179

ABSTRACT 95

DISABILITY AFTER STROKE: A PREDICTOR FOR EXERCISE ABILITY IN A LONGITUDINAL PERSPECTIVE?

Langhammer B, Lindmark B

Background: It is argued that all stroke patients, indifferent of disability, have the same possibility to improve with training. The aim of the study was to follow and register functional improvements in two groups with different functional capacities at baseline for a period of 36 months.

Method: Stroke patients were recruited and divided into groups related to their functional status at baseline. During the acute rehabilitation both groups received functional task-oriented training, followed by regular self- or therapeutic driven training the first year post stroke and varied exercise patterns the following 24 months. The participants were tested on admission, and at three, six, twelve and thirty-six months after the onset of stroke.

Results: Both groups improved functional activity up to six months which then stabilized up to twelve months for to decline somewhat at thirty-six months post stroke. Change scores indicate a greater potential for rehabilitation in the MAS ≤35 in relation to group MAS >35, although the functional capacity was higher in the latter.

Conclusion: These results indicate the importance of maintaining exercise and training for all persons post stroke.

POSTER 180

ABSTRACT 99

HOW PHYSICALLY ACTIVE ARE PEOPLE WITH STROKE IN THERAPY SESSIONS AIMED AT IMPROVING MOTOR FUNCTION? A SYSTEMATIC REVIEW

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Background and Aims: People with stroke in rehabilitation centres spend very little time engaged in physical activity each day, with therapy sessions being the most active part of the day. The aim of this systematic review was to synthesise findings of published studies which investigated the total amount of time spent by people with stroke engaged in physical activity (total active time), and time spent engaged in different physical activity categories during physiotherapy and/or occupational therapy sessions in stroke rehabilitation.

Methods: A systematic search was conducted to identify published studies that investigated the use of time by people with stroke in therapy sessions. Studies were included if participants were adults receiving rehabilitation post-stroke in either an acute or rehabilitation hospital, and data relating to both the therapy content (type of physical activity subcategories) and the amount of time spent in therapy sessions were reported. Two reviewers independently appraised all included studies.

Results: Seven studies were included in the final review. Methods of data collection included therapist self-report, behavioural mapping and video recording. The mean (standard deviation [SD]) of total therapy session duration was 49.5 (14.6) in all the included studies. The time spent physically active by people with stroke in their therapy sessions was 65.1%. The most common activities practiced in a therapy session were walking, sitting and standing with a mean (SD) practice time of 8.7 (4.3), 4.5 (4.0) and 8.3 (2.6) minutes respectively.

Conclusion: People with stroke spend less than three-quarters of therapy sessions physically active. Time spent in the most commonly observed physical activity categories (walking, sitting and standing) may not be sufficient to drive neuroplasticity and promote optimal functional recovery. Therapists should aim to increase active time within therapy sessions. More research is required on the optimal timing, intensity and organisation of therapy services post-stroke.

POSTER 181

ABSTRACT 109

TEMPORAL TRENDS IN STROKE AND ACQUIRED BRAIN INJURY IN DENMARK, YEARS 2000-2010

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Background and Aims: Incidences of acquired brain injury (ABI) and stroke have varied in time. Updated, valid epidemiological data is essential for the detection of new temporal trends, in understanding the impact of preventive measures, and for the planning of rehabilitation services.

Methods: Data regarding the incidence of stroke, traumatic brain injury, subarachnoid haemorrhage, encephalitis, metabolic encephalopathy and primary brain tumours was obtained from the Danish National Patient Registry. This database covers all hospital discharges in Denmark.

Results: The incidence of stroke decreased steadily over the period from 256 to 194 per 100,000 inhabitants from year 2000 to 2010 (a 25% decrease). In contrast, a 35% increase was observed in ABI. The majority of this increase was seen in traumatic brain injury (49%), metabolic encephalopathy (73%), and encephalitis (31%).

Conclusions: The Danish health care system is financed trough taxes and is free for the individual patient. It can therefore be assumed, that the Danish National Patient Registry includes all cases of ABI and stroke in Denmark. The observed decrease in stroke incidence may be contributed to improved medical treatment of risk factors such as hypertension, diabetes, atrial fibrillation and hypercholesterolemia, surgical treatment of carotid stenosis, and improved use of antiplatelet and anticoagulant drugs. No obvious explanation was present for the observed increase in ABI, except from an increase in anoxic brain injury due to cardiac resuscitation.

POSTER 182

ABSTRACT 110

THE NEED OF HOSPITAL AND COMMUNITY HEALTH CARE SERVICES FOR THE REHABILITATION OF ACQUIRED BRAIN INJURY AND STROKE

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Introduction: Acquired brain injury (ABI) and stroke are major challenges to the health care delivery system. Valid epidemiological data is essential for the planning of rehabilitation services within hospitals as well as in the community.

Methods: Data regarding stroke, traumatic brain injury, subarachnoidal hemorrhage, encephalitis, metabolic encephalopathy and primary brain tumors were obtained from the Danish National Patient Registry. This database covers all hospital discharges in Denmark.

Results: In year 2010, 8812 patients (0.16%) were discharged with ABI and 10.731 patients (0.19%) with a diagnosis of stroke from a total population of 5.5 million inhabitants in Denmark. Their characteristics (age, gender, length of hospital stay and mortality) will be presented. From the length of hospital stay, it was estimated that 13,500 patients needed in-hospital rehabilitation; 89% on a general level (i.e. general neurological departments and stroke units), 8% on a regional specialized level, and 3% on a national, highly specialized level. An estimated number of 18,000 patients needed rehabilitation in the community after hospital discharge.

Discussion: The Danish health care system is financed trough taxes and is free for the individual patient. This regards both in-hospital rehabilitation as well as rehabilitation within the community. It can therefore be assumed, that the Danish National Patient Registry includes all cases of ABI and stroke in Denmark. However, incidences may differ from country to country. This could be especially true for traumatic brain injury, because violent conduct and the number of traffic accidents may vary considerably between countries.

POSTER 183

ABSTRACT 112

ANTI-SPASTIC EFFECTS OF THE DIRECT APPLICATION OF VIBRATORY STIMULI TO THE SPASTIC MUSCLES OF HEMIPLEGIC LIMBS IN POST-STROKE PATIENTS: A PROOF-OF-PRINCIPLE STUDY

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Background and Aim: Our pilot study reported the potential effect on novel vibratory therapy for spasticity in post-stroke patients. The aim of this study was to investigate whether the direct application of vibratory stimuli (DAVS) inhibits spasticity in the hemiplegic upper limbs of post-stroke patients.

Methods: Thirty-six post-stroke patients (25 men, 11 women; 16 with right and 20 with left hemiplegia; aged 61 $\pm$ 14.2 years) were randomly allocated to the 'Rest group', 'Stretch group', or 'DAVS group'. After relaxing in a supine posture for 30 minutes, subjects received the interventions for 5 minutes. The modified Ashworth scale (MAS) scores and F-wave parameters (i.e. F-wave amplitude, F/M ratio and F-wave persistence) were recorded before, immediately after and 30 minutes after each intervention. Moreover, cortical activations and finger dexterity were investigated before and after DAVS using functional near-infrared spectroscopy (fNIRS) during finger tapping and 9-hole peg test.

Results: The Rest group showed no significant changes in F-wave parameters and MAS scores. The Stretch group showed a tendency to decrease in F-wave amplitude and F/M ratio immediately after the intervention, but not 30 minutes later. The DAVS group showed significant improvements in F-wave parameters and MAS scores immediately after the intervention, which remained 30 minutes later. The changes in F-wave parameters and MAS scores observed in the DAVS group significantly differed from those in the Rest group and the Stretch group. Increases of oxygenated hemoglobin in the ipsilateral widespread frontal lobe cortex changed to localized increases of oxygenated hemoglobin in contralateral motor cortex after DAVS in parallel to improvement of finger dexterity.

Conclusions: The DAVS has anti-spastic effects in the hemiplegic upper limbs of post-stroke patients. The findings of fNIRS investigation suggest potential cortical reorganization by DAVS treatment and have important implications for the future development of neurorehabilitative spastic treatment.

POSTER 184

ABSTRACT 113

A NATIONAL STRATEGY FOR THE REHABILITATION OF PATIENTS WITH ACQUIRED BRAIN INJURY AND STROKE IN DENMARK

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Background and Aims: Acquired brain injury can occur from a large range of diagnoses such as trauma, encephalitis, metabolic encephalopathy, subarachnoid haemorrhage and brain tumour. ABI possesses a great challenge to the rehabilitation provided in hospitals as well as in the community. Therefore, the Danish National Board of Health initiated the development of a national strategy for the rehabilitation of patients with ABI in Denmark.

Methods: The strategy for rehabilitation of patients with ABI is a further development of a health technology assessment on the same issue also carried out in 2011 by the National Board of Health. It is therefore in line with the current scientific evidence on neurorehabilitation. Demographical data presented was derived from the Danish National Patient Registry that covers all hospital discharges in Denmark.

Results: A total of 8.812 patients (159 per 100,000 inhabitants) were discharged in 2010 with ABI, and 10,731 with a diagnosis of stroke (194 per 100,000 inhabitants). From the length of hospital stay, it was estimated that 13,500 needed in-hospital rehabilitation, 89% on a general level (i.e. general neurological departments), 8% on a regional specialized level, and 3% on a national, highly specialized level. An estimated 18,000 patients needed rehabilitation within the community. Patient pathways in the Danish health care system will be presented.

Conclusions: The Danish Health Care system is financed through taxes and is therefore free for the individual patient. It can therefore be assumed, that the Danish National Patient Registry includes all cases of ABI and stroke in Denmark. However, incidences may differ between countries. The national strategy on the rehabilitation of stroke and ABI resulted in recommended changes in patient pathways, both in hospital and in the community. These recommendations will be presented.

POSTER 185

ABSTRACT 115

SOMATOSENSORY SENSITIZATION IN PERSISTENT SHOULDER PAIN AFTER STROKE: RESULTS OF A PROSPECTIVE FOLLOW-UP STUDY

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Background and Aims: The mechanisms underlying persistent post-stroke shoulder pain (pPSSP) are largely unclear. Recently, it was shown for the first time that pPSSP was associated with clinical signs indicative of somatosensory sensitization already in the first 6 months after stroke. The present study aimed to further explore the mechanisms underlying these signs by using pain research tools such as quantitative sensory testing (QST) and conditioned pain modulation.

Methods: Extensive assessment of somatosensory symptoms and signs was performed within 2 weeks (t0), at 3 months (t1) and at 6 months (t2) after stroke. QST results were compared to the clinical examination. Conditioned pain modulation (CPM) was performed using a cold pressor test combined with QST.

Results: At the affected side, pPSSP (n = 9) was associated with diminished proprioception (t0), with diminished sensation for touch (t1) and sharpness (t2), with increased QST threshold ratios and with increased cold sensation (t2). At the unaffected side, pPSSP was associated with reduced cold pain tolerance thresholds (t1). Notably, in patients with pPSSP reporting increased sensation, multiple body sites across multiple stimulus modalities were involved and increased sensation persisted from t1 to t2. CPM was not different from patients without pPSSP (n = 22).

Conclusions: Pain complaints and somatosensory loss were suggestive of nociceptive pain initiated by repetitive (micro) trauma. Signs indicative of somatosensory sensitization were mild and seemed to occur at the (supra) spinal level. The results are consistent with a study of pPSSP in the chronic phase after stroke, and suggest that central sensitization of both nociceptive and neuropathic origin may contribute to the progression of PSSP.

POSTER 186

ABSTRACT 124

DIFFICULTY ORDER OF ACTIVITIES OF DAILY LIVING IN STROKE PATIENTS: AGE DIFFERENCE

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Background and Aims: The difficulty order of activities of daily living (ADL) is often studied by simple percentages independent of specific factors at discharge from a rehabilitation ward; however, the difficulty order would differ between patients with low and high ADL levels. We investigated whether the difficulty order within the total ADL score differed according to age.

Methods: Subjects were 1022 stroke patients with a unilateral supratentorial lesion who were discharged to Kaifukuki (subacute) Rehabilitation Ward from September 2004 to October 2009. Patients with multiple stroke or with complications restricting rehabilitation were not included. Subjects were divided into 3 groups (younger, middle-aged, and elderly); this investigation included the younger group (<60 years, n = 295) and elderly group (≥75 years, n = 272), with 33.5 and 40.7 mean days from onset to admission, respectively. The Functional Independence Measure (FIM) (version 3) was recorded on admission and at discharge. Ranked logistic analysis that predicted each item of the FIM score from the motor subscore of the FIM (FIMM) was employed to calculate percentages of patients scoring 1, 2, 3, 4, 5, 6, or 7 for each of the 13 items. Using each percentage, average score was estimated for each item, with possible total scores from 13 to 91. The difficulty order was compared between the two groups. The score range (score of most difficult item subtracted from the score of easiest item) for each FIMM score was also calculated.

Results: The score range was larger in the elderly group at discharge. Changes in the difficulty order of items during admission were similar in both groups except for that on locomotion.

Conclusions: Age affected ADL structure. General factors such as cognitive status may influence the learning process in the elderly. This structural difference in performing rehabilitation should be carefully considered.

POSTER 187

ABSTRACT 125

WEIGHT-BEARING EXERCISE IMPROVES MOBILITY IN STROKE SURVIVORS AND MAY PREVENT FALLS IN FASTER WALKERS

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Background and Aim: To investigate whether an exercise intervention can enhance mobility, prevent falls, and increase physical activity among community dwelling people after stroke.

Methods: A randomised trial with blinding of physical outcome assessment was conducted. 151 participants were randomly allocated to an experimental or a control group. Both groups received exercise classes, advice and a home program for 12 months. The experimental group program (n = 76) aimed to improve walking, prevent falls and increase physical activity. The control group program (n = 75) aimed to improve upper limb and cognitive function. The primary outcomes were walking capacity and speed measured before and after the intervention and falls measured monthly.

Results: After 12 months, the experimental group walked an average of 34m further in 6 min (95% CI 19 to 50, $p < 0.001$) and 0.07m/s faster over 10 m (95% CI 0.01 to 0.14, $p = 0.03$) than the control group. There were no differences in proportion of fallers (RR 1.22, 95% CI 0.91 to 1.62, $p = 0.19$) or the rate of falls between groups (IRR 0.96, 95% CI 0.59 to 1.51, $p = 0.88$). There was, however, a significant interaction with a greater falls prevention effect of the experimental intervention in faster walkers (interaction term $p = 0.03$).

Conclusions: The experimental intervention delivered through stroke clubs enhanced mobility but had no effect on falls. Sub-group analysis suggests that the program prevented falls in those with faster walking speeds. The weight-bearing exercise program should be implemented for people after stroke without markedly slowed walking (speed >0.8m/s). Falls prevention for those with slower walking requires further investigation.

POSTER 188

ABSTRACT 126

EFFECT OF MIRROR THERAPY IN RECOVERING UPPER LIMB STRENGTH AND FUNCTION IN CHRONIC STROKE PATIENTS

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Background and Aim: Upper extremity weakness is the common cause of disability after stroke. Many new interventions including mirror therapy have been developed to rehabilitate arm and hand recovery. This study aimed to evaluate the effect of mirror therapy in recovering upper limb strength and function in chronic stroke patients.

Design: Randomized-controlled, assessor-blinded trial

Setting: Thai Red Cross Rehabilitation Center.

Participants: Inpatient hemiplegic stroke of more than 3 months.

Methods: Patients were assigned into either the mirror or the control group by blocked randomization. Each group received standard stroke rehabilitation program, 5 days a week, for 2 weeks. The mirror group had an additional 30 minutes of mirror therapy consisting of 6 functional-oriented tasks. The control group only received 30 minutes of sham therapy. Hand and arm Brunnstrom stage of recovery, motor assessment scale, Barthel ADL index, modified ashworth scale, lateral pinch strength and tip pinch strength were measured before and on the 2nd, 4th and 12th week.

Results: Thirty-four stroke patients were studied. The mean age was 56.2 ± 10.8 years old and median duration of stroke was 4 months. The baseline data for both groups were not significantly different. In the mirror group, the hand Brunnstrom stage of recovery significantly improved after the 4th week ($P < 0.0167$) and lateral pinch strength after the 2nd week. Both groups had significant improvements in the arm for the Brunnstrom stage of recovery and Barthel ADL index after the 2nd week ($P < 0.0167$). Between both groups, the mirror group showed more improvement in the hand for the Brunnstrom stage of recovery and lateral pinch strength ($P < 0.05$).

Conclusion: A standard stroke rehabilitation program with a 2-week mirror therapy can improve the hand Brunnstrom stage of recovery and lateral pinch strength in chronic stroke patients.

POSTER 189

ABSTRACT 127

EFFICIENCY AND VALIDITY OF THE COMPUTERIZED ADAPTIVE TESTING OF FUGL-MEYER MOTOR TEST IN PATIENTS WITH STROKE

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Background and Aims: Efficient and precise assessment of motor function is required for busy clinics. We have developed the computerized adaptive testing of Fugl-Meyer motor test (CAT-FM) for stroke patients to achieve efficient and precise motor assessments. However, the efficiency and concurrent validity of the CAT-FM are largely lacking limiting its clinical utility. Thus, the purpose of this study was to examine efficiency and concurrent validity of the CAT-FM in stroke patients receiving rehabilitation.

Methods: A total of 49 patients receiving routine rehabilitation were assessed by the original 50-item FM and CAT-FM, individually. Both measures were administered by an individual rater with a counterbalanced sequence. The time needed to administer both measures was recorded individually.

Results: The patients' motor function distributed widely, as shown by the 50-itm FM scores ranging from 4-94 points. The CAT-FM was efficient to administer and took only 4 minutes and 2 seconds (4.7 items) on average whereas it took 3.9 times of time to administer the FM (50 items). In addition, the scores of CAT-FM was highly correlated with those of the FM (Pearson's r UE = 0.93, LE = 0.84, motor = 0.92) indicating that the concurrent validity of the CAT-FM was supported.

Conclusions: The CAT-FM was efficient to assess motor function in stroke patients receiving rehabilitation. The concurrent validity of the CAT-FM was also supported. The CAT-FM can achieve efficient and precise assessment of motor function to promote efficiency of patient management and outcome measurement.

POSTER 190

ABSTRACT 128

CEREBRAL PERFUSION AND COGNITIVE FUNCTION IN POST-STROKE PATIENTS WITH HYPERTENSION

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Background and Aim: Hypertension is a major risk factor of stroke, and is the main causes of chronic cerebrovascular insufficiency and cognitive-function decline. Moreover, there is a relationship between hypertension and vascular dementia, the latter of which results in marked neurocognitive dysfunction and social disadaptation of patients. To estimate cerebral perfusion and cognitive function in post-stroke patients with hypertension before and after hypotensive therapy.

Methods: The treatment group comprised 28 post-stroke patients (mean age ± standard deviation [SD], 57.8 ± 8.3 years) with previously untreated or ineffectively treated essential hypertension. All patients underwent brain xenon-enhanced computed tomography (Xe-CT) scanning and comprehensive neuropsychological testing, both before and after 24 weeks of hypotensive therapy using the angiotensin II receptor blocker (ARB) olmesartan medoxomil. The control group comprised 20 age-matched post-stroke patients (mean age ± SD, 56.6 ± 8.5 years) without hypertension, carotid atherosclerosis, coronary artery disease, or psychiatric disorders.

Results: The hypertensive patients had significantly lower levels of cerebral perfusion (4-8%) in all brain regions, a 25% decrease in attention and psychomotor speed, and an 18% decrease in mentation compared with the control subjects. Following 6 months of hypotensive therapy, the hypertensive patients experienced an increase in cerebral perfusion by 8-15% in all brain regions, an 18-36% improvement in attention and psychomotor speed, and an average 19% improvement in abstract mentation.

Conclusions: Hypertensive post-stroke patients showed marked signs of cerebral hypoperfusion and impaired cognitive function compared with controls, including decreased attention, reduced psychomotor speed, and slower mentation. Hypotensive treatment with ARB for 24 weeks improved their cerebral perfusion and cognitive function.

POSTER 191

ABSTRACT 129

TRIGEMINAL SOMATOSENSORY EVOKED POTENTIALS IN POST-STROKE PATIENTS

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Background and Aim: Sensory nerves that supply mechanoreceptors in the mucosal lining of the oral cavity, pharynx, and larynx provide the substrate for a variety of sensations. The purpose of this study was to determine the relationship between the trigeminal somatosensory evoked potentials (TSEPs), videofluoroscopic examination of swallowing (VF), and oral sensation.

Methods: Fifteen post-stroke patients (age: 66.2 ± 13.3 years, duration after stroke onset: 17.5 ± 7.6 weeks, 12 males and 3 females) were enrolled in this study. TSEP was recorded contralaterally from C'5 or C'6 (midpoint between Cz and external auditory porus). Clip shaped silver-balled stimulating electrodes with 2 mm contact surface and inter-electrode distance of 10 mm were applied to the inner surface of the lip. Each half of the upper and lower lip was stimulated by an electrical rectangular pulse of 3 or 4 times sensory threshold and 0.2 msec duration, at 2.3Hz. These patients had all undergone VF, and a videofluoroscopic dysphagia scale (VDS) was made according to the VF recordings. The oral touch score (OTS) and oral stereognostic ability (OSA) were evaluated simultaneously.

Results: The pattern of TSEP consisted of 6 and 7 discrete peaks by the upper and lower lip stimulation respectively. The mean peak latencies of the waves obtained by the upper lip were P3, N9, P20, N25, P35 and N45. The mean peak latencies of the lower lip were N3, P9, N13, P20, N25, P35 and N45. We next divided the patients into two subgroups based on their responsiveness of TSEP. In good response group, the OTS and OSA scale were significantly superior to those of the other group. Further, the VDS score tended to be lower in good response group.

Conclusions: The TSEP was developed to be used as an objective and quantifiable parameter of post-stroke patients with dysphagia and oral dysfunction.

POSTER 192

ABSTRACT 135

ARM FUNCTION WITHIN 72 HOURS AFTER FIRST OCCASION OF STROKE AND STROKE OUTCOME IN AN UNSELECTED POPULATION

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Background and Aims: Impaired motor function in upper extremity is reported to be approximately in 70-80% of patients, and influences the stroke unit care and rehabilitation. Aim of this study is to describe upper extremity function, the acute care and outcome in an unselected population of patients with first occasion of stroke and explore factors associated with impaired upper extremity function as well as impact on outcome.

Method: Retrospectively all patients over 18 years of age, living in a geographical catchment area, with first ever stroke being at the stroke unit within 72 hours after onset were included. Baseline characteristics, stroke outcome, arm and hand function within 72 hours, care pathway in acute phase were described using information from the patients' charts. Strokes were categorized according Bamford classification and the Trial of Org 10172 in Acute Stroke Treatment criteria.

Results: This study screened 984 patients with first ever stroke. Of these, 707 patients fulfilled the inclusion criteria. 77.9% received hospital care on same day as stroke onset, and 89.3% were directly admitted to a stroke unit. Mean length of stay in the stroke unit were 9.8 days. Mortality within 72 hours after stroke onset was 5.0%. Within 72 hours 48.1% had impaired arm and hand function which was positively associated with age ($p < 0.002$), need of acute hospital care ($p > 0.0001$) and mortality within the acute care ($p < 0.0001$).

Conclusions: Impaired arm and hand function in this study is present in 48% of patients which is less than the previously reported 70-80% in the acute stage. This indicates that acute stroke care and medical treatment have improved which influences the rehabilitation.

POSTER 193

ABSTRACT 138

"FAST-TRACK" OF ACUTE STROKE PATIENTS IS EFFECTIVE AND SAVES TIME!

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Background and Aims: There is still a considerable delay between onset of symptoms and arrival in the stroke unit in acute stroke for most patients. The aim of the present study was to describe the impact of "fast track" direct admission from ambulance to stroke unit on the delay from call for ambulance until arrival in a stroke unit.

Methods: Between September 2008 and November 2009 a subset of patients with presumed acute stroke in the ambulance were directly admitted to a stroke unit bypassing the emergency department (ED). A control group matched for a number of background variables was created.

Results: In all, there were 53 patients in the ambulance direct (AD) group and 49 patients in the control group (CG). The mean delay time from call for ambulance until arrival in stroke unit was 57 minutes in AD versus 339 minutes in CG ($p < 0.0001$). A final diagnosis of stroke was found in 55% in AD versus 70% in CG (NS). A final diagnosis of stroke, transient ischemic attack (TIA), sequelae of cerebral events or epilepsy was found in 91% and 96% respectively. Among stroke patients who lived at home prior to event the proportion who lived at home after 3 months was 71% and 62% respectively (NS).

Conclusion: A fast track concept of direct admission to stroke unit from ambulance if a presumed stroke had a dramatic effect on delay to stroke unit admission. Although only 55% had a final diagnosis of stroke more than 90% had the diagnoses that are most commonly seen in stroke units.

POSTER 194

ABSTRACT 143

CLINICAL APPLICATION OF COMBINED 6-HZ PRIMED LOW-FREQUENCY RTMS AND INTENSIVE OCCUPATIONAL THERAPY FOR UPPER LIMB HEMIPARESIS AFTER STROKE

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Background and Aims: As a novel technique for modulating local neural activity, 6-Hz primed low-frequency repetitive transcranial magnetic stimulation (rTMS) has been reported to have a more potent and long-lasting suppressive effect compared with non-proceeded continuous 1-Hz low-frequency rTMS. Although 6-Hz primed low-frequency rTMS has been already applied clinically for upper limb hemiparesis after stroke as an isolated intervention at other institutions, combined application of 6-Hz primed low-frequency rTMS and intensive occupational therapy (OT) for the impairment has not been reported. Therefore, the aim of this study was to evaluate the safety, feasibility and efficacy of 6-Hz primed low-frequency rTMS applied with intensive OT for upper limb hemiparesis after stroke.

Methods: Eleven patients with history of stroke and upper limb hemiparesis (age at intervention: 61.0 ± 13.7 years, time after stroke onset: 70.2 ± 39.8 months) were studied. Each patient received 22 sessions of 6-Hz primed low-frequency rTMS (10-min 6-Hz priming stimulation followed by 20-min low-frequency rTMS of 1-Hz) applied to the non-lesional hemisphere plus intensive OT comprising 60-min one-to-one training and 60-min self-training during 15-day hospitalization. The motor function of the affected upper limb was evaluated by Fugl-Meyer Assessment (FMA) and Wolf Motor Function Test (WMFT) on the days of admission and discharge.

Results: The scheduled protocol was well tolerated by all patients. None of the patients experienced any new symptoms or any deterioration of neurological function. The treatment significantly increased the FMA score (from 42.2 ± 6.9 to 45.6 ± 7.2 points, $p < 0.005$) and shortened the log performance time of WMFT (from 3.26 ± 1.21 to 2.81 ± 1.26 sec, $p < 0.05$).

Conclusions: The 15-day protocol of 6-Hz primed low-frequency rTMS combined with intensive OT seems to be a safe and a potentially useful therapeutic approach for upper limb hemiparesis after stroke, although randomized controlled studies with control patient group should be performed to confirm the efficacy of the protocol.

POSTER 195

ABSTRACT 145

NEUROREHABILITATION OUTCOMES OF THE EARLY SUPPORTED DISCHARGE (ESD) PROGRAMME FOR STROKE PATIENTS: THE SINGAPORE EXPERIENCE

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Background and Aim: Early supported discharge from hospital with continued home therapy has shown good rehabilitation outcomes in a number of international centres. We aim to determine neurorehabilitation outcomes of stroke patients who were recruited into the Early Supported Discharge (ESD) programme of an acute hospital in Singapore.

Method: 255 consecutive patients (60% male, mean age 65.2, SD 11.7 years) were recruited into the ESD program during July 2007 to July 2010. Main eligibility criteria for ESD include: acute stroke onset (within 3 months), residual mild to moderate disability, and availability of a caregiver. The programme was administered by a multi-disciplinary team comprising of a neurologist, a physiotherapist, an occupational therapist and a nurse clinician. Rehabilitation outcomes measures include Motricity Index (MI), Frenchay Activity Index (FAI), Functional Independence Measure (FIM), and Modified Rankin Scale (MRS). These were assessed at the first and the last ESD sessions with differences being statistically analysed using paired-sample t-test. Improvements in individual FIM component scores were also determined to evaluate neurological recovery.

Results: All patients received home therapy within 3 days after discharge that lasted from 2-6 weeks. Significant improvements ($p < 0.001$) were found in all the functional outcome measures. Motor recovery showed improvements of 12 points in upper limb MI (78 to 90) and 14 points in lower limb MI (75 to 89). Functional gains in basic and instrumental activities of daily living with a mean improvement of 16 points (100 to 116) in FIM and 9.9 points (1.0 to 9.9) in FAI were observed. 9 individual motor components in FIM improved by ≥ 1 point post-ESD. Globally, these improvements translated into significant increases in the proportions of patients achieving excellent (MRS 0-1; 4.4% to 49.4%) or independent (MRS 0-2; 23.4% to 86.1%) functional outcomes.

Conclusion: ESD for stroke patients in Singapore has been promising in facilitating motor gains and improving neurorehabilitation outcomes, although comparisons with stroke patients not receiving therapy or receiving in-patient rehabilitation therapy in controlled studies need to be performed to confirm the usefulness of ESD.

POSTER 196

ABSTRACT 146

EFFECTIVENESS OF INTRAVENOUS RT-PA THERAPY FOR CEREBRAL INFARCTION BASED ON THE JAPANESE ASSOCIATION OF REHABILITATION MEDICINE PATIENT DATABASE

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Background and Aims: In Japan in 2005, the administration of recombinant tissue plasminogen activator (rt-PA) therapy was approved for cerebral infarction patients within 3 hours from onset. The purpose of this study was to investigate the effectiveness of rt-PA therapy for cerebral infarction from the standpoint of rehabilitation medicine as a scholarly research project for the "Japanese Association of Rehabilitation Medicine Patient Database."

Methods: Subjects comprised 4168 patients with cerebral infarction, including 2959 cases in acute-treatment hospitals providing initial treatment and 1209 cases in convalescent hospitals providing rehabilitation services. The patients were divided into two groups, an rt-PA group and a non-therapy group. The scores for the National Institute of Health Stroke Scale (NIHSS), modified Rankin Scale (mRS), and functional independence measure (FIM) in the rt-PA group were compared with those in non-therapy group in both acute-treatment hospitals and convalescent hospitals.

Results: In acute-treatment hospitals, NIHSS, mRS, and FIM were significantly improved in the rt-PA group compared with the non-therapy group. In convalescent hospitals, NIHSS, but not mRS and FIM, was significantly improved in the rt-PA group compared with the non-therapy group. In the acute-treatment hospitals, two factors (functional impairment and limited activity) regarding International Classification of Functioning, Disability and Health were improved in the rt-PA group.

Conclusions: In the present study, the effectiveness of rt-PA therapy was reconfirmed, especially in the acute phase of cerebral infarction. In Japan, the regional liaison-critical pathway was introduced in 2008 to effectively facilitate the transfer from acute-treatment hospitals to convalescent hospitals, and to quickly initiate rehabilitation services. The present study suggests that rehabilitation services in the acute phase enhance the effectiveness of rt-PA therapy.

POSTER 197

ABSTRACT 147

A CLOSER LOOK AT ARM REHABILITATION AND OUTCOMES AFTER STROKE: A RESEARCH PROTOCOL

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Background: Recent studies show a variation in the dose of upper limb therapy being provided, and how dose is recorded. There is limited research on the number of repetitions of upper limb practice that stroke patients can, and do manage to complete. Most studies show that stroke patients are inactive for large parts of the day during inpatient rehabilitation. Although there is consensus that increased dosage should improve functional outcomes, the optimal dose is unclear and more research is needed. The aims of this study are to: describe the amount of upper limb practice completed by stroke survivors during inpatient rehabilitation at a stroke unit and their outcomes; establish predictors for a higher amount of practice and better outcomes and; investigate the relationship between the upper limb practice undertaken by stroke survivors and upper limb outcomes.

Methods: A prospective cohort study design is being used. A sample of 100 consecutive inpatients of the stroke unit at Bankstown Lidcombe Hospital is being recruited over an 18-month period. Patients have a confirmed diagnosis of stroke, upper limb impairments due to their stroke; an admission score of <18 on the Motor Assessment Scale Upper limb Items (6, 7 and 8) and a Modified Rankin Scale of ≥ 3. The type and amount (repetitions) of upper limb practice, baseline, discharge and weekly progress measures are being collected. Outcome measures include the Motor Assessment Scale (items 6, 7, 8), the Box and Block Test, Action Research Arm Test, Manual Muscle Test, and self-care items from the Functional Independence Measure. Data are being prospectively recorded by treating therapists.

Conclusion: This study will provide unique insights into the capacity of stroke survivors to practice throughout their hospital admission. In addition, outcomes will be systematically documented and predictors of both outcome and dosage of practice will be established.

POSTER 198

ABSTRACT 149

IS IT POSSIBLE TO IMPROVE THE LIFE SITUATION AMONG COMMUNITY-DWELLING INDIVIDUALS IN THE LATE PHASE OF STROKE THROUGH A RHYTHM AND MUSIC METHOD AND THERAPEUTIC RIDING? STUDY PROTOCOL FOR A THREE-ARMED RANDOMIZED CONTROLLED TRIAL

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Background: There is a need to strengthening the evidence for complementary rehabilitation programs in the late phase after stroke for which there is empirical support.

Methods/Design: A single blinded three-armed randomized controlled trial is described with the aim to evaluate whether it is possible to improve the life situation among individuals in the late phase of stroke through a rhythm and music method and therapeutic riding. A total of 123 individuals will be consecutively and randomly allocated to one of three groups: (T1) rhythm and music therapy; (T2) therapeutic riding; or (T3) control group receiving music therapy after one year. Evaluation is conducted at baseline, following the 12-week intervention period, three and six months after completion of the intervention period. The evaluation comprises questionnaires, blood sampling for analysis of biomarkers, and a comprehensive functional and cognitive assessment. In addition, a

qualitative part is included to add an insight into participants' experiences and attitudes towards the two interventions. Based on the Classification of Functioning, Disability, and Health (ICF) the outcome measures are classified into 6 comprehensive domains, with participation being the primary outcome measure. The main primary outcome measure is the degree of participation measured by the Stroke Impact Scale. Another primary outcome measure within the participation domain is the psychosocial subscale of Fatigue Impact Scale. The secondary outcome measures are grouped within the following domains: body functions and structure; activity; environmental factors; personal factors; life satisfaction and health related quality of life (constituting a separate domain).

Conclusion: A positive outcome would increase the scientific basis for interventions in the late phase of stroke thus facilitating further research and implementation in everyday clinical practice. Furthermore, this research programme will contribute to the knowledge about how group intervention programs may improve the life situations among individuals in the late phase of stroke.

Trial registration: Clinical Trials.gov Identifier: NCT01372059

POSTER 199

ABTRACT 150

FALLS PREVENTION AFTER STROKE: DOES ADHERENCE TO EXERCISE INFLUENCE FALLS?

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Background and Aims: Falls are common after stroke. The Otago-Exercise-Programme (OEP) is effective in reducing falls in older people. However, a randomised controlled trial (RCT) conducted by our group found that a multi-factorial falls intervention, including OEP, was not effective in reducing falls in people with stroke. Adherence to exercise may have contributed to the negative result. Therefore, the aim of this paper is to determine the effect of exercise adherence on falls in people with stroke returning home after rehabilitation.

Methods: Participants receiving intervention in the RCT (N = 64, mean 71 years, 37% female, 78% infarct) were included. Participants were assessed after discharge and prescribed exercises using the OEP protocol. Adherence was determined from exercise diaries/physiotherapist review. Full adherence was defined as exercising at least three times/week, partial adherence one-two times/week, and non-adherence less than once/week, averaged over one year. The relationship between adherence and falls was analysed by determining incidence rate ratios (IRR) using negative binomial regression, and chi-square for proportions.

Results: Sixteen participants (25.0%) were fully adherent, 36 (56.3%) partially adherent and 12 (18.7%) non-adherent. There was a significant difference in proportion of fallers across adherence categories ($p = 0.01$), with a higher proportion of fallers in those who partially adhered. Falls rate was significantly less in those fully adhering compared to partial adherers (IRR 0.34, 95% CI: 0.15–0.78, $p = 0.01$). Those who were non-adherent had a lower non-significant falls rate than those who partially adhered (IRR 0.77, 95% CI: 0.32-1.82, $p = 0.56$). The rate of falls was lower in those who fully adhered compared with non-adherers, but not significant (IRR 0.45, 95% CI: 0.16-1.28, $p = 0.13$).

Conclusion: Contrary to expectations, the relationship between adherence and falls was not linear. This may reflect exposure to risk or the heterogeneity of the sample. Factors influencing adherence need to be considered in research and clinical practice when prescribing exercise.

POSTER 200

ABSTRACT 152

KINEMATIC ANALYSIS OF UPPER EXTREMITY PERFORMANCE AND ITS RELATIONSHIP TO SENSORIMOTOR IMPAIRMENTS AFTER STROKE

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Background and Aim: Kinematic analysis is a powerful method for an objective assessment, and is increasingly employed as outcome measure after stroke, but little is known about associations between kinematics and sensorimotor impairments. The aim of this study was to determine the relationships between the actual movement performance from kinematic analysis and the sensorimotor impairments in subjects after stroke.

Methods: 30 subjects with first time stroke, able to perform the drinking task, were included from the cohort of the SALGOT-study. The 3D kinematic analysis of movement performance during drinking task was used to assess movement time, smoothness and compensatory movements of trunk. The sensorimotor impairments of sensitivity, pain, passive range of motion, spasticity and grip strength were included as predictors into the regression models. The level of impairment was measured with Fugl-Meyer Assessment (FMA) and the activity limitation with Action Research Arm Test (ARAT).

Results: Only small amount of variance in movement performance (movement time, smoothness) and in compensatory trunk displacement was explained by sensorimotor impairments, respectively 14% and 21%. These models were significantly improved when the ARAT was added, and in the final model with sensorimotor impairments and ARAT as predictors, the ARAT alone was statistically significant and explained 56% of variance in movement time and smoothness and 36% of variance in compensatory trunk displacement. The FMA did not have significant influence in these models.

Conclusions: Our results indicate that the sensorimotor impairments (sensitivity, pain, passive range of motion, spasticity, grip strength) alone are not sufficient to explain the variance in actual movement performance obtained with kinematic analysis. In contrary, the ARAT seems to be more appropriate clinical measure that can capture the essential elements of movement performance during a daily task, as drinking from a glass.

POSTER 201

ABSTRACT 158

THERAPEUTIC APPLICATION OF HIGH-FREQUENCY RTMS COMBINED WITH INTENSIVE OCCUPATIONAL THERAPY FOR PEDIATRIC STROKE PATIENTS WITH UPPER LIMB HEMIPARESIS: A CASE SERIES STUDY

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Background and Aims: Recently, several authors have reported that low-frequency repetitive transcranial magnetic stimulation (rTMS) applied to the non-lesional hemisphere significantly improved the motor function of the affected upper limb in adult stroke patients with hemiparesis. For pediatric stroke patients, beneficial effects of low-frequency rTMS has been already confirmed in a randomized controlled study. However, no report describing therapeutic application of high-frequency rTMS for this patient population has been published. As a case series study, therefore, we introduced high-frequency rTMS combined with intensive occupational therapy (OT) in two pediatric hemiparetic patients.

Methods: Two pediatric patients with upper limb hemiparesis in their chronic phase of stroke were subjected (8-year-old right-handed boy and 9-year-old right-handed boy). In both of the patients, 22 treatment sessions of high-frequency rTMS combined with intensive OT were provided during 15-day hospitalization. The high-frequency rTMS was applied over the lesional motor cortex at the frequency of 10 Hz for 15 minutes in each session (1,500 pulses per session). One session of intensive OT consisted of 60-min one-on-one training and 60-min self-exercise. Motor function of the affected upper limb was serially evaluated with Fugl-Meyer Assessment (FMA), Wolf Motor Function Test (WMFT), Simple Test for Evaluating hand Function (STEF), and Ten-second Test.

Results: Neither of the patients showed any adverse effect with the intervention. On some measures applied for this study, the improvement of motor function in the affected upper limb was found in both of the patients. In addition, they became able to use their affected upper limb for some activities of daily livings.

Conclusions: Our proposed protocol featuring high-frequency rTMS and intensive OT was safe and feasible in two pediatric stroke patients. This protocol could be a novel intervention for upper limb hemiparesis after pediatric stroke.

POSTER 202

ABSTRACT 160

ILC MEDIATED FES FOR STROKE ARM REHABILITATION

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Background: Evidence exists for the effectiveness of functional electrical stimulation (FES) and robots in stroke rehabilitation. This study examined i) the feasibility of using Stimulation Assistance through Iterative Learning (SAIL), a novel system combining FES and robots for chronic stroke upper limb rehabilitation and ii) participants' perspectives of the system.

Method: Five chronic stroke participants, three men and two women aged between 33 and 67 years, with reduced upper limb function were recruited to this study via stroke clubs and a volunteer database. Participants undertook 18, 1 hour training sessions involving 3D tracking tasks in which they moved their impaired arm, supported by a robot, to follow a slowly moving sphere along a specified trajectory. FES precisely controlled by advanced iterative learning control (ILC) algorithms, was applied to the triceps and anterior deltoid muscles. For assessment participants completed unassisted tracking tasks in each session, and the Action Research Arm Test (ARAT) and Fugl-Meyer Assessment (F-M) pre- and post-intervention. Participant perspectives were explored during a semi-structured interview post-intervention. Analysis of data was conducted using: linear regression for changes in assisted and unassisted tracking; a signed Wilcoxon sum-rank test for F-M and ARAT; and content analysis for the semi-structured interviews.

Results: From pre- to post-intervention a significant improvement in the F-M (mean 23.5 (SD 12.95) to 32.8 (SD 12.28), $z(5) = -2.02$, $p = .04$), an improvement in unassisted tracking performance, and a reduction in the amount of ES required for accurate assisted tracking were demonstrated. No changes were found for the ARAT. Participants responded positively to the system and identified ways to achieve more effective, functional improvements.

Conclusion: The feasibility of SAIL in reducing upper limb impairments following stroke was demonstrated. Participants' perspectives highlighted key issues to be considered by researchers developing new rehabilitation technologies, indicating the value of user involvement.

POSTER 204

ABSTRACT 165

COMPONENTS OF AN EFFECTIVE EARLY SUPPORTED DISCHARGE TEAM FOR STROKE: A WEST AUSTRALIAN PERSPECTIVE

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Background: Early supported discharge (ESD) services for stroke have been proven clinically and economically appropriate, as well as providing a meaningful rehabilitation context for clients. Implementation of these services however, has been little studied. Recently, a framework of components for "effective" ESD teams was derived from teams participating in clinical trial research.This study applies the framework to an ESD service in practice, providing general rehabilitation in Western Australia. The achievement of components is investigated as well as contextual factors that may influence achievement from a staff point of view.

Method: An explanatory mixed methods approach was utilized involving secondary analysis of service data, structured survey and focus group interviews of staff. Results were presented together in four theme areas using quantitative and qualitative descriptive methodologies.

Results: The service fulfilled most components with exceptions for physiotherapy staffing levels, the presence of a key worker and the collection of subjective patient outcome measures. Teams had additional professions supported by national guidelines and described collaborative working as a product of the work environment and context of rehabilitation. ESD intervention was influenced by staff capacity, timing of hospital discharge and availability of community services.

Conclusions: Findings suggest that the context in which an ESD team operates influences its implementation in relation to the evidence base. In a configuration that provides general rehabilitation, an appropriately coordinated team of senior clinicians with stroke-related skills can achieve most components of an "effective" ESD team for stroke. This may be of interest to the provision of ESD services in areas where a geographically dispersed population requires flexibility in the provision of specialist care. More study is required to ensure best practice is provided to early discharge stroke patients.

POSTER 205

ABSTRACT 171

A QUALITATIVE INVESTIGATION OF STROKE EARLY SUPPORTED DISHCARGE SERVICES: MOVING BEYOND THE EVIDENCE BASE

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Introduction: Recent evidence has helped to establish key components of effective Early Supported Discharge (ESD) services within the stroke rehabilitation pathway. However, less is understood about the challenges of implementing these services in practice. The current study addresses this gap, and investigates issues of uncertainty around how best to organise and deliver ESD services.

Method: We adopted a multi-method, qualitative approach to data collection and analyses, employing; interviews, observation, and documentary data. Findings are based on a thematic analysis of semi-structured interviews with service commissioners, service managers, physicians, therapists, nurses and allied healthcare professionals (n = 42), working in and around three ESD services in the UK.

Results: ESD can be accessed after varying lengths of acute, in-patient stays, meaning that hybrid systems for different patient cohorts may operate within the same service. The nature, intensity and duration of rehabilitation can also vary, depending on individual patient therapy needs and rehabilitation goals. Collaboration between acute staff and ESD teams is critical for eligibility decisions, especially for more complex cases. The multidisciplinary team nature of ESD is cited as a positive feature, and is manifested through: interdisciplinary working, shared team roles, and composite rehabilitation sessions. Having stroke specialist healthcare professionals within the ESD team is also viewed favourably. Shared job roles, staff rotations and joint training sessions are forwarded to meet the challenges of spanning the professional and organisational boundaries between acute, ESD, and community services.

Conclusion: Ongoing research will provide insights into how to implement effective ESD services within an integrated stroke care system, for the benefit of patient and carer groups.

POSTER 207

ABSTRACT 177

FUNCTIONAL ELECTRICAL STIMULATION IN COMBINATION WITH ROBOTIC MECHANIC IN PATIENTS WITH ACUTE ISCHEMIC STROKE

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Introduction: The aim of our research was to evaluate the efficacy and safety of functional electrical stimulation, combined with a robotic mechanical therapy in patients with central hemiparesis in acute ischemic stroke.

Material/Methods: We examined and divided into 2 groups 104 patients with acute ischemic stroke in middle cerebral artery. Group I included 58 patients who received a course of rehabilitation therapy with the inclusion of training on robotic system Erigo and synchronized with functional electrical stimulation. Patients with group II (46) received treatment without FES. To assess the rehabilitation measures used a 6-point scale paresis and electrophysiological examination (impedance cardiography, Doppler ultrasound of the affected middle cerebral artery, evoked potentials) before, during and after the session robotic mechanotherapy.

Results: In all patients, a decrease in the degree of paresis of 1.4 points in group 1 at 0.54 in 2. Hemodynamic abnormalities during robotic therapy in combination with FES were not revealed. At 20 days of rehabilitation, a decrease of the segmental latency response in both groups of patients, more pronounced in patients of group 1.

Conclusion: It was found that the use of functional electrical stimulation is safe in acute stroke, and the effect of the combination of FES with robotized mechanical therapy is higher than in conventional kinesiotherapy.

POSTER 208

ABSTRACT 185

COMBINATION TREATMENT OF RTMS AND INTENSIVE OCCUPATIONAL THERAPY FOR UPPER LIMB HEMIPARESIS: A PILOT STUDY OF 60 POST-STROKE PATIENTS

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Background and Aims: We developed a 15-day protocol of low-frequency repetitive transcranial magnetic stimulation (rTMS) and intensive occupational therapy (OT) for upper limb hemiparesis after stroke. The aim of this study was to clarify the safety and the significance of clinical changes induced by the protocol.

Methods: The study subjects were 60 post-stroke patients with upper limb hemiparesis (age: 58 $\pm$ 17 years. time after onset: 57 $\pm$ 43 months). The severity of upper limb hemiparesis was categorized as Brunnstrom stages of 3-5 for hand-fingers. They were assessed as to have reached a plateau state of recovery in spite of conventional occupational therapy. In our proposed protocol, each patient received 22 treatment sessions of 20-min low-frequency rTMS applied to the non-lesional motor cortex and 120-min intensive OT over 15-day hospitalization. The intensive OT comprised two components; a 60-minute one-on-one training and a 60-minute self-training. The program of OT involved shaping techniques and repetitive task practice. The Fugl-Meyer Assessment (FMA), log performance time of Wolf Motor Function Test (LPT-WMFT) and modified Ashworth scale (MAS) for the affected upper limb were evaluated at admission, at discharge and 4 weeks after discharge.

Results: All patients completed the protocol and none showed any adverse effects throughout the treatment. At the end of treatment, significant improvements in FMA score, WMFT log performance time, and MAS score for finger flexors were found (FMA score: from 41.7 $\pm$ 12.8 points to 45.1 $\pm$ 12.1 points, $p < 0.05$; LPT-WMFT: from 3.0 $\pm$ 1.3 to 2.7 $\pm$ 1.4, $p < 0.05$; MAS score: from 2.9 $\pm$ 1.3 points to 2.6 $\pm$ 1.0 points, $p < 0.05$). The improved scores were maintained until 4 weeks after discharge.

Conclusions: Our proposed 15-day protocol of combination treatment seems to be a safe and feasible therapeutic intervention for upper limb hemiparesis after stroke, although the efficacy of the protocol needs to be clarified in a randomized controlled study with a control group.

POSTER 209

ABSTRACT 186

CORRELATION BETWEEN BRUNNSTROM RECOVERY STAGE AND WOLF MOTOR FUNCTION TEST/FUGL-MEYER ASSESSMENT IN POST-STROKE PATIENTS

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Background and Aims: Both Wolf Motor Function Test (WMFT) and Fugl-Meyer Assessment (FMA) are outcome measures for upper limb motor function which have been broadly used in Japan as well as in the United States/Europe. However, the correlation between Brunnstrom recovery stage for hand-fingers (BRS-HF) and WMFT/FMA still remains unknown. Therefore, the aim of this study was to clarify the correlation between BRS-HF and WMFT/FMA and to determine optimal cut-off value of WMFT/FMA for the discrimination of BRS-HF.

Methods: Seventy-four post-stroke patients with upper limb hemiparesis categorized as BRS-HF of 3-5 (age: 58 ± 13 years old, time after stroke onset: 56 ± 41 months, BRS-HF: Stage 3-16 patients, Stage 4-31 patients, Stage 5-27 patients) were studied. The WMFT and FMA were simultaneously evaluated by occupational therapist from our department. Subsequently, a logistic regression analysis was performed to clarify the correlation between BRS-HF and WMFT/FMA. In addition, receiver operating characteristic (ROC) curve analysis was performed to determine optimal cut-off value of WMFT/FMA for the discrimination of BRS-HF. For the analysis, mean performance time of WMFT was transformed into natural logarithm. Results: Both WMFT performance time and FMA score were significantly correlated with BRS-HF ($p < 0.005$). Optimal cut-off value of WMFT performance time for discriminating BRS-HF of 3 versus 4, and 4 versus 5 was 873 seconds (sensitivity 94%, specificity 61%) and 540 seconds (sensitivity 71%, specificity 64%), respectively. Similarly, optimal cut-off value of FMA score for discriminating BRS-HF of 3 versus 4, and 4 versus 5 was 31 points (sensitivity 69%, specificity 56%) and 46 points (sensitivity 84%, specificity 58%), respectively.

Conclusions: Both WMFT and FMA were significantly correlated with BRS-HF in post-stroke patients.

POSTER 210

ABSTRACT 189

TRANSCRANIAL DIRECT CURRENT STIMULATION (TDCS) FOR IMPROVING APHASIA AFTER STROKE: A SYSTEMATIC COCHRANE REVIEW

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Background and Aims: TDCS is a non-invasive approach to alter brain excitability. Recent studies suggest that TDCS might improve aphasia after stroke. However, it lacks on a systematic review of the effectiveness of the intervention.

Methods: We included only randomised controlled trials (RCTs), which investigated TDCS either with conventional speech and language therapy (SLT) or no intervention versus sham-TDCS and/or conventional SLT or no intervention in people with aphasia due to stroke according to the criteria of the World Health Organization (WHO). We searched the following databases: The Cochrane Stroke Group Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library, latest issue), MEDLINE (from 1948), EMBASE (from 1980), CINAHL (from 1982), AMED (from 1985), Science Citation Index (from 1899), the Physiotherapy Evidence Database (PEDro, http://www.pedro.org.au/), Rehabdata (from 1956) and the Engineering databases Compendex and Inspec (from 1969). Two review authors used the PEDro-Scale in order to assess the methodological quality of the included trials independently. We quantified heterogeneity across the included studies by using I^2 statistics. For all statistic comparisons we used the current version of the Cochrane Review Manager Software, RevMan 5.1.

Results: We included 5 RCTs in the analysis. The methodological quality of the included trials was moderate to good (median 6 out of 10 points PEDRO). They implicate that TDCS might be a promising adjunct to neurorehabilitation after stroke to improve language function, particularly word learning. However, included studies used different primary outcome assessments and measured heterogeneously. A pooled effect could therefore not be estimated. At least a more detailed review will be published and updated in the Cochrane Database of Systematic Reviews.

Conclusion: Our review showed that in some studies TDCS might facilitate word learning after stroke and hence might improve aphasia. However, it is still unclear if TDCS could improve functional communication, i.e. real life communication. Thus further research seems to be needed.

POSTER 211

ABSTRACT 190

THE EFFECT OF AN EMG-ES PROGRAM ± BILATERAL TRAINING PROGRAM ON ARM FUNCTION AND IHI AFTER STROKE

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Background and Aims: Two strategies which have been shown to assist motor recovery following stroke are electrical muscle stimulation to the affected arm and bilateral movement training. This study examined the effect on arm recovery and inter-hemispheric inhibition (IHI) of an electromyographically triggered electrical muscle stimulation (EMG-ES) program to wrist and finger extensors, combined with either bilateral or unilateral functional training.

Methods: Twenty individuals (mean 67 ± 13.7 years, time post stroke 44 ± 19.9 months) were randomly allocated to EMG-ES assisted practice using only the impaired hand or EMG-ES assisted bilateral practice. Participants trained at home for up to 30 minutes/day, every day for 6-weeks. Arm motor function was assessed at baseline, immediately post-intervention

and three months later using the upper-extremity subscale of the Fugl-Meyer (FMUE), the Arm Motor Ability Test (AMAT) and the Motor Activity Log (MAL). In eight participants, single- and paired-pulse transcranial magnetic stimulation was used to examine IHI acting on the affected hemisphere. Motor evoked potentials were recorded from the trained muscles both ipsilateral and contralateral to the affected hemisphere.

Results: Despite stratified randomisation, the unilateral group had higher motor scores at baseline. Motor performance scores improved for both groups (mean changes: FMUE + 3.55, AMAT + 14.95, MAL amount of use + 8.17), with no significant difference between groups. Post-intervention scores were maintained or increased at follow up. A change from inter-hemispheric inhibition to inter-hemispheric facilitation acting on the affected hemisphere was observed in 5/8 participants immediately post-intervention, but was not maintained at follow up.

Conclusion: From these pilot data, EMG-ES was associated with small objective and subjective improvements in motor performance of the affected arm in a cohort with moderately severe arm deficits post stroke. Bimanual training did not confer any additional advantage. Larger studies may identify those most likely to benefit from either protocol.

POSTER 212

ABSTRACT 191

ELECTROMECHANICAL-ASSISTED TRAINING FOR WALKING AFTER STROKE: WHAT IS THE EVIDENCE?

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Background and Aims: Although electromechanical-assisted gait training after stroke seems to be effective, in the absence of a direct comparison between electromechanical devices it is, however, not clear which device may be the most effective for recovery of walking. The purpose of our study was therefore to conduct an updated and focused systematic review comparing the effects of different devices used in electromechanical-assisted gait training after stroke.

Methods: We searched the Cochrane Stroke Group Trials Register, CENTRAL, MEDLINE, EMBASE, CINAHL, AMED, SPORTDiscus, PEDro, COMPENDEX and INSPEC. Additionally, we handsearched relevant conference proceedings, searched trials and research registers, checked reference lists and contacted authors in an effort to identify further published, unpublished and ongoing trials. We included studies using random assignment. Authors independently selected trials for inclusion, assessed trial quality and extracted the data. The primary outcome was the proportion of patients walking independently.

Results: Twenty trials with 899 participants were included in this review. Electromechanical-assisted gait training in combination with physiotherapy increased the chance to walk independently (odds ratio (OR) 2.37, 95% confidence interval (CI) 1.66 to 3.40; $P < 0.001$). In the end effector subgroup the test for an overall effect for achieving independent walking was statistically significant (risk difference, RD = 0.09, 95% CI: 0.03 to 0.15; $p = 0.003$), but in the exoskeleton subgroup the test for an overall effect was not significant (RD = 0.01, 95% CI: –0.02 to 0.05; $p = 0.41$). Intensity and frequency of therapy provided in the studies was comparable between the subgroups. The subgroup comparison between end effector and exoskeleton subgroup showed statistically significant differences ($\chi^2 = 4.92$, $p = 0.03$).

Conclusions: Our results suggest that the type of electromechanical-assisted device might influence the outcome of gait rehabilitation after stroke.

POSTER 214

ABSTRACT 201

CORTICAL ACTIVITY CHANGES AMONG STROKE PATIENTS FOLLOWING ROBOTIC UPPER LIMB REHABILITATION AS MEASURED BY EEG DURING REACHING MOVEMENTS

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Background and Aims: Many stroke survivors are left with upper limb impairments that affect their ability to carry out everyday activities. Improvements in motor function are observed in many patients, however little is known about changes that occur in the brain itself. More research is required to clarify the nature, sequence, and timing of spontaneous and rehabilitation-induced neuroplastic changes that occur following stroke, and to explore how these changes relate to improvements in motor function. Electroencephalography (EEG) can be used to quantify motor cortex activity by examining event-related desynchronisation (ERD) and synchronisation (ERS) during limb movement. The initial aim of this study was to develop a protocol to explore short-term cortical activity changes, as measured by EEG during reaching movements, in subacute stroke patients following a period of robot-assisted therapy (RT).

Methods: Existing literature was reviewed to identify existing methods and best practice. Design requirements were identified in accordance with the study's research questions.

Results: A pilot, quasi-experimental, repeated measures design was developed, involving two groups of twelve participants each: (1) stroke patients receiving ten two-hour sessions of RT using the ArmeoSpring, over two weeks, and (2) age-matched healthy participants who will undergo the same training programme. EEG and clinical measures will be taken at different time points, to examine pre- and post-intervention trends. An adjustable reaching device was built, allowing for a standardised reaching movement and recording of movement characteristics via a potentiometer. Data collection and analysis methods will be presented.

Conclusions: The study will commence in the coming months. Its findings will add to the body of knowledge on neuroplasticity after stroke and will potentially assist rehabilitation professionals with selecting rehabilitation protocols that promote desired brain activity changes according to type of stroke and timing of intervention.

POSTER 215

ABSTRACT 202

LENGTH OF STAY AND FUNCTIONAL OUTCOMES FOR PATIENTS WITH STROKE ADMITTED TO A REHABILITATION CENTRE FOLLOWING THE INTRODUCTION OF A NEUROREHABILITATION UNIT

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Background and Aim: Evidence indicates that better outcomes are achieved if patients with stroke are managed in a neurorehabilitation unit compared with a general rehabilitation unit. A neurorehabilitation unit was established at a Victorian metropolitan rehabilitation centre in 2008. The aim of this study was to determine whether there have been any changes in the length of stay (LOS), functional outcome and discharge destination of patients with a primary diagnosis of stroke since the introduction of the neurorehabilitation unit.

Method: We conducted a retrospective audit of 114 case histories of patients admitted to the neurorehabilitation unit during the 2009-2010 financial year with a primary diagnosis of stroke. All patients with transient ischemic attack, stroke secondary to subdural, subarachnoid, extradural haemorrhage, and those who were transferred back to acute hospitals and did not return to the centre within 30 days were excluded from the study. Demographic data, pre-morbid function, LOS, mobility status at discharge, discharge destination and functional outcomes at admission and discharge were collected. The data was compared with a similar audit conducted of case histories of stroke patients admitted to the same institution between July 2005 and July 2007 (n = 188).

Results: There were no statistically significant differences in the demographic data or functional outcomes between the two groups. The median time spent in the acute hospital fell from 13 to 10 days ($p = 0.004$) and a reduction was also observed in LOS in rehabilitation (median 31 to 24.5 days, $p = 0.022$). An increase in the percentage of patients discharged home (70% versus 65%) was observed, but was not statistically significant.

Conclusion: The introduction of a dedicated neurorehabilitation unit at this health service appears to have had a positive impact on the total LOS in hospital without negatively impacting on functional outcomes.

POSTER 217

ABTSRACT 208

TECHNOLOGIES IN UPPER LIMB REHABILITATION POST-STROKE: THE USERS' PERSPECTIVE

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Background: Technologies may address some current and future challenges in upper limb stroke rehabilitation by providing cost-effective and motivating opportunities for intensive practice, suitable for home-use and without the supervision of a therapist. The potential for technologies has therefore excited development and clinical testing. The study aim was to explore the perceptions of patients, their carers and healthcare professionals (HCPs) regarding barriers and opportunities of using upper limb technologies in the context of rehabilitation.

Method: Following an interactive exhibition of 27 different upper limb technologies appropriate for use with stroke patients, four focus groups were conducted with people who: had not used technologies (n = 4 patients and 3 carers); had used technologies (n = 4 patients and 2 carers); carers (n = 5) and HCPs (n = 7). Each group discussed the barriers to and opportunities for upper limb technology use. Transcriptions of each group were analysed using thematic analysis. Overall findings came from comparing and contrasting themes across the groups.

Results: The potential for technologies to support self-management was a key theme. Barriers included lack of: information and 'joined up' approach between device providers, HCPs and service users; knowledge/confidence of HCPs; patient and carer's exposure during rehabilitation and poor service delivery models. Device design was considered key to effective use, especially in home settings.

Conclusions: Although participants were interested in technology (attended the exhibition), and identified benefits of technologies (informing which technologies should be evaluated in a clinical trial), their overall response was that systemic barriers prevented the development of technology use in service provision. The findings formed the basis of two wider questionnaires for HCPs and patients & carers and will inform the development of new technologies, ensuring that they are designed to satisfy both users and clinical needs.

POSTER 218

ABSTRACT 214

PSYCHOMETRIC PROPERTIES OF THE HRQOLISP-40: A NOVEL, SHORTENED MULTICULTURALLY VALID HOLISTIC STROKE MEASURE

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Background and Aims: A recent review showed that no existing instrument measured the entire spectrum of health-related quality of life (HRQOL) in stroke patients. However, the HRQOL in stroke patients (HRQOLISP) questionnaire is valid and exceptionally comprehensive. Founded on a holistic model of human life, it comprises both physical and spiritual spheres. However, its 102-item length may discourage routine use. Therefore, the aim was to determine the psychometric attributes of a shortened version based on a multicultural transnational study.

Methods: HRQOLISP was administered to 100 stroke patients in Ibadan, 103 in Berlin, and control groups of 100 apparently healthy adults in Ibadan and 50 in Berlin. Analyzing data from both cities, items were reduced to 40. Construct validity of the resulting HRQOLISP-40 was assessed by comparison with the National Institutes of Health Stroke Scale (NIHSS), Stroke Levity Scale (SLS), modified Rankin Scale (mRS), and Short Form 36 (SF-36) Health Survey.

Results: In multicultural settings, the HRQOLISP-40 showed good internal consistency ($\alpha = .76, .86$) and test-retest reliability. It retained its discriminant validity between stroke and healthy participants and demonstrated good "known-groups" validity in its relationship to the SLS, NIHSS, and mRS in the physical sphere. The physical sphere showed good convergent validity with corresponding facets of the SF-36.

Conclusions: Despite item reduction, the HRQOLISP-40 demonstrated excellent psychometric properties and is valid for routine use and clinical trials in stroke. The relative preservation of the spiritual sphere demonstrated the concept of disability disparity. Its ability to simultaneously assess the physical and spiritual spheres may be beneficial in studies aimed at potentiating internal adaptation in stroke patients.

POSTER 219

ABSTRACT 216

COLOR DOPPLER ULTRASONOGRAPHY (CDS) IN THE EVALUATION OF EXTRACRANIAL VERTEBRAL ARTERY (VA) IN SUBJECTS WITH VERTEBROBASILAR INSUFFICIENCY (VBI)

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Background and Aims: CDS in a non-invasive method for evaluation of vertebral arteries. Since AV supply posterior brain with the blood, then VA diseases may be a cause of VBI. The aim of the study was to visualize VA in subjects with VBI symptoms with CDS, then to perform morphological and spectral analysis of hemodynamic parameters and to investigate whether symptoms are cause-related to VA disease.

Methods: The study was carried out on 167 subjects in total (131 women and 36 men) with VBI symptoms, and all being evaluated in the time period between April 2008 and October 2011. The evaluation was performed bilaterally, in supine and neutral positions, and during flexion, extension, and rotation of the cervical spine, by linear 4-10 MHz transducer (GE Volusion 740). Anatomic, morphologic, and hemodynamic parameters were all determined (diameter, PSV, SDV, VF, RI, PI) and all were statistically processed.

Results: Cervical spine spondylosis was present in 37% of subjects where we noted bilateral flow reduction with worsening during cervical spine rotation in 17%. 22.75% of subjects had no VA changes, 34.73% had unilateral changes in, and tortuosity was most common in 29.34%, coupled with spondylosis in 33% and 23.95% had VA stenosis. Morphology analysis identified abnormalities of VA: hypoplasia, kinking, coiling, aneurism and subclavian steal syndrome. The analyzed results statistically significantly lead to changes in hemodynamic parameters ($p < 0.05$) and therefore may be related to VBI symptoms.

Conclusion: CDS evaluation of VA is non-invasive and reliable method in diagnosing VA diseases. It accurately measures of hemodynamic parameters in pretransversal and intertransversal segments and their analysis may be used for indirect evaluation of inaccessible segments. It provides accurate data on the level and size of stenosis. The main limitation of duplex ultrasonography is in difficulties in evaluation of VA in bony canal.

POSTER 220

ABSTRACT 220

CATS-TEST: NORMATIVE DATA FOR A SCREENING TEST FOR VISUAL NEGLECT

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Background and Aims: Patients with visual neglect explore contralesional space inadequately if at all. Visual exploration tests are therefore often employed in the process of diagnosing neglect. The sensitivity of such tests increases when the template has no recognizable structure with lines or grids, and when finding the target stimuli is rendered more difficult by the presence of as many diverting stimuli as possible. The use of relatively large, contrasting, and simple figures facilitates testing elderly patients.

Methods: Taking these premises into consideration, we developed the Cats-Test: 24 target stimuli (silhouettes of cats, 12 each on the left and right half of the standard-size paper) are hidden among approximately 240 distracting stimuli. The subjects were instructed to cross out all cats. Number and positions of omissions, position of the first four cats crossed out, and exploration time were recorded.

Results: Two hundred seventeen subjects were tested (25-87 years of age, median 67 years; minimal education mandatory schooling; no history of neurological disease).Results were as follows: no subject omitted more than five cats; the difference between left- and right-sided omissions never exceeded three cats; the first target stimulus was found on the left side of the sheet in 89%; and 98% crossed out at least one of the first four cats on the left side. Time required was between 30 and 164 seconds.

Conclusions: Although neurological patients often require more time, the Cats-Test is nonetheless a short and, according to first clinical experience, a very sensitive screening test for neglect. Test forms, instructions, and normative data are obtainable free of charge by e-mail (thomas.haid@tilak.at).

POSTER 221

ABSTRACT 221

CHANGES IN CUTANEOUS SENSATION WITH CONSTRAINT-INDUCED MOVEMENT THERAPY

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Background and Aims: Constraint-Induced Movement Therapy (CIMT) has been established as an effective upper-limb rehabilitation. The recently completed EPCIT trial R01HD067180 resulted in improvements in physical functioning similar to the EXCITE trial. Additionally, home training was found as effective in achieving those benefits as in-clinic training. The purpose of this component of the EPCIT project was to determine if CIMT resulted in changes to cutaneous sensation. A second purpose was to explore if cutaneous sensation would predict motor performance or recovery for manipulation tasks.

Methods: Sixty-five subjects, post- stroke at least 9 months (Mean age = 58 years),with at least minimal ability to move two fingers and a thumb and lift the wrist 10 degrees, and who were capable of registering cutaneous sensation, were included in this analysis. Subjects were randomly divided into two groups based on home versus in-clinic training. Subjects were tested on the Wolf Motor Function test, pinch strength and cutaneous sensation of the index and small fingers. The hand and finger manipulation items of the WMFT were used for this analysis.

Results: No significant correlations were found in this study between the cutaneous sensation of the index and small fingers to the ability to perform the manipulation tasks on the WMFT. Cutaneous sensation improved significantly with CIMT, index finger improvement $p < .002$ and small finger improvement $p < .001$. Significant improvement in cutaneous sensation was observed in 52% of subjects for the small finger and in 50% of subjects for the index finger. Surprisingly, the change in sensation was not predictive of the improvement in manipulation skills. No difference in the cutaneous measures or manipulation performance was observed between the two groups.

Conclusion: Cutaneous sensation as well as motor ability is effected by stroke. This study demonstrates the possible training of cutaneous sensation with CIMT.

POSTER 222

ABSTRACT 222

VISUAL NEGLECT FOLLOWING FIRST STROKE: LEFT VERSUS RIGHT HEMISPHERICAL LESION

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Background and Aims: To quantify the frequency of occurrence of visual neglect according to laterality of lesion.

Methods: We tested 300 patients after unilateral first stroke involving the thalamus or structures above with the Cats-Test. The Cats-Test is a visual exploration test, in which 24 target stimuli (silhouettes of cats, 12 on each half of the page) are hidden among approximately 240 distracting stimuli on a standard-size sheet of paper. The patient is instructed to cross out as many cats as possible, without a time limit.

Results: No significant differences in age (median entire group = 64 years) or time lapsed after stroke (median = 26 days) existed between the 156 patients with right-hemispherical (RHL) and the 144 with left-hemispherical lesions (LHL). In the RHL group, 22% (n = 35) crossed out no target stimuli on the contralesional side; only 1% (n = 2) of the LHL group did the same. In neurologically healthy subjects (n = 217), the difference in overlooked target stimuli on the left and right sides was never more than three; 36% (n = 56) of the RHL group, but only 3% (n = 4) of the LHL group, exceeded this number.

Conclusions: Our study once more corroborates the observation that the neglect phenomenon appears much more frequently in stroke patients with right-hemispherical rather than left-hemispherical lesions. Clinical experience with use of the Cats-Test endorses its sensitivity.

POSTER 223

ABSTRACT 224

WHAT ARE THE MAIN REASONS FOR EXCLUSION FROM AN EARLY REHABILITATION TRIAL (AVERT)?

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Background and Aims: A Very Early Rehabilitation Trial (AVERT) requires sites to regularly submit logs of all stroke patients admitted. Using these, we aimed to determine the main reasons for exclusion.

Methods: Study design: Mulitcentre, international, Phase III RCT using nurse/physiotherapist clinicians as recruiters. Inclusion criteria: Patients < 24 hours of confirmed stroke with physiological parameters within set limits. Exclusion Criteria: Patients with severe premorbid disability, severe comorbidities or needing palliative care.

Results: Logs from 19 hospitals between July 2006–July 2009 were reviewed. 7143 patients were screened, 505 recruited (7%) and 6638 not recruited. Larger metropolitan hospitals screened between 450-1400 confirmed strokes. Site recruitment as a proportion of patients screened ranged from <3 to 17%. Reasons for non-recruitment were considered as modifiable or non-modifiable. Non-modifiable: On average 17.2% of patients were disabled prior to stroke, 18.6% were medically unwell. Only 1.3% were recruited to other intervention trials and 1.6% refused. Delay in hospital admission after stroke prevented 46.4% of patients from being eligible. Modifiable: The absence of a dedicated recruiter and after hours admissions were major factors affecting recruitment with 29.5% eligible patients not recruited for these reasons. The most common 'other' barrier was that stroke patients were not admitted to the stroke unit.

Conclusions: Pre-admission delays are a major barrier to eligibility. Stroke clinicians have limited hours available for recruitment. Dedicated trials nurses could improve current recruitment rates.

POSTER 224

ABSTRACT 225

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION EARLY AFTER STROKE: A PILOT AND PROOF OF PRINCIPLE STUDY

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Background and Aims: Low-frequency repetitive transcranial magnetic stimulation (rTMS) of the unaffected hemisphere is a potential tool to enhance function of the paretic hand in patients with mild motor impairment. Effects of low-frequency rTMS at an early stage after stroke, in patients with mild to severe hand paresis are unknown.

Methods: In this pilot, randomized, double-blinded clinical trial we compared the effects of either low-frequency rTMS or sham rTMS as add-on therapies to outpatient customary rehabilitation, in patients within 5-45 days after ischemic stroke, and mild to severe hand paresis. The primary feasibility outcome was compliance with the interventions. The primary safety outcome was the proportion of intervention-related adverse events. Performance of the paretic hand in the Jebsen-Taylor test and pinch strength were secondary outcomes. Outcomes were assessed at baseline, after ten sessions of treatment administered over two weeks and at 1 month after end of treatment.

Results: Among 30 included in the study, there were no significant differences in baseline characteristics between the active and sham groups. For the primary feasibility outcome, compliance with treatment was 100% in the active group and 94% in the sham group. There were no serious intervention-related adverse events. Performance in the Jebsen-Taylor test and force of the paretic hand improved significantly in the active group but not in the sham group.

Conclusions: Active low-frequency rTMS of the unaffected hemisphere is feasible, safe and potentially effective to improve function of the paretic hand, in patients with a wide range of motor impairments early after stroke.

POSTER 225

ABSTRACT 228

TRIALS, TRIBULATIONS AND THE TRUTH: RECRUITING HOSPITALS TO A VERY EARLY REHABILITATION TRIAL (AVERT– INTERNATIONAL)

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Background/Aims: While recruitment of participants to trials is often discussed, little attention is given to the time and costs associated with the selection of recruiting hospitals to large clinical trials. Centralised research networks have emerged internationally, in part to assist with reducing delays in the ethics approval process of research projects. We aimed to describe the time required to reach important milestones between first contact with a potential hospital, to recruitment of their first patient to the AVERT trial and to compare these timelines for Australasian hospitals with UK hospitals where a centralised research network exists.

Methods: Hospitals were selected after feasibility questionnaires, phone contact and face to face meetings with potential staff. Records of all contact were maintained throughout. Prior clinical experience in running trials and the size of the hospital was considered.

Results: Of 130 hospitals indicating preliminary interest, 55 proceeded to ethics approval and 41 hospitals have recruited patients. The time between initial hospital contact and selection to participate ranged from 4 to 694 days. Full ethics approval took between 20 to 562 days from submission. Training completion after ethics approval ranged from 1 to 405 days. Once trained, it took between 1 to 816 days to recruit the first patient. In total, the time from initial contact to recruitment of first patient ranged from 139 to 1460 days. Size of hospital or trials experience did not appear to influence delays. Regional differences in achieving milestones were apparent.

Conclusion: When planning a clinical trial, the time (and cost) associated with selecting and starting up hospitals needs careful consideration. We hope our experiences aid other trialists.

POSTER 226

ABSTRACT 239

EFFICACY OF VIDEO-GAME BASED BIOFEEDBACK EXERCISES ON BALANCE FUNCTION IN CHRONIC STROKE SUBJECTS: A PILOT RANDOMIZED CONTROL TRIAL

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Background and Aims: Standing balance deficits are common in individuals after stroke, which have been shown to be associated with ambulatory dysfunction and increased fall risk. Visual biofeedback with force-plate system is often used for treatment of balance disorders. However, patients may lose interest in performing such repetitive tasks. To enhance the level of training, coupling biofeedback exercise to video games has been developed. The aim of this study was to evaluate the therapeutic effects of a video-game based biofeedback apparatus-Tetrax biofeedback system on balance function in chronic stroke subjects.

Methods: Twenty-six subjects with chronic stroke were randomly assigned to experimental or control group. All subjects received conventional rehabilitation training. The experimental group had additional 20-minute exposures to computer games of Tetrax biofeedback system, 3 times a week for 6 weeks. The video games in Tetrax biofeedback system are controlled via change of central of pressure (COP). The COP signal input is acquired via a pressure board. An interface box captured the pressure data to display on a personal computer, which containing the games software. Outcome measures were assessed by using the Physiological Profile Assessment (PPA)–short form and functional balance tests, including Timed Up and Go, forward reach and 5-m walking tests, pre and post intervention.

Results: Twenty-one subjects completed the study, 10 in experimental group 11 in control group. The change values of simple reaction time (-19.66 ± 12.63 ms versus -0.49 ± 8.98 ms $p = .002$), proprioception (-1.50 ± 2.06 cm versus 0.29 ± 0.67 cm, $p = .002$) in PPA and up and go (-1.77 ± 1.35 seconds versus -0.00 ± 0.70 seconds, $p = .001$), forward reach (2.50 ± 2.05 cm versus 0.18 ± 2.08 cm, $p = .016$) tests were significantly higher in the experimental group than in the control group.

Conclusions: Our preliminary research suggested that Tetrax videogame based biofeedback system is a potentially effective technology to improve balance in chronic stroke subjects.

POSTER 227

ABSTRACT 242

THE USEFULNESS OF BLADDER RECONDITIONING BEFORE INDWELLING URETHRAL CATHETER REMOVAL FROM STROKE PATIENTS

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Background and Aims: To determine the effects of bladder reconditioning by indwelling urethral catheter (IUC) clamping before catheter removal, on bladder dysfunctions in stroke patients.

Methods: Sixty patients with stroke, including 35 with hemorrhagic stroke and 25 with ischemic stroke were randomized 1:1:1 to 0 (control), 1 or 3 days of IUC clamping. IUCs were removed without clamping from the 20 subjects in the control group. In the other two groups, IUCs were clamped for four hours followed by five minutes of urinary drainage, a cycle repeated 24 hours in the 1-day ($n = 20$) and over 72 hours in the 3-day ($n = 20$) clamping group. Time to first voiding (FV), first voided volume (FV-vol.), residual urine volume after first voiding (FV-RUV), and method of first voiding after IUC removal were measured, as were mean voided and residual urine volumes on the third day after IUC removal. The incidence of symptomatic urinary tract infections (UTI), subjective symptoms and other complications during reconditioning or after IUC removal were recorded.

Results: Bladder reconditioning through IUC clamping had no noticeable effects in stroke patients. Following IUC removal, 5, 8, and 8 patients in the 0-, 1-, and 3-day IUC clamping groups, respectively, underwent intermittent catheterization for FV. Of the 40 patients in the 1 and 3-day groups, 3 (7.5%) had symptomatic UTI and 9 (22.5%) complained of urinary leakage during IUC clamping.

Conclusions: Bladder reconditioning through IUC clamping is not effective in stoke patients and may induce additional problems. These findings suggest that IUC removal without clamping is superior to IUC clamping for bladder reconditioning in stroke patients.

POSTER 228

ABSTRACT 250

IDENTIFICATION OF PROTEINS RELATED TO FUNCTIONAL RECOVERY IN THE PERILESIONAL CORTEX OF RATS WITH CEREBRAL INFARCTION

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Background and Aims: Recently, it has become widely known that rehabilitation brings about some improvement of paralysis by neuronal plasticity in an area adjacent to the lesion and in the contralateral hemisphere; however, little is known about the relationship between functional recovery and molecular mechanisms in the brain. Hence, alterations of protein expression profile in the cerebral cortex of rat groups with/without voluntary exercise after cerebral infarction were examined in this study.

Methods: Cerebral infarction was produced by transient middle cerebral artery occlusion in rats. Voluntary exercise using a running wheel was initiated from 2 days after surgery in the exercise group, and the exercise period was 12 hours/day, 7 days/week for 14 days. Motor performance measured by the accelerated rotarod test and alteration of protein expression was screened by antibody microarray analysis comprised 725 different antibodies and was confirmed by Western blotting in the cerebral cortex adjacent to infarction area.

Results: In motor performance analysis using the accelerated rotarod test, the mean latency until falling from the rotating rod in the group with exercise was significantly longer than that in the group without exercise. In protein expression profile, up-regulated proteins were involved in protein phosphorylation, stress response, cell structure and motility, DNA replication and neurogenesis (11 proteins). In contrast, down-regulated proteins were related to apoptosis, cell adhesion and proteolysis (4 proteins). Additional protein expression analysis showed that both growth-associated protein 43 (GAP43) and phosphorylated serine41 GAP43 were significantly increased adjacent to the lesion cortex.

Conclusions: These data support the idea that alterations of these protein expressions may be related to the underlying mechanisms of exercise-induced paralysis recovery, that is, neurite formation and remodeling of synaptic connections may be through the interaction of NGF, calmodulin, PKC and GAP43.

POSTER 230

ABSTRACT 259

THE RELATIONSHIP BETWEEN LANGUAGE FUNCTION AND NONLINGUISTIC COGNITION IN POST-STROKE PATIENTS

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Background and Aim: Stroke may develop both language problem and nonlinguistic cognitive problem. But the relationship between language function and nonlinguistic cognition is not well-established, thus the object of present study was to verify this relationship.

Method: Twenty stroke patients (7 men, mean age 66.8 ± 9.5 years, onset duration 24-762 days) were recruited. All participants completed Loewenstein Occupational Therapy Cognitive Assessment-Geriatric (LOTCA-G) as a nonlinguistic test of cognition and. Korean version of the Western Aphasia Battery (K-WAB). To reduce the linguistic influences upon nonlinguistic cognition, we recruited unclassified aphasia patients after K-WAB. The Pearson's/Spearman's correlation coefficient was used to evaluate the correlation between nonlinguistic cognition and language function. Multivariate logistic regression analysis was performed to determine the explanatory factors associated with language function.

Results: There was a significant correlation between aphasia quotients (AQ) and the following parameters; orientation ($\gamma = 0.649$, $P = 0.002$), perception ($\gamma = 0.531$, $P = 0.016$), spatial perception ($\gamma = 0.635$, $P = 0.003$), while other LOTCA-G subscales such as praxis ($\gamma = 0.394$, $P = 0.086$), visuomotor organization ($\gamma = 0.088$, $P = 0.712$), thinking operation ($\gamma = 0.342$, $P = 0.140$), memory ($\gamma = 0.225$, $P = 0.341$), and attention and concentration ($\gamma = 0.350$, $P = 0.131$) did not show significant correlations. Orientation was the only remaining explanatory variable for AQ in regression analysis ($\beta = 3.079$, $P = 0.002$).

Conclusions: Orientation had the highest correlation and explanation power for language function. Therefore, orientation may be useful for stroke patients in the monitoring the language function.

POSTER 231

ABSTRACT 267

ELECTRONIC SCREENING FOR DEPRESSION IN STROKE PATIENTS: A QUALITATIVE STUDY OF DOCTOR AND PATIENT PERCEPTIONS OF ACCEPTABILITY

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Background: Post stroke depression (PSD) is highly prevalent and is associated with poorer outcomes for stroke sufferers. Despite this, post stroke depression is often unnoticed and untreated. Mood screening may assist neurorehabilitation clinicians with identification; however research has failed to identify a benefit for depression screening in isolation for patient outcomes. This study is associated with a larger study and aims to qualitatively explore clinician and patient's perceptions of acceptability of an electronic screening process for post stroke depression.

Methods: Interviews were conducted with stroke clinicians (n = 7) working at clinics targeted by the depression screening process within Newcastle, Australia. Data analysis involved an inductive thematic approach with constant comparison. Patient data was analysed from an acceptability survey (n = 62), completed by stroke patients after screening.

Results: Five themes emerged from clinician interviews. The majority of clinicians did not systematically discuss mood disturbances, with attenuating factors and barriers to identification both influencing identification. Variations in the management of mood centred on the use of pharmacotherapy and role overlap with general practitioners (GP). The screening process assisted with identification and saved time during diagnosis and management. The majority of patients found screening easy to complete and understand, important and a good way of passing on information to the clinician.

Conclusions: The positive perceptions of patients and clinicians support the concept of routine screening and feedback for post stroke depression. This process has the potential to improve post stroke depression practice to meet national guidelines that promotes the implementation of early, targeted therapy. A larger multi-centre study is required to verify findings.

POSTER 232

ABSTRACT 268

QUANTITATIVE MEASUREMENT OF PHYSICAL ACTIVITY AFTER STROKE: ARE WE THERE YET?

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Background and Aims: Stroke rehabilitation targets motor recovery and physical activity (PA). New devices for measuring PA are reported, but their utility in clinical practice has not been described. This review identifies devices for objective measurement of PA after stroke and describes their psychometric properties.

Method: Searches were conducted in five databases. Reference lists of relevant papers were reviewed and citations tracked. Studies (any design) that included stroke survivors whose PA was quantitatively measured using a device were eligible for inclusion. Two reviewers independently determined inclusion. Quality assessment included selection bias and data/reporting quality. Data were extracted by one reviewer.

Results: Searches yielded 896 papers, with 34 potentially eligible. Eight papers were excluded on full text review leaving 26 included. Quality assessment scores ranged from four to six out of seven. PA was measured in 742 survivors aged 21 to 89 years. Most participants were ambulant and > 6 months post stroke. Fourteen devices, mostly accelerometers, were identified, using between one and five sensors. PA was recorded from 8 hours to seven days. There was no outcome common to all devices. Step counts, activity counts, duration and frequency of activity, peak activity, postures, and transitions were reported. Few papers described device algorithms or defined activity thresholds. Neither device cost nor normative data were reported. Test-retest reliability of PA estimates ranged from unmentioned in five cases, to poor (Caltrac for activity calories, $r = 0.44$), to excellent (Step Activity Monitor for step counts, $r = 0.975$). Validity for five devices was not reported, but others appeared valid for use in stroke.

Conclusions: Measures of activity were highly variable across studies. Consensus in PA reporting would allow comparison in different stroke populations. No one device appears ready for clinical application which requires a simple device, with meaningful data, that is inexpensive and acceptable to stroke survivors.

POSTER 233

ABSTRACT 270

EXPLORING POST STROKE CHANGES IN COMMUNITY DWELLING STROKE SURVIVORS: A MIXED METHODS LONGITUDINAL COHORT STUDY

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Background: There are few longitudinal studies exploring the patterns of psychological morbidity and factors contributing to change over time. We hypothesized that a number of clinical, functional and psycho-social factors will be associated with anxiety and depression during the 12 month follow-up stroke. The aim of this study is to explore the predictors of anxiety and PSD and factors contributing to change in symptoms in stroke survivors over a 12 month period.

Method: This study is a prospective cohort study of 134 stroke survivors interviewed at baseline (stroke onset), 3, 6, 9, and 12 months. Outcome is assessed with measures of physical function (MRS, BI), depression and anxiety (HADS) and psycho-social function (K10, AQOL, social support, community participation).

Results: Data has been collected on 134 participants. Over time anxiety reduced ($p = 0.001$) and depression (HADS) and distress (K10) remained unchanged. Increased disability (MRS) was associated with higher anxiety (HADS) ($p = 0.0405$), depression (HADS) ($p = 0.0015$), distress (K10) ($p = 0.0728$) and reduced QOL ($p = <0.0001$) over time.

Conclusion: Anxiety is heightened at baseline and reduces over time. Clinicians should be mindful of this when using screening measures that have an anxiety and depression sub-components. Increased disability impacts QOL over time and is most notable following discharge from hospital. Results assist neurorehabilitation clinicians to identify and instigate early support for those patients at greatest risk of PSD. These results support the need for greater availability of longer term community services to monitor for PSD and facilitate community participation.

POSTER 234

ABSTRACT 271

THE KINEMATICS OF UPPER EXTREMITY MOVEMENT OF STROKE PATIENTS IN DRINKING

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Background and Aims: Drinking is one of the important tasks for performing upper extremity movement in activities of life. The purpose of this study was to examine systematically how the drinking movements differ between the stroke and elderly groups. The kinematic variables of upper extremity movement were evaluated by objective and reliable analysis methods.

Methods: Sixteen stroke patients and twenty-two elderly subjects were recruited for this study. 16 retro-reflective markers were attached along the subject's arm and the drinking movements were measured through the 3 D motion analysis. Subjects were asked to make a movement of drinking from a glass. The outcome measures included upper extremity reaction time, movement time, peak velocity, smoothness, and straightness of hand trajectory. The kinematic variables in the analysis were computed by averaging 3 trials for each subject. The independent t-tests were used to compare the differences in the kinematic variables between the groups.

Results: There were significant differences in reaction time, movement time, peak velocity, smoothness, and straightness of hand trajectory (all p's

were statistically significant at $p < 0.05$). Stroke patients showed longer reaction and movement times, slower peak velocity, and larger straightness of hand trajectory.

Conclusions: These kinematic variables help us understand the arm movements in drinking and assist stroke patients in upper extremity rehabilitation. In addition, the results of the present study could be utilized in the task-oriented motor control and the robot-mediated therapy for those whose upper extremities were impaired after stroke.

POSTER 235

ABSTRACT 274

BEHAVIOURAL IMPROVEMENT OF TOUCH SENSATION FROM ONE TO SIX MONTHS POSTSTROKE IS ASSOCIATED WITH RESTING-STATE FUNCTIONAL CONNECTIVITY CHANGES

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Background and Aims: Few studies have investigated the relationship between improved touch sensation after stroke and brain reorganization. Functional connectivity analysis of low frequency resting-state functional magnetic resonance imaging data (fcMRI) can be used to study brain networks during undirected behaviour. We aimed to characterise the relationship between somatosensory recovery and functional network changes measured using resting-state fcMRI in patients with somatosensory loss post-stroke.

Methods: Ten stroke survivors (4 male, 58.96 ± 18.38 years) with impaired touch discrimination of the upper limb after first-episode ischemic stroke underwent clinical testing and resting-state fMRI scans at one and six months post-stroke. Ten age-matched healthy controls were also studied. Random effects group analysis was applied to resting-state functional connectivity maps based on seed regions in primary somatosensory cortex (SI), secondary somatosensory cortex (SII) and thalamus. Clinical change, measured using the Tactile Discrimination Test (TDT) was included as a regressor.

Results: Patients demonstrated a wide range of behavioural impairment severity one month poststroke, followed by variable improvement. Significantly greater interhemispheric functional correlations between somatosensory regions, as well as with visual and frontal areas, were observed at six months compared to one month poststroke. Improvement in tactile discrimination over six-months was associated with greater correlations between contralesional SII and inferior parietal cortex and middle temporal gyrus, and between contralesional thalamus and cerebellum.

Conclusions: The results suggest that resting-state fcMRI patterns mirror known anatomical connections, and that the degree of functional correlations between different brain regions may change over time following stroke in conjunction with behavioural improvement. Use of rehabilitation methods that draw on understanding of the extensive and interacting somatomotor and attention networks of the brain is needed to promote access to higher order cognitive processes and utilisation of alternate behavioural strategies.

POSTER 236

ABSTRACT 282

REPEATABILITY OF A THREE-DIMENSIONAL SCAPULAR MOVEMENT ANALYSIS IN PERSONS AFTER STROKE

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Background and Aim(s): Three-dimensional movement analysis (3DMA) is a powerful tool providing objective information on joint motion. This pilot study investigated the repeatability of scapular 3DMA in stroke patients.

Methods: Scapular motion at the hemiplegic (HS) and non-hemiplegic side (NHS) of 7 stroke patients was assessed twice, during frontal (EF) and sagittal (ES) plane elevation (0-60°, 0-120°). Ten retroreflective markers were placed on the trunk, scapula and humerus. Scapular bony landmarks were palpated and digitized during static trials (CAST-method); anatomical coordinate systems were defined following the ISB. Waveform similarity was assessed with the coefficient of multiple correlation.

Result(s): 0°-120°: *Within session repeatability* was excellent (0.90) for all scapular rotations for EF and ES (HS and NHS). *Between sessions repeatability* was excellent for scapular upward rotation for both tasks, on both sides. ES resulted in good (0.80-0.89) repeatability for protraction (both sides), while protraction was moderately (HS) (0.60-0.79) to poorly (NHS) (0.60) repeatable for EF. Scapular tilt was excellently repeatable during both tasks on the NHS, though only poorly (EF) to moderately (ES) repeatable on the HS.

0°-60°: *Within session repeatability* was excellent for all scapular rotations for both tasks on the NHS and during ES on the HS. EF on the HS resulted in an excellently repeatable upward rotation, and moderately repeatable protraction and tilt. *Between sessions* protraction and tilt were poorly (EF) to moderately (ES) repeatable (both sides), while upward rotation resulted in moderate to good repeatability.

Conclusion(s): Since low repeatability is dependent of plane and degree of elevation, considerations on the movement protocol should be made. Additional tasks should be added and tested for repeatability. Optimization of standardization procedures might be required to maximize repeatability, especially between the sessions.

POSTER 237

ABSTRACT 283

COMPUTERIZED AIMING TASK TO ASSESS SENSORIMOTOR IMPAIRMENT LEVEL IN CHRONIC STROKE

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Introduction: Computer-assisted assessment of arm-hand-function (AHF) after stroke is gaining interest. Fitts' law describes movement in human-computer interaction as the relation between movement time

and movement difficulty. However, it is unclear to what extent Fitts' law is sensitive to severity of sensorimotor impairment in stroke.

Aim: To assess the relation between Fitts' law and AHF impairment in stroke.

Patients: Sixteen chronic stroke patients ((M/F = 11/5); mean age: 58.8yr (sd = 7.0)) participated.

Methods: Design: Cross-sectional study. Subjects performed a unimanual pointing task, involving the affected arm. Movement direction, distance and target width were systematically varied across 160 attempts. From these parameters the index-of-difficulty was calculated. Reaction time, movement time and movement errors were recorded. Linear regression analyses between movement time and index-of-difficulty produced 2 parameters: regression angle (A) and error estimate of the regression model (RMSerror). Both parameters are presumed to be associated with (cerebral) motor impairment in stroke. Correlations between A, RMSerror and Fugl-Meyer test (FM) were calculated.

Results: Mean values of A, RMSerror and FM were 0.137rad (sd = 0.142), 311ms (sd = 189) and 53.6 (sd = 7.6) respectively. Correlation coefficients between A and FM, and RMSerror with FM were –0.432 (p = 0.095), and –0.648 (p = 0.007) respectively.

Conclusions: A strong inverse relation exists especially between RMSerror, calculated from Fitts' model, and FM, indicating that less error is associated with better AHF in chronic stroke. The reliability of the Fitts' test and its sensitivity-to-change, i.e. its ability to detect (clinically significant) differences between conditions, still have to be investigated. First indications suggest that the Fitts' test can be developed into a valid (and possibly sensitive), easy to use instrument to assess arm-hand-function impairment levels in stroke patients.

POSTER 239

ABSTRACT 289

ARM ACCELEROMETRY IN STROKE: RELATION WITH FUNCTION, ACTIVITY, AND FUNCTIONAL QUALITY OF LIFE

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Background and Aim: Approximately 50% of the stroke patients suffer from arm-hand function loss, which is characterized by loss of manual dexterity and difficulties in the performance of activities of daily living. Different aspects of arm hand performance can be measured: arm-hand function, arm-hand capacity, perceived and actual arm-hand performance. The aim of this study was to investigate the association between actual arm-hand performance (measured by accelerometry) on the one side and arm-hand function (measured by the Fugl Meyer (FM)), arm-hand capacity (measured by the Action Research Arm Test (ARAT)) and quality of life (measured by the SF-36) on the other side.

Methods: A cross-sectional study was performed at Adelante Rehabilitation Centre (Hoensbroek, the Netherlands). Patients had to be more than 9 months post-stroke and suffer from a central paresis of the arm/hand to be included. The FM, ARAT, SF-36, as well as Actiwatch AW7 (CamNtech,UK) were used. Spearman's correlation coefficients were calculated to determine the association between accelerometry data and FM, ARAT and SF-36 data.

Results: Patients (n = 16) were on average 59 years old (SD = 7). The highest association was found between accelerometry and the SF-36 (physical health: r = 0.67, p = 0.004 and mental health: rs = 0.57, p = 0.022). Also, associations between accelerometry and the FM and the ARAT were found to be significant (rs = 0.52, p = 0.039 and rs = 0.51, p = 0.043 respectively).

Conclusion: This study shows that accelerometry has the highest association with the ICF participation level. Also, associations were found between accelerometry and the ICF function and activity level. Future research is warranted to draw more definitive conclusions on the relationship between accelerometry and other measurement instruments on function, activity and/or participation level across the total spectrum of stroke patients.

POSTER 240

ABSTRACT 290

TRANSFER OF MOTOR LEARNING IN (ROBOTIC) TASK-ORIENTED ARM-HAND TRAINING AFTER STROKE

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Background and Aims: Impairment of arm-hand performance after stroke severely affects activities of daily living. Technology-supported rehabilitation is a promising tool for improving arm-hand performance in chronic stroke patients. Besides the task-specific learning process, the ability to transfer acquired arm-hand performance from trained skills to other (untrained) skills and situations is very important. The aim of this study was to examine to what extent transfer of arm-hand skilled performance occurred after task-oriented training of 2-4 skills to untrained skills, and whether or not transfer effects differed between technology-supported task-oriented arm-hand training and non-technology supported task-oriented arm-hand training.

Methods: Twenty-two chronic stroke patients (mean age 59 year; mean time post-stroke 3.3 years) participated in a single-blind, randomized controlled trial. Both groups received intensive task-oriented arm-hand training (2 × 30min/day, 4 days/week, 8 weeks). The use of technology (Haptic Master) during training was the only difference between the intervention group (HMG) and control group (CG). The Motor Activity Log (MAL), consisting of an amount of use scale (AOU) and quality of use scale (QOU), was used to determine the improvement on untrained tasks. Data analysis included the Mann Whitney Test.

Results: Transfer of motor learning occurred in both groups. The HMG improved for the AOU scale on 29% of the untrained tasks and for the QOU scale on 38% of the untrained tasks, reported by the MAL. The CG improved on 29% of the untrained tasks (AOU scale) and 50% of the untrained tasks (QOU scale). The mean improvement in score for untrained tasks was 67% (AOU) and 45% (QOU) for the HMG and 62% (AOU) and 41% (QOU) for the CG. No significant differences between groups were found.

Conclusions: Transfer of motor learning occurred in both groups. This may be attributable to the task-oriented training approach, applied in both groups.

POSTER 242

ABSTRACT 296

ESD STROKE BERGEN—AN RCT COMPARING TWO DIFFERENT SCHEMES OF EARLY SUPPORTED DISCHARGE AFTER STROKE WITH ORDINARY TREATMENT: RESULTS FROM 3 MONTHS FOLLOW-UP

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Background and Aims: In early supported discharge (ESD) patients are discharged home as early as feasible after acute stroke and then receive their rehabilitative treatment, thereby reducing societal cost. Previous studies have shown that ESD also is beneficial for the patient, but the most effective organization and content of this rehabilitation remains unclarified. In this study two different treatment schemes are compared with treatment as usual in a randomized controlled study.

Methods: Around 350 acute stroke patients will be recruited during the period December 2008 through December 2011. Patients in the two ESD arms are followed by a multidisciplinary coordinating team and rehabilitative treatment is provided by a municipal treatment team during the first 5 weeks after discharge, either at a municipal day unit or in the patients' home. These patients are also offered follow-ups. All included patients are extensively tested at 0, 3, 6, 12 and 24 months. Main outcome is modified Rankin Scale (mRS) at 6 months.

Results: By now 321 patients have been included, with 245 still remaining in the study (deaths and drop-outs 24 %). Preliminary results indicate that home treatment is the only treatment scheme with significantly better outcome than treatment as usual when controlling for sex and age. The odds of a patient scoring mRS ≤ 2 at 3 months follow-up is 2.22 times higher for home treatment compared to treatment as usual. There seems to be no significant differences for Barthel Index, probably due to its ceiling effect, nor for measuring skills objectively by Assessment of Motor and Process Skills (AMPS).

Conclusions: Acute stroke patients are randomized to two different schemes of ESD and to ordinary treatment. Preliminary results seem to indicate that early rehabilitation in the patients' homes is most effective by 3 months follow-up. Complete results including subgroup analyses will be presented.

POSTER 243

ABSTRACT 298

PREDICTING LOWER EXTREMITY MOTOR FUNCTION IN PATIENTS WITH CHRONIC STROKE USING STRUCTURAL INTEGRITY OF CORTICOSPINAL TRACT AND LATERALIZATION OF SENSORIMOTOR CORTEX ACTIVATION

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Background and Aims: Both the structural integrity of the corticospinal tract (CST) and the lateralization of cortical activation during affected limb movements have been shown to be related to motor functions in stroke patients. This study was aimed to further determine the relative predictability of the structural integrity of the CST lower extremity (LE) motor fibers and the lateralization of primary sensorimotor cortex (SMC) activation on the affected LE motor function of chronic stroke patients.

Method: Eleven hemiplegic patients with chronic ischemic stroke (4 females and 7 males; mean age, 63 ± 8 years) undertook the LE motor component of the Fugl-Meyer Assessment (FMALE), as well as diffusion spectrum imaging (DSI) and functional MRI scans using a 3T MR scanner. We applied tract-specific analysis of DSI data. The structural integrity of the ipsilesional CST LE motor fibers was assessed by calculating the relative general fractional anisotropy of the posterior limb of internal capsule segment (rGAFPLIC) between bilateral CSTs. Greater rGAFPLIC values indicated poorer integrity. During the fMRI scan, subjects performed active affected ankle dorsiflexion movements. The lateralization of SMC activation during ankle movements was calculated and denoted as weighted laterality index_SMC (wLI_SMC). Greater wLI_SMC values indicated greater lateralization. Correlation and stepwise multiple linear regression analyses were performed to determine the relationships of the FMALE with DSI and fMRI measures, and the relative predictability of DSI and fMRI measures on FMALE.

Results: The FMALE was strongly associated with rGFAPLIC and wLI_SMC ($r = -0.776$ and 0.770, respectively, $p < 0.05$). Regression analysis results showed that the rGFAPLIC was the single independent predictor of FMALE (adjusted $R^2 = 0.496$, $p < 0.05$).

Conclusions: Results suggest that the structural integrity of CST LE motor fibers is a more important factor in determining LE motor function of chronic stroke patients than the lateralization of SMC activation.

POSTER 244

ABSTRACT 303

A COMPARATIVE EFFICACY TRIAL OF UNILATERAL VERSUS BILATERAL ROBOT-ASSISTED ARM TRAINING FOR IMPROVING MOTOR AND DAILY FUNCTIONS IN PATIENTS WITH CHRONIC STROKE

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Background and Aims: This study compared the effects of unilateral (URT) vs bilateral (BRT) robot-assisted arm training on upper extremity (UE) control, trunk compensation, and function in chronic stroke patients.

Methods: Fifty-three stroke patients were randomly assigned to URT ($n = 18$), BRT ($n = 18$), or control treatment (CT, $n = 17$). Each group received UE training for 90-105 min/day, 5 days/week, for 4 weeks. The kinematic variables for arm motor control and trunk compensation included normalized movement time, normalized movement units, and trunk contribution slope in unilateral and bilateral tasks. Motor function and daily function were measured by the Wolf Motor Function Test (WMFT), Motor Activity Log (MAL), and ABILHAND Questionnaire.

Results: The BRT and CT groups elicited significantly larger trunk contribution slope values at the start part of bilateral reaching than the URT group. For the middle part of the trunk contribution slope in the bilateral task, URT produced significantly greater values than CT. URT also led to

significantly better effects on WMFT-Time than BRT. Differences in arm control kinematics and performance on the MAL and ABILHAND among these 3 groups were not significant.

Conclusions: BRT and URT resulted in differential improvements in specific UE/trunk performance in stroke patients. BRT elicited larger benefits on reducing compensatory trunk movements at the beginning of reaching than URT. In contrast, URT produced better improvements in UE movement efficiency. These relative effects on movement kinematics, however, did not translate into differential benefits in daily functions.

POSTER 245

ABSTRACT 309

DEVELOPMENT OF A WEB-SUPPORTED PROGRAMME OF CONSTRAINT INDUCED THERAPY FOLLOWING STROKE (LIFECIT)

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Background and Aims: Constraint Induced Therapy (CIT) is an evidence-based intensive intervention which has not been widely implemented in UK stroke rehabilitation practice. A team at the University of Southampton has developed a software system ('LifeGuide'). LifeGuide allows researchers to create web based interventions for online healthcare support. The aim is to use LifeGuide to develop a web supported CIT system ('LifeCIT') for upper limb stroke rehabilitation.

Method: To identify and implement the necessary components of this web-based intervention, qualitative "think aloud studies" were carried out with a purposive sample of 4 chronic stroke patients. Data was transcribed and coded, using constant comparison to extract principles for optimal intervention design. Data collection and analysis has been concurrent with intervention development, allowing immediate modification and re-testing of intervention components as potential improvements have been identified. We anticipate to recruit 12 acute stroke patients in early 2012 and their carers/therapists to take part in further 'think aloud' studies.

Results: Two main themes were identified: usability and motivational aspects of the system. The need for explicit instructions to navigate the website emerged, as well as a system design with limited choice and self-evident navigation. Participants reported they would have been motivated to adhere to LifeCIT if it was available to them. Data analysis revealed that computer games and activities would be motivational if they had an addictive challenging nature, with a user centred approach.

Conclusion: The results have led to an alteration of the LifeCIT system design, which automatically directs users through the website, rather than having user led navigation. Computer games are currently being developed to be included in the CIT therapy programme, which are based on the findings of this study. Future work involves conducting a randomised controlled, single blinded pilot study of the feasibility, acceptability and clinical effectiveness of LifeCIT.

POSTER 246

ABSTRACT 311

PHYSICAL ACTIVITY AND WALKING SPEED AFTER STROKE COMPARED TO CONTROL VALUES

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Background and Aims: Persons with stroke are often less physically active than healthy and it can be hypothesized that activity increases over time and that walking speed is important. The aim was to describe the physical activity level using a questionnaire, compare with normative data and examine relationships between physical activity level, time since stroke and walking speed.

Methods: A convenience sample of 70 persons (48 men, 22 woman) with a mean age of 60 (SD 6.8) was examined at a mean of 6 (SD 3) years after first event of stroke. A population based sample of 141 persons (70 men, 71 women) between 40 and 79 years of age from the same geographical area, divided into four cohorts, served as controls. The Physical Activity Scale for the Elderly (PASE) (1) was used to estimate the self-reported physical activity level. The self-selected walking speed was measured on a 30 m track and in stroke persons motor function in the affected leg was assessed according to Fugl-Meyer (maximum score 34).

Results: The mean PASE score in the stroke group was 119 (SD 74), corresponding to 72% (SD 31) of the control score. There was no correlation between PASE and time since stroke. The median Fugl-Meyer score was 29 (range 11-34). The mean self-selected walking speed in the stroke group was 1.01 (SD 0.42) m/s which corresponded to 73% of the controls'. In a regression model, the self-selected walking speed could explain the variation in the PASE to 24% ($p < 0.001$) and 6% (p 0.002), in the stroke and control groups, respectively.

Conclusions: Persons with stroke reported lower physical activity than controls several years after stroke. Self-selected walking speed could partially explain physical activity level in persons with stroke but not in controls.

POSTER 247

ABSTRACT 319

THE RESPONSIVENESS OF FUNCTIONAL OUTCOME MEASURES FOR THE UPPER EXTREMITY FOLLOWING STROKE: A SYSTEMATIC REVIEW

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Background and Aim: Responsiveness is an important factor to consider when selecting a tool that captures functional recovery of the upper extremity (UE) following a stroke. The purpose of this paper is to critically review the responsiveness of outcome measures used to assess UE function after stroke.

Methods: A systematic review employing a search of the literature using multiple databases (eg. MEDLINE, CINAHL) was undertaken to identify outcome measures that met the following criteria: 1) in at least one peer-reviewed study examining its responsiveness or test-retest reliability, 2) captures UE ability and includes ≥50% functional activities and 3) used in a randomized clinical trial (RCT). Responsiveness metrics were extracted and organized based on three different types of responsiveness: clinically important difference (CID), minimal detectable change (MDC) and observed change over natural recovery.

Results: Twelve outcome measures met the inclusion criteria. A large number of UE measures were used to assess function following constraint induced therapy. Only six studies determined CID values. CID values varied greatly depending on the method used to define important change. Measures that capture function in one's own environment

(eg. Motor Activity Log) had larger MDC values than lab-based measures (eg. Wolf Motor test). Observed change scores were larger when expressed as standardized response means (vs effect sizes). The effect sizes over the subacute period following stroke were larger and more varied than effect sizes captured during the chronic stage.

Conclusions: The magnitude of the responsiveness value is affected by multiple factors such as: time post stroke, measurement setting and method used to calculate the responsiveness value. Careful consideration of these factors is recommended when interpreting responsiveness values. Also, as clinically important difference is the only type of responsiveness to consider the meaningfulness of change, more studies are needed that explore this type of responsiveness.

POSTER 248

ABSTRACT 321

INPATIENT STROKE EDUCATION IN A REHABILITATION HOSPITAL: PATIENT EVALUATION

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Background and Aims: A stroke educational program (SEP) was implemented at a rehabilitation hospital last year for inpatients who had an ischemic or hemorrhagic stroke, and who had appropriate cognitive abilities to take part in the sessions. Family members were allowed to accompany each patient. Members of the inpatient neuro-rehabilitation team: a physiatrist, a physiotherapist, a pharmacist, a social worker and a dietician, took turns to present the sessions. The SEP consisted in four weekly sessions lasting one hour each, covering one the following topics on a rotating basis: Understanding Stroke Anatomy and Prevention (USAP), Medications (M), Nutrition (N), and Psychosocial Issues (PI) surrounding stroke. The aim of this study was to determine the inpatients' perception of the SEP.

Methods: Retrospective review of 201 stroke inpatients' evaluation of the SEP program between January and August 2011. Patients used a 5-point Likert-type scale (excellent, very good, good, fair, poor) to rate the information received at the end of each session.

Results: Sixty inpatients (29.9%) participated in the M session, 53 (26.4%) in the USAP session, 46 (22.9%) in the PI session, and 42 (20.9%) in the N session. Of the 116 evaluations received, 34 (29.3%) sessions were rated excellent, 67 (57.8%) very good, and 15 (12.9%) good, none of the sessions was rated as fair or poor.

Conclusions: The experience gained through the SEP to date shows great acceptance by participants who considered the SEP good or excellent. This is in contrast to a previous program presented by a non-multidisciplinary group in which 70% of the patients felt that they had not received enough information and 87% identified gaps in the information received.

POSTER 249

ABSTRACT 323

ATTENDING A STROKE GROUP CAN IMPROVE WALKING PERFORMANCE OF CHRONIC STROKE PATIENTS

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Background and Aims: The estimated cost of strokes in Australia is $2.14 billion annually. Rehabilitation usually ceases 3 to 6 months post stroke. There is little evidence on best practice with chronic stroke patients, particularly in a group format. The Stroke Maintenance Group commenced at Strathdon Day Therapy Centre in 2000. The impacts of the program were evaluated in a longitudinal study of clients' walking speed and stride length.

Methods: Data were collated on 42 clients (24 men, 18 women; 21 left hemiplegia, 19 right hemiplegia, 2 bilateral weakness). At baseline, average age was 69.3 years (range 55-82); average post-stroke period was 24.5 months (range 2-108). The average number of 10-week stages attended was 12 (range 3-32); average attendance was 73%. Speed and stride length were assessed 10-weekly.

Results: Analysis of the first 3 stages showed significant change over time for both walking speed and stride length. Participants improved on both measures from baseline (mean speed: 27.1 to 29.3m/min; mean stride 66.1 to 68.2cm, both $p < .05$). While most improvement occurred in clients' first stage, some clients continued to improve noticeably thereafter. Walking speed increased with stages attended ($r = .38$, $p < .05$): performance improved as clients continued to attend the group. Change in speed was not related to months post stroke: clients benefited regardless of time since stroke. Stride length also tended to increase with stages attended ($r = .29$, $p < .10$). While neither gender nor age predicted change on outcomes, men's outcomes were significantly more variable than women's.

Conclusions: Through attending the Stroke Group, clients' walking continued to improve over long periods. This study supports the view that ongoing group therapy can improve or maintain walking performance after stroke, and that long-term engagement with chronic stroke patients is justified.

POSTER 250

ABSTRACT 325

PHYSICAL ACTIVITY IN STROKE REHABILITATION: A BEHAVIOURAL MAPPING STUDY

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Background and Aim: Evidence suggests improved functional outcome after stroke with more intensive rehabilitation. However research indicates that stroke patients have low physical activity whilst in rehabilitation. The purpose of this study was to determine the level of physical activity in routine rehabilitation practice, as a step towards a randomised controlled trial of increased intensity of rehabilitation.

Method: Behavioural mapping was used to determine the physical activity of consenting participants over one weekday at 10 minute intervals between 8AM and 5PM. At each observation physical activity, location and people present were ascertained. Patients managed at four rehabilitation hospitals in Sweden who were >7 days since stroke onset and >18 years of age were eligible for the study. Patients receiving palliative care were excluded.

Result: The 104 patients who completed the study had a mean age of 70.3 (SD 14.4) years. Fifty three percent were men. Median time since stroke at time of observation was 19 days (range 7-142 days). Stroke type

consisted of 72% ischemic and 28% hemorrhagic. Patients spent 13% in standing and walking activities whilst 38% of their day was spent in bed. They were alone most of the time (52%). Time with therapists took up 17% of the day. With 82% of patients treated, physiotherapy was the most frequent therapy provided, followed by occupational therapy (61%). Using multiple regression we found that higher Acute Stroke Mobility Scale walking scores at the time of observation ($p < .001$) and younger age ($p < .001$) were predictors of higher physical activity levels.

Conclusion: High-levels of physical activity and social interaction are possible in stroke rehabilitation. This study suggests there is a huge potential to increase the patients' activity level and augment social interaction above current levels. Testing interventions that enrich the environment and promote activity is warranted.

POSTER 251

ABSTRACT 326

HOW TO ENHANCE APPLICATION OF AVAILABLE EVIDENCE TO LOCAL PRACTICES? STROKE REHABILITATION AS AN ILLUSTRATIVE EXAMPLE

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Background and Aims: Therapists have difficulty to identify evidence that is applicable to their local practices. This study aimed to visualize in a matrix structure what evidence is relevant for severe disabled stroke patients admitted to a rehabilitation centre and how this evidence can be translated to the local setting.

Methods: A combination of literature study of reviews on stroke services, and individual and focus group interviews with therapists, patients and caregivers. Atlas-ti was used to code and analyze the material.

Results: The available evidence for stroke rehabilitation units could directly be applied to the local setting, as it met the four criteria set by the Trialists. Evidence for early supported discharge (ESD) could not directly be applied because of differences in target group and implementation environment between research and practice. A knowledge gap existed in evidence for home- and community-based rehabilitation services in the chronic stage. Future directions were articulated in terms of: 1) combining clinical and home rehabilitation for severe disabled stroke patients in an early rehabilitation phase, and 2) establishing a regional multidisciplinary professional stroke network with help of e-health technology covering inpatient and outpatient services.

Conclusion: Improvement of local practices with help of evidence produced in research settings is a matter of comparing, logical reasoning and creative working with heterogeneous knowledge sources and not a straightforward procedural process.

POSTER 252

ABSTRACT 328

MOTOR IMPAIRMENTS ASSOCIATED WITH LOSS OF UPPER LIMB FUNCTIONAL ACTIVITY EARLY AND LATE POST-STROKE

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Background and Aims: Understanding the relationship between motor impairments and functional activity will allow clinicians to define optimal patient treatment strategies. The aim of this study was to characterise wrist motor impairments which underlie loss of upper limb activity in the acute and chronic phases post-stroke.

Methods: In a single assessment observational study, two groups of participants with hemiplegia (acute <4 months, chronic >1 year) performed maximal voluntary contraction, range of movement (ROM) and active and passive tracking tests in an instrumented wrist rig. Force, position and EMG (wrist flexors and extensors) signals were recorded. Indices quantified: isometric extensor strength, EMG onset time and coactivation during tracking, spasticity (flexor EMG stretch response), stiffness (torque during slow stretch), and contracture (passive extension [PROM]). Activity was measured by the Wolf motor function test (WMFT).

Results: Twenty-nine participants (13 acute, 16 chronic) took part. Statistically significant ($p \leq 0.05$) correlations were found between WMFT and both extensor strength and PROM in the acute ($r = 0.888$ and $r = 0.611$) and chronic groups ($r = 0.853$ and $r = 0.614$), plus extensor onset ($r = –0.707$) and coactivation ($r = –0.783$) in the chronic group. A regression analysis showed that extensor strength explained most of the variance in activity in the acute and chronic groups ($R^2 = 69\%$, $R^2 = 61\%$, $p < 0.001$). The contribution of PROM was similar in both groups. Contribution of onset timing ($R^2 = 53\%$, $p = 0.003$) and coactivation ($R^2 = 31\%$) was greater in the chronic group.

Conclusions: Although our findings confirm the correlation between weakness and activity, our results suggest that loss of PROM is important even within the first 4 months post-stroke, and that delayed EMG extensor onset and coactivation contribute to loss of activity in the chronic phase. Rehabilitation strategies early and late post-stroke should take account of the predominant contributing factors to activity loss.

POSTER 254

ABSTRACT 340

EFFECTIVENESS OF HAPTIC MASTER SUPPORTED TASK-ORIENTED ARM TRAINING IN CHRONIC STROKE PATIENTS

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Introduction: Stroke is the first cause of motor problems worldwide and has a large impact on the everyday life activities and quality of life of the affected patient. Fifty percent of the stroke patients face long-term impairments and only 6% of the patients are satisfied with the function of their impaired arm four years after stroke. Due to the rising costs of stroke rehabilitation, (cost-) effectiveness becomes increasingly important. Rehabilitation technologies have emerged as promising training solutions. Most systems to date are robots that offer arm training on the ICF function level. The aim of this study was to assess the effectiveness of (technology-assisted) task-oriented arm training on upper extremity activity in chronic stroke patients.

Methods: In a single-blind randomized controlled trial, chronic stroke patients with a high functional level were randomly assigned to receive technology-assisted task-oriented training with the Haptic Master robot (T-TOAT) (HMG) or task-oriented training that was supported by DVD instructions only (CG). Therapy consisted of 8 weeks training (4×/week, 2×30'/day). The outcome measures were the Action Research Arm Test (ARAT); and the AOU-scale of the Motor Activity Log (MAL).

Results: Twenty-two patients were included (average age = 59; average post-stroke time = 3.3 years). On the ARAT (capacity level), only the HMG showed significant improvements ($p = 0.01$) after 8 weeks training. On the MAL (perceived performance), both groups showed significant improvements after 8 weeks training ($p = 0.02$). Individual improvements over time (IIT) were for ARAT higher in the HMG (IIT = 23.5, SD = 46) than in the CG (IIT = 22.6, SD = 38). For MAL, IIT values were higher in the CG (IIT = 65.5, SD = 85.47) than in the HMG (IIT = 50.9, SD = 64.22). There were no significant differences for ARAT and MAL between CG and HMG.

Conclusion: Robot-assisted task-oriented arm hand training resulted in significant improvements at the capacity level. Both task-oriented trained groups showed a significant increase in perceived performance.

POSTER 256

ABSTRACT 352

BODY COMPOSITION AND METABOLIC CHANGES BETWEEN TWO WEEKS AND SIX MONTHS OF STROKE

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Background and Aims: Losses of muscle mass and increased fat mass after stroke are thought to contribute to detrimental bone loss and insulin resistance. This study aims to determine the skeletal, body composition and metabolic changes which occur in the first six months after stroke.

Method: Patients with hemispheric stroke from Austin Hospital, Melbourne, without history of stroke or known diabetes, who are medically stable, and are unable to walk within one week of stroke are included. Outcome measurements: total body bone mineral density (BMD), total lean and fat mass using dual-energy x-ray absorptiometry (DXA); and glucose tolerance. Assessments are undertaken within two weeks, one month, three months and at six months of stroke.

Results: Twenty-two baseline and 14 six month follow-up assessments have been undertaken. Two participants died and one dropped out, reporting deteriorating health. Median age of patients at baseline was 67.7 years (range 41.7-89.8), nine (40.9%) female. Body mass index (BMI) was 26.84 kg/m^2 (95% CI 24.80, 28.88), n = 22. Mean six-month change in BMD was –0.023 g/cm^2 (95% CI –0.035, –0.012), (n = 12). Changes in total lean and fat mass were –477.83grams (95% CI –1853.01, 897.3426) and –3610.33grams (95% CI –6185.44, –1035.22) respectively. BMI at six months was 26.85 kg/m^2 (95% CI 24.80, 28.90), n = 14. Dysphagia prevented baseline glucose tolerance testing in eight participants. Glucose tolerance at six months was normal in ten participants and impaired in three. One participant declined blood testing.

Conclusion: Within six month of stroke, expected trends in loss of total body BMD and lean mass were observed. BMI was expected to reduce, but was maintained, and fat loss was greater than expected. However, sample size was small and individual results varied. Two year follow-up is planned for 35 participants to determine the emergence of insulin resistance and bone loss.

POSTER 258

ABSTRACT 359

A PRELIMINARY STUDY INTO THE USE OF ANKLE FOOT ORTHOSIS IN THE EARLY STAGES OF STROKE RECOVERY

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Introduction: Ankle foot orthoses (AFO's) are prescribed to patients who have ankle impairments causing difficulty walking following stroke. The evidence regarding the benefit of prescribing AFO's is controversial. Methods: Temporal distance gait measures were collected using the GAITRite mat (CIR Systems GRG-24, United States, 80Hz) for 13 participants (10 male) aged 23-71 years ($M = 52.3 \pm 13.9$) diagnosed with a stroke. Inclusion criteria included onset of stroke less than 15 weeks ($M = 7.3 \pm 3.9$) and the ability to walk barefoot but had ankle impairments. Two baseline conditions; barefoot and shoes, and three AFO's; push aequi brace, spring leaf AFO and fibreglass casts, were tested with four trials of each condition. Parameters analysed were walking velocity, double limb support (DLS), single stance times (SST) and affected leg step length (SL), with order of testing counterbalanced. Differences across the five conditions were assessed using the Friedman's Test. The 'smallest real different' measure was used to determine the degree of individual improvement with use of the AFOs compared to the shod walking.

Results: Across the five conditions there were significant differences with respect to walking velocity (Friedman's $\chi^2(4) = 12.8$, $p = .012$), and SL (Friedman's $\chi^2(4) = 18.7$, $p = .001$). Post hoc analyses indicated that when using the shod condition patients demonstrated significantly better velocity (barefoot, M = 23.34 m/min, SD = 13.74 m/min; shod, M = 27.54 m/min, SD = 15.54 m/min) and SL (barefoot, M = 37 cm, SD = 9.4 cm; shod, M = 41.6 cm, SD = 10.6 cm) than the barefoot condition. There were no significant differences for DLS and SST. Individual's improved using an AFO as evidence by, for example, increased velocity.

Conclusion: This study did not show benefits from AFO prescription for this group of stroke patients. There was large variability in temporal distance measures in the group in the baseline conditions. Analysis of individual participants demonstrated variable responses both in terms of whether there was improvement with an AFO and the type of AFO yielding benefit.

POSTER 259

ABSTRACT 361

MAXIMAL EXERCISE TESTING AFTER STROKE

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Background and Aims: Graded maximal exercise tests (GXTs) are considered the gold standard for evaluating aerobic capacity for the general population, but logistic issues often limit its application in stroke rehabilitation settings. GXTs, however, do serve as an important screening tool for cardiovascular abnormalities during exercise that is useful for guiding prescription. The aims of this paper were to describe logistical considerations for performing GXTs with people with stroke, adverse events encountered, and participant characteristics associated with achievement of age-predicted maximum heart rate (HR).

Methods: GXTs using a ramp protocol on an upright cycle ergometer were performed (n = 50 participants, mean ± SD age 67 ± 7 years, 4 ± 3 years post stroke). Peak values for gas exchange, HR and rating of perceived exertion were noted, as were adaptations made to testing procedures and occurrence of adverse events. Logistic regression analysis was performed to evaluate participant characteristics that were related to better test performance (defined as ability to achieve peak HR ≥85% age-predicted maximal HR).

Results: Of the 50 GXTs performed, 49 (98%) were completed without major incident. Peak VO_2 was 16.7 ± 6 $ml/kg^{-1}/min^{-1}$, respiratory exchange ratio was 1.17 ± 0.2, and rating of perceived exertion was 15 ± 2 (out of 20). Logistic regression revealed that motor impairment of the leg ($P = 0.06$) and gait speed ($P = 0.02$) were associated with the participants' ability to achieve peak HR ≥85% age-predicted maximal HR ($\chi^2(2) = 6.9$, $P = 0.03$).

Conclusions: We demonstrated that GXTs are important for cardiovascular screening for people with stroke prior to embarking on an exercise program, providing appropriate adaptations were made to accommodate the broad range of physical abilities. The ability to achieve age-predicted maximal HR on the GXT was associated with less motor impairment and higher gait speed. Further study is warranted to examine the validity of performing GXTs among participants with more impaired lower limb function.

POSTER 260

ABSTRACT 364

LOW COMPLIANCE WITH NATIONAL STROKE GUIDELINES: FEW PHYSIOTHERAPY OR OCCUPATIONAL THERAPY SESSIONS OCCUR OUTDOORS IN PUBLIC STREETS

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Background: Australian clinical practice guidelines recommend that people with stroke should have access to multiple escorted outings with a therapist (ie, up to seven sessions) to improve community transport and ambulation. The aims of this study were to describe current practice and compliance with the guideline recommendation by Australian occupational therapists and physiotherapists, based on service type.

Methods: An observational descriptive design was used involving retrospective medical record audit of prospectively collected data. A total of 22 private and public rehabilitation teams were recruited in Sydney, Australia: (a) community-based transitional aged care (TAC), (b) home-based therapy (HBT), (c) hospital-based out-patient; (d) day therapy. All teams employed occupational therapists and physiotherapists. We audited 15 patient records per team against the guideline (total, n = 300 records). Data collected included: number/type of therapy sessions, number of escorted outings, duration of therapy program, stroke severity, time post-stroke.

Results: Escorted outings involving walking over rough ground or up/down kerbs in public streets were rare (median 0 sessions/patient, IQR 1). A higher proportion of TAC patients received four or more escorted outings (47%) compared to HBR (12%), outpatient (5%) and day therapy teams (2%). More escorted outings were provided by TAC (median 3, IQR 0) than by other service types. Outdoor practice in hospital grounds or the person's garden was also rare (median 0 sessions per patient, IQR 1). No significant practice differences were identified between private and public sector services, or stroke severity based on Modified Rankin Scale scores.

Conclusions: Community-based TAC were the only service to comply with the guideline. Team location and mode of delivery (ie hospital-based) may be a barrier to evidence-based community rehabilitation. Feedback from this audit is being used to help teams improve their practice as part of a large randomised trial.

POSTER 261

ABSTRACT 372

ACTIVE-PASSIVE BILATERAL THERAPY (APBT) AS A BRAIN-PRIMING STRATEGY FOR WII-BASED MOVEMENT THERAPY AFTER STROKE

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Background and Aims: Stroke is the leading cause of acquired adult motor disability, for which rehabilitation remains the only means to recover functional movement. Motor deficits post-stroke are thought to be compounded by the development of asymmetric interhemispheric inhibition. APBT was developed to try and rebalance the asymmetry. This study investigated the effect of APBT-priming before Wii-based movement therapy to improve post-stroke rehabilitation.

Methods: Ten stroke patients (aged 23-77 years, 3-123 months post-stroke) underwent a 14-day intensive program of Wii-based movement therapy for upper-limb rehabilitation. Ten formal Wii-therapy sessions were immediately preceded by 15 min of APBT priming whereby active flexion-extension of the less-affected wrist drove mirror-symmetric passive movements of the more-affected wrist through a custom device. Functional movement was assessed pre- and post-therapy, using the Wolf Motor Function Test (WMFT), upper limb Fugl-Meyer Assessment (FMA) and Motor Activity Log (MAL). Case-matched controls were stroke patients who received Wii-therapy but not APBT.

Results: Mean FMA scores increased significantly from 37.2 to 43.7 ($p = 0.002$) for the primed cohort, as did MAL scores, 50.3 to 70.2 ($p = 0.001$), indicating a transfer of therapy gains to activities of daily living. Performance on the WMFT timed tasks improved, with summed times decreasing from 863 to 797 s, but not significantly ($p = 0.059$). The mean number of APBT movements increased significantly from 626 to 1156 ($p < 0.001$).

Changes in FMA scores for APBT-primed patients were twice that of case-matched control patients (31.6% versus 16.5%, respectively). Improvements on the WMFT and MAL were similar for both groups.

Conclusion: All patients gained additional functional upper-limb movement following APBT-priming before Wii-therapy, with FMA score changes that were twice that of the case-matched control group. Although there was no statistical difference between groups, these data suggest that APBT brain-priming may enhance the efficacy of Wii-based movement therapy, particularly for low-functioning stroke patients.

POSTER 262

ABSTRACT 374

POST-STROKE CARDIOVASCULAR FITNESS IS IMPROVED BY WII-BASED MOVEMENT THERAPY

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Background and Aim: Stroke recovery is limited by physical deconditioning that is ~50% of healthy age-matched controls. Initial post-stroke therapy typically focuses on speech and ambulation without targeting reduced cardiovascular fitness, a primary risk factor for recurrent stroke. In this study we investigated changes in cardiovascular fitness with Wii-based movement therapy, a protocol specifically designed for upper-limb rehabilitation.

Methods: Thirteen males and six females with upper-limb hemiparesis aged 22-75 years and 4-91 months post-stroke completed a 2 week Wii-based movement therapy program. One hour of formal therapy on 10 consecutive weekdays was augmented by home training. Physiological signals including heart rate and stepping were recorded *during* therapy using wireless telemetry at three time points: early (day 2), mid (day 6-8) and late (day 14). Functional assessments included the Wolf Motor Function Test (WMFT), the upper-limb motor subscale of the Fugl-Meyer Assessment (FMA), 6-minute walk and stair climbing speed.

Results: Across all Wii therapy activities, peak heart rate significantly increased compared to resting rates by up to 33% ($p < 0.001$) with a sport specific gradient ranging from 17.8 ± 13% in golf to 40.9 ± 15% in tennis ($p = 0.004$). Stepping increased by 56% in tennis ($p = 0.02$) and 27% in boxing ($p = 0.02$). Heart rate recovery times decreased by 54 ± 6% ($p = 0.05$) from early to late sessions reflecting increased fitness that transferred to a 6% improvement in the 6-minute walk distances ($p = 0.04$) and 8% increase in stair-climbing speed ($p = 0.09$). Upper-limb function improved with performance on the WMFT timed tasks improving from 519 s to 448 s ($p = 0.02$) and FMA scores increasing from 43 to 48 ($p = 0.006$).

Conclusion: These results suggest that Wii-based movement therapy not only improves upper limb functional ability but promotes cardiovascular fitness. The sports-specific graded heart-rate response means that Wii therapy can be specifically targeted to the functional and cardiovascular status of individual patients.

POSTER 263

ABSTRACT 376

ASSESSMENT TOOLS TO MEASURE THE EFFICACY OF WII-BASED MOVEMENT THERAPY FOR HIGH- AND LOW-FUNCTIONING PATIENTS

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Background and Aims: Post-stroke disability depends on many factors including; stroke severity, location, size and acute treatment. Functional improvement after therapy is more evident in those with high function, and more difficult to measure in low-functioning patients. This study investigated the best assessment tools for measuring functional improvement in both high- and low-functioning patients after Wii-based movement therapy.

Method: 21 male and 13 female patients with upper-limb hemiparesis, aged 22-83 years (mean 63 ± 14 years), 1 month to 21 years post-stroke (mean 32 ± 52 months), completed an intense 2-week Wii-based movement therapy program. Patients were classified as low functioning if active range-of-motion of digits I-II was <20° ($n = 13$). Function was assessed using the Wolf Motor Function Test (WMFT), Fugl-Meyer Assessment (FMA), Motor Activity Log (MAL) and a suite of secondary measures including tests of dexterity.

Results: All patients improved after 2 weeks of therapy regardless of disability, age or time post-stroke. WMFT timed tasks improved from 225-161 s (29.3%, $p = 0.005$) and 1491-1418 s (5.4%, $p = 0.022$) for high- and low-functioning patients, respectively. Whereas the FMA scores improved from 50.6-54.9 (9.5%, $p = 0.0004$) and 16.7-22.2 (40%, $p = 0.001$). Floor and ceiling effects were associated with functional status. The block and box test of gross manual dexterity was the best discriminator between high and low function, as the low-functioning group with severe stroke were unable to move any blocks either pre- or post-therapy. The grooved pegboard test discriminated between mild and moderate stroke within the high-functioning group. The moderate-stroke group were unable to place any pegs whereas the mild-stroke group completed the test significantly faster after therapy ($p = 0.02$).

Conclusions: The sensitivity of functional assessments is affected by the level of disability. These data suggest that tests of dexterity were the best discriminator of functional ability, and that no one assessment adequately reflected functional improvements across all levels of disability.

POSTER 264

ABSTRACT 380

COMPARISION OF TRUNK TRAINING ON UNSTABLE SURFACE VERSUS STABLE SURFACE IN TRUNK CONTROL AND BALANCE FOLLOWING ACUTE STROKE: A PILOT RANDOMIZED CLINICAL TRIAL

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Background: Trunk control is also an early predictor of the functional outcome following a stroke. Trunk muscle weakness could affect trunk control, balance and ADL functions in early phase stroke rehabilitation. Though there is adequate available literature on limb rehabilitation, studies on trunk rehabilitation are scarce.

Aim: To compare additional trunk training using physio ball Vs therapeutic mat on trunk control and balance in acute stroke patients.

Methodology: An observer blinded pilot randomized controlled clinical trial of 30 acute stroke patients from neuro-rehabilitation hospital who can be unsupported sitting ability more than 30 seconds were randomly

assigned to the experimental group (n = 15) underwent trunk training on an unstable surface using physio ball while the control group (n = 15) received it on a stable surface i.e. mat. Along with routine acute-stroke physiotherapy, both groups received additional trunk training for 45 minutes, four days a week and for three week durations. Trunk Impairment Scale (TIS) and Brunel Balance Assessment (BBA) were the outcomes used to measure the trunk control and balance following interventions. The parametric test results within the group, and between the groups were obtained and statistically analyzed using the student's paired and unpaired t-test with $p < 0.05$.

Results: No significant difference was found for the baseline characteristics of patients in both the groups. Post intervention, both groups attained significant improvement on trunk control and balance. The physio ball group resulted statistically significant improvement [mean (SD)] in dynamic sitting balance 1.47 (1.36), coordination 1.3 (0.61) items of TIS, total TIS 3.06 (1.43) and BBA 1.8 (1.4) than the mat group.

Conclusions: Trunk training on unstable surface produced better trunk control and balance improvement in acute stroke rehabilitation. Future study should assess the long term effects of trunk rehabilitation using physio ball on the level of balance self-efficacy and community reintegration in patients with stroke.

POSTER 265

ABSTRACT 392

DOES A FOCUS ON PARTICIPATION AND PERSONAL GOAL ACHIEVEMENT HAVE AN IMPACT ON DEPRESSION IN THE FIRST YEAR AFTER STROKE?

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Background and Aims: The development of depression is a common sequelae following stroke. There is evidence to support the effectiveness of goal-based interventions post-stroke, however, the effect of such interventions on depression is largely unknown. Thus, the aim of this study was to investigate the effectiveness of a client-centred, integrated approach to facilitating goal achievement in the first year post-stroke on depressed mood.

Methods: This study was a single blind randomised controlled trial that addressed ways to enhance participation in patient-valued activities and screened for adverse stroke sequelae, following discharge home from rehabilitation. The control group received treatment as determined by the treating rehabilitation team post hospital discharge. In addition, the intervention group received: collaborative goal setting and review of goal achievement levels, written information provision, and further referral to relevant health services as required. Interventions were delivered both as home visits and telephone contacts. Assessments were conducted at discharge from inpatient rehabilitation, and at six and twelve months post-stroke. The main outcome measure was depression, measured by the Geriatric Depression Scale (GDS-15 item), with depression defined as GDS ≥6 at 12 months post stroke.

Results: One-hundred and ten participants with the primary diagnosis of acute stroke were recruited. No significant differences were identified between the groups at baseline on all demographic and clinical variables. There was a significant difference between the two groups with respect to the rates of depression at the 12 month post-stroke follow-up. The rate of depression in the intervention group (14.6%, $n = 7$) was significantly lower than the rate of depression in the control group (34.8%, $n = 16$), $\chi^2(1) = 5.19$, $p = .023$.

Conclusions: This model of community-based rehabilitation management proved effective in reducing the incidence of post-stroke depression. An integrated approach that takes into account the patient's expressed valued activities should form a routine part of post-stroke management.

POSTER 266

ABSTRACT 394

STROKE REHABILITATION ENHANCING AND GUIDING TRANSITION HOME

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Background and Aims: People with stroke and their carers often feel poorly prepared for the experience of going home from inpatient stroke rehabilitation. Stroke Rehabilitation ENhancing and Guiding Transition Home (STRENGTH) is an innovative outreach approach to inpatient stroke rehabilitation that implements one day of in-home therapy in each week prior to discharge. The hypothesis was that STRENGTH would improve the transition experience by promoting interprofessional therapy goals and interventions addressing client and/or carer needs in and around the home environment.

Methods: Participants were recruited from a general rehabilitation unit in a metropolitan hospital, including seven clients with stroke, four carers and nine health professionals. Clients were eligible if they were in active rehabilitation after a first time stroke and were planning to be discharged to the community. A mixed methodology collected client and carer data at baseline, discharge and six-week follow-up. Data included semi-structured interviews, age gender, type of stroke, time from stroke, functional independence, Geriatric Depression Scale, Stroke Impact Scale (SIS), and Caregiver Strain Index. Health professionals participated in a semi-structured group interview at the completion of the program. The methodology replicated a previous study and allowed comparison with a historical cohort with non-parametric statistics and comparison of inductively determined themes.

Results: Clients received on average 4.5 (2-9) visits home with STRENGTH prior to discharge. There were no statistically significant differences in quantitative measures. Inductive thematic analysis found improved preparation for living within the home but challenges remaining for community participation and carer lifestyles. Qualitative themes from the health professionals identified that the changes in the program shaped and formed a genuinely client-centred and interprofessional team approach to rehabilitation.

Conclusion: The results from the perspectives of the clients, carers and health professionals suggest that STRENGTH is a promising alternate approach for improving transition to home from inpatient rehabilitation.

POSTER 267

ABTSRACT 399

REHABILITATION TRIALS WITHIN THE VIRTUAL INTERNATIONAL STROKE TRIALS ARCHIVE (VISTA-REHAB)

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Background and Aims: Stroke rehabilitation trials vary by the intervention, impairment targeted, outcomes captured and assessment tools employed. Inter-trial variation and individual patient differences in meaningful recovery contribute to the complexity of interpreting stroke rehabilitation trial evidence. We sought to inform the design and conduct of stroke rehabilitation trials through the establishment of VISTA-Rehab: a stroke rehabilitation resource that can be used for novel exploratory analyses.

Methods: Trials conducted since 1998, which enrolled at least 20 patients with a diagnosis of stroke were eligible for inclusion. Data on initial stroke severity measured using a recognised scale (e.g. the Modified Rankin Scale (mRS), Functional Independence Measure or Barthel Index) were required. We imposed no time limit between stroke onset and intervention reflecting the long-term nature of stroke rehabilitation. Our Steering Committee reviewed projects and publications and we commenced recruitment of rehabilitation trials into this resource.

Results: As of September 2011, we held data on 10,194 patients (median age 73 (IQR 65, 80) years) from 37 stroke rehabilitation trials. We also secured agreements for the contribution of 16 additional rehabilitation trials. Outcomes include mRS at 6 months (median = 3, IQR [2,5]), and Nottingham Extended Activities of Daily Living Score at 6 months (median = 20, IQR [9,38]). Impairment specific outcomes are also selectively available including the Rivermead Motor Assessment, Hospital Anxiety and Depression Scale and Wolf Motor Function Test.

Conclusions: Rehabilitation trials of interventions targeting specific impairments are often hindered by small sample sizes, limited information on the natural history of recovery, and a dearth of guidance on stroke rehabilitation trial methodology. While VISTA-Rehab regulations do not permit the re-analysis of treatment effects, the pooling of trials with similar outcomes permits the examination of some of these novel issues. Investigators are invited to contribute further datasets or to propose analyses using these shared data.

POSTER 268

ABSTRACT 400

COMPARING THE EFFECTIVENESS OF GROUP-BASED MEMORY TRAINING AND PREDICTORS OF OUTCOME FOR PATIENTS WITH STROKE VERSUS EPILEPSY

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Background and Aims: Neurological patients can benefit from memory training, but few studies have looked for effects of etiology on training success and predictors of outcome.

Methods: Groups of patients with stroke ($n = 27$) or epilepsy ($n = 31$) attended a group-based memory intervention and were assessed three times using a waitlist-control design. The six, weekly intervention sessions included (i) education regarding memory function and associated lifestyle factors, and (ii) practice in the use of internal and external memory strategies. Outcome measures included: Rey Auditory Verbal Learning Test (RAVLT), Royal Prince Alfred Prospective Memory Test, 'Appointment' Memory, Strategies Reported, Comprehensive Assessment of Prospective Memory (CAPM, Self- and Other-Reports).

Results: At baseline, Stroke and Epilepsy groups differed in age (Stroke: $M = 54.3$, $SD = 12.4$; Epilepsy: $M = 43.3$, $SD = 11.2$; $p < .05$), years since onset (Stroke: $M = 4.7$, $SD = 7.8$; Epilepsy: $M = 15.6$, $SD = 12.2$; $p < .05$) and CAPM-Self (Stroke group reported fewer memory difficulties [$p < .05$]). Following training, both groups showed significant improvements on RAVLT scores. Epilepsy patients also demonstrated gains in Appointment Memory, Strategies Reported and CAPM-Self. The only additional gain for the Stroke group was on CAPM-Other (p's<.05). Better training outcome was related to lower baseline memory scores across both groups. Lower age and education also predicted greater gains (*partial* r's = –.30 and –.37, respectively, $df = 28$, $p < .05$, controlling for baseline memory score) within the Epilepsy group, but not for the Stroke group.

Conclusions: Patients with epilepsy gained more widespread benefits from group-based memory training than stroke patients. However, they were also younger and judged their prospective memory as worse than the stroke group, which may have made them more motivated to engage with training.

POSTER 269

ABSTRACT 405

CONTINENCE CARE FOLLOWING STROKE: WHAT DOES IT TAKE?

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Background and Aims: Urinary incontinence (UI) is a common consequence of stroke and the most significant indicator of poor outcome, yet continence management in many acute settings remains suboptimal. We sought to develop solutions to improve post stroke continence care within the context of the National Stroke Foundation (NSF) guideline recommendations.

Methods: Using a pre and post intervention methodology we evaluated the effect of a stroke continence assessment and management program (SCAMP) on continence management practice across three local rehabilitation sites. SCAMP is an evidence based program based on the NSF guideline recommendations and includes a structured functional continence assessment, diagnosis and management tool, and a supporting online education package. A staff focus group was also used to help identify potential barriers to practice change.

Findings: Results showed a substantial evidence/ practice gap across the three rehabilitation sites, including a lack of continence assessments and individual management plans, a failure to recognise and document the specific UI type, a tendency to overlook the underlying problem, and a lack of multidisciplinary involvement in continence care. Following implementation of SCAMP we found an increase in the numbers of patients with a structured continence assessment ($p < 0.001$), and a documented UI diagnosis ($p = 0.041$), when compared with those in the pre-implementation period. Improvements were seen in several key management strategies including: assessment of post void residual urine volumes ($p = 0.002$), environment modification ($p = 0.004$), medication assessment

($p < 0.001$), and the involvement of multidisciplinary team members in the management of UI ($p = 0.013$).

Conclusion: The complexity of post stroke urinary incontinence management requires a multifaceted approach which includes the implementation of evidence based processes, clinician support and education.

POSTER 270

ABSTRACT 408

EMG BIOFEEDBACK FOR MOTOR RECOVERY OF LOWER LIMB AFTER STROKE: A META-ANALYSIS

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Background and Aims: Electromyography biofeedback (EMG-BFB) has been recommended as an adjunct therapy for stroke rehabilitation. However, evidences showed that EMG-BFB improved motor outcomes at the impairment level of the International Classification of Function (ICF) model. The aim of this review was to update recent evidences regarding the effects of EMG-BFB in people with stroke with a special emphasis on the outcome in the activity level of ICF model.

Method: Searches were conducted in MEDLINE, PEDro, CINAHL and Cochrane Library databases (to October 2011). Language was restricted to English. We recruited randomized control studies of stroke, in which the effects of EMG-BFB in lower limb motor function were compared with conventional physical therapy alone. Each study was appraised using the PEDro scale by two reviewers. Effect sizes of outcomes were calculated as standardized mean differences (SMD) using the Review Manager 5.1 software.

Results: Eleven studies (221 people) met our inclusion criteria and the range of methodological quality was from 3 to 7 (mean: 4.7). In overall effects, EMG-BFB significantly improved strength of the tibialis anterior (TA) muscle (SMD = 1.04, 95% CI = 0.46~1.62, p = 0.0005), ankle range of motion (ROM) (SMD = 0.51, 95% CI = 0.19~0.83, p = 0.002) and walking speed (SMD = 0.63, 95% CI = 0.18~1.07, p = 0.006). Subgroup analysis revealed that EMG-BFB trials which included practice during functional activities (SMD = 0.66, 95% CI = 0.14~1.18, p = 0.01) improved walking speed compared with trials which only practiced in static positions (SMD = 0.53, 95% CI = –0.33~1.4, p = 0.23).

Conclusions: The results of current analysis indicate that EMG-BFB used in a dynamic and functional training mode is superior to conventional physical therapy alone for improving TA strength, ankle ROM, and walking speed in people with stroke. The effects of clinically common practices of using EMG-BFB in static positions in improving outcomes at the activity level remains unclear.

POSTER 271

ABSTRACT 409

FACTOR RELATED STROKE KNOWLEDGE AMONG THAI RURAL POPULATION

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Background and Aims: Stroke is the third leading cause of death in Thai and also has devastating effect on patient and families. About half of stroke patients in Thailand lived in rural area which difficult to access the health care service and information. To reduce the incidence of stroke, public stroke awareness is critical. Therefore, this study aimed to determine the factor related stroke knowledge in Thai rural people.

Methods: A cross sectional study was conducted among 579 peoples who live in rural area (Khao Suan Kwang district, Khon Kaen, Thailand). All participants were asked to complete the questionnaire which consisted of (1) demographic data (2) stroke risk factor (3) sign and symptom of stroke including warning sign and (4) management after stroke attack.

Results: The majority of participants (79%) were female, with mean age 49 (SD 16) years. Only 19% were considered as good knowledge in risk factor, sign and symptom of stroke and warning sign. On contrary, most of them recognized proper management after stroke attack. In multivariate regression models, age (more than 40 years old) showed positive associated with stroke knowledge ($b = 2.81$, $p = 0.002$) whereas male suggested inverse association ($b = –1.92$, $p = 0.002$). There was no association between education level, income or medical history and stroke knowledge.

Conclusions: This study suggested deficit in stroke knowledge in rural area. Therefore education campaign should be conducted in rural area particular in male and young people.

POSTER 272

ABSTRACT 414

DEVELOPMENT OF A CHRONIC STROKE RESOURCE KIT: PUTTING EVIDENCE INTO PRACTICE

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Background and Aims: In Australia, stroke is a leading cause of long-term, permanent disability. Post-stroke sequelae, such depression, limited participation in community life and poor perception of quality of life are well documented in the literature pertaining to chronic stroke. There is Level 1 and Level 2 evidence that community-based rehabilitation interventions can reduce depression, maintain functional status, improve participation, and have an impact on health related quality of life in chronic stroke survivors. After the initial intensive rehabilitation period, there may be a lack of access to community-based services and programs that can address these issues and facilitate community reintegration in the context of disability. The purpose of this project was to develop a resource kit based on current evidence-based practice for the multidisciplinary assessment, treatment and overall management of chronic stroke survivors within the community setting.

Methods: In the development of this resource kit, a comprehensive literature review was conducted and expert opinions were sought from relevant health professionals. In addition, certain components were trialled by community-based clinicians, who then provided feedback regarding the kit's utility and feasibility.

Results: The resource kit comprises of guidelines for assessment and management under 10 domains: participation; functional limitations and decline; falls prevention; communication; cognition; depression; quality of life; secondary stroke prevention and risk factor management; carer support; and goal setting. A screening assessment process enables identification

of arising issues, as well as a method of documentation and communication for health professionals.

Conclusions: Rehabilitation services in the community setting should adopt screening processes that readily identify issues that commonly arise in the chronic phase of stroke recovery. Appropriate targeted interventions, integrating goal-based practice, can then be implemented. The development and use of this resource and assessment tool across Victoria will facilitate high quality care for chronic stroke survivors within the community setting.

POSTER 273

ABSTRACT 419

A NEW APPROACH TO COMMUNITY REHABILITATION FOLLOWING ACQUIRED BRAIN INJURY: SUPPORTING THE GROWTH OF THE PEER-PROFESSIONAL WORKFORCE OF THE STEPS PROGRAM

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Background and Aims: The Skills To Enable People and Communities (STEPS) Program seeks to train, supervise and support a peer-professional leadership workforce for two main purposes: (1) the delivery of a 6-week self-management based group program for adults with Acquired Brain Injury (ABI) and their families; and (2) to foster the development of ongoing support networks in local communities throughout Queensland. The rapid expansion of the program in recent years has highlighted the need to further explore the measures employed to train, supervise and support the peer-professional workforce of the STEPS Program, which is the primary aim of this research.

Methods: An initial pilot study of the 2-day STEPS Leader Training Course employed questionnaire based data collection techniques. A thematic analysis of responses was completed to examine the specific components of the training that were most and least valued by trainees. The ongoing study will utilise a multiple methods approach. First, active peer and professional leaders of the STEPS Program will complete in-depth semi-structured interviews concerning perceptions of ongoing training and support needs. All interviews will be transcribed verbatim and thematically analysed. Phase two will involve leaders participating in a 2-day training forum in Brisbane in late 2011. A pre-post design incorporating qualitative and quantitative methods will be employed to examine the effectiveness of the forum.

Results: Evaluation of the pilot data demonstrated that 97% of leaders ($n = 85$) were either very/mostly satisfied with the 2-day STEPS Leader Training Course; 92% found it very/mostly relevant, and 100% reported it was very/mostly useful. Trainees reported valuing its practical and interactive nature, including the opportunity to facilitate part of the group program within the training itself and the experience of peer review. It was further reported that the training enhanced confidence in leading the program.

Conclusion: The STEPS Program demonstrates the utility of innovative workforce approaches in the delivery of community rehabilitation following ABI.

POSTER 274

ABSTRACT 421

THE CHARACTERISTICS OF QUANTITATIVE SENSORY ASSESSEMNT OF UPPER LIMBS IN SUBACUTE STROKE PATIENTS

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Background and Aims: Impairment of sensory function of upper limb may impede activities of daily living in stroke patients. Hemiplegic stroke patients show impaired two-hand ADL performance frequently. Most clinical assessments of sensory function rely on categorical or ordinal ratings by clinicians that lack the ability to discriminate subtle differences. We aimed to quantitatively assess the characteristics of sensory function of both upper limbs in subacute stroke patients.

Methods: Fourteen stroke patients (9 men, 5 women; age 63.9 ± 10.2 years; ischemic 6, hemorrhagic 8; duration of disease 43.8 ± 17.7 days), who can understand and perform quantitative sensory assessment with CASE IV (WR Electronics Co., Minneapolis, USA) instrument, were enrolled. Stereognosis and proprioception were evaluated by clinician before quantitative sensory assessment. Vibratory perception thresholds (VPT) on the nail of index finger, cold perception thresholds (CPT) and warm perception threshold (WPT) on the dorsum of hand were obtained with CASE IV instrument using 4, 2, 1 testing algorithm in both upper limbs. Clinical evaluation tools including hand screening test, grip strength test and Jebsen-Taylor hand function test were performed.

Results: 1) In affected hand, VPT was 21.3 ± 3.8 JND (just noticeable differences), CPT was 21.5 ± 5.6 JND and WPT was 20.8 ± 3.5 JND, respectively. 2) In unaffected hand, VPT was 13.9 ± 3.0 JND, CPT was 21.6 ± 3.0 JND and WPT was 19.3 ± 3.3 JND, respectively. 3) There was significant difference of VPT parameter between affected and unaffected hands. 4) Stereognosis and proprioception were impaired bilaterally in 4 patients, and VPT parameter was higher in all patients. 5) In affected hand, hand function and grip strength was significantly impaired on the clinical evaluation tools.

Conclusions: QST parameters, especially VPT, may explain the functional impairment of affected upper limb, which is not readily explained by clinical neurological tests.

POSTER 275

ABSTRACT 422

DISABILITY, IDENTITY AND LIFE CHANGE: A QUALITATIVE FIVE-YEAR FOLLOW-UP STUDY OF STROKE

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Aims: The purpose of this paper is to shed light on how stroke survivors experience their disability, how they see themselves and how they manage a changed life over time.

Methods: Qualitative interviews were conducted with fifteen men and women, aged 42 to 84, who had suffered first-time stroke five years earlier. The interviews addressed how they experienced their body and their self-understanding (identity), how their disability influenced daily living and how this had changed over time. The interviews took place in the participants' homes. The analyses were informed by Giorgi's phenomenological philosophy.

Results: Though these stroke individuals have achieved greater acceptance of the situation the stroke has created for them compared with the two to three years immediately after the stroke, all respondents describe how they are still being confronted with individual consequences of their

stroke. New illnesses and additions to the stroke have occurred, and disability alongside changes of identity and life patterns seems to constitute a continuous process that never truly stabilizes. They cope with this continuous process in at least two different ways: by resigning themselves or by making a life project that allows them to control the situation, to emphasize other possibilities and to formulate a positive self-image.

Conclusions: Stroke has submitted the stroke individuals to considerable difficulties as regards disability, identity and everyday life, which demand a continuous process of change that can drain their energy. The study also shows that adopting an optimistic approach to life can lead to continued learning about abilities and limitations, to the development of new skills and to the fashioning of a new identity. This study suggests that stroke survivors should be offered individualized rehabilitation programmes with continuity through all stages of the rehabilitation. It recommends that the interventions offered should be guided by a pedagogical approach that promotes the survivor's own resources, their abilities to take action and an optimistic view of life.

POSTER 276

ABSTRACT 423

START-PREPARE—PREDICTION AND PREVENTION TO ACHIEVE OPTIMAL RECOVERY ENDPOINTS AFTER STROKE: STUDY RATIONALE AND PROTOCOL

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Background: Stroke and depression have two of the highest Burden of Disease rankings. About one third of stroke survivors experience depression. Depression is associated with worse outcome, more cognitive deficits, poorer functional and rehabilitation outcome, reduced quality of life and reduced participation in previous life activities. Yet, post-stroke depression is under-diagnosed. Moreover, good predictors of depression that could be used to identify 'at risk' patients early as part of the clinical care pathway currently do not exist. Further, we rarely measure the stroke survivor's participation in domestic, social and leisure domains when they have returned home. The ability to predict the impact of neurological impairment and factors such as depression and cognitive impairment on participation is critical for discharge planning, patient education and planning of health resources.

Aim: Our aim is to *identify predictors* of depression based on imaging and functional outcome (in particular participation), which may be used in clinical management to aid early diagnosis, prevention and more targeted interventions.

Methods: A longitudinal cohort of 100 stroke survivors will be investigated for functional and structural changes in putative brain regions associated with depression, and for functional outcome including cognition and participation. Participants will be recruited into the START-PrePARE study from selected study sites in metropolitan Melbourne. Stroke survivors will be investigated at Day 3-7, 3 months and 12 months for depression and 3 and 12 months for changes in the brain and functional outcome including cognition and participation. We will also monitor factors such as stroke severity, diet and lifestyle that may have an influence. The impact of depression on stroke outcomes and participation in previous life activities will be quantified using the Activity Card Sort.

POSTER 277

ABSTRACT 424

THE CLINICAL CHARACTERISTICS OF POST-STROKE PNEUMONIA IN THE STROKE REHABILITATION WARD

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Background and Aims: Post-stroke pneumonia occurs due to various etiologic factors such as direct neurological problems or depressed mental status. Most studies on post-stroke pneumonia were conducted in acute stroke patients. There are few studies on the microbiology of pneumonia or association with outcomes. We aimed to investigate the clinical characteristics of pneumonia observed in stroke rehabilitation ward over a period of five years.

Methods: We retrospectively reviewed the medical records of four hundred and twelve stroke patients (256 male, 156 female; age 63.95 $\pm$ 15.11 years; 263 ischemic stroke, 149 hemorrhagic stroke; duration from onset to admission to rehabilitation ward 263.53 $\pm$ 916.53 days), who participated in inpatient rehabilitation program from November, 2005 to May, 2011. Pneumonia is defined by clinical symptoms and signs such as fever, sputum, elevated C-reactive protein, leukocytosis, elevated erythrocyte sedimentation rate, infiltration on chest X-ray or computed tomography, or positive sputum cultures. Patients with previous pulmonary disease, infectious disease, febrile disease or dysphagia before the onset of stroke were excluded.

Results: Thirty three patients (8.00%; 17 male, 16 female; age 68.30 $\pm$ 12.13 years; 12 ischemic stroke, 21 hemorrhagic stroke; duration from onset to admission to rehabilitation ward 287.18 $\pm$ 521.23 days; duration from onset to pneumonia 397.88 $\pm$ 620.02 days) developed pneumonia. Eighteen patients displayed pneumonic infiltration on imaging studies. Sputum culture was positive in eighteen cases and negative in fifteen cases. The most common bacterium was *Staphylococcus aureus*. Empirical antibiotics treatment was successful in ten cases. Antibiotics were switched according to the result of sputum culture in two cases. Aspiration was reported in eighteen cases and tracheostomy was observed in eight cases. Feeding route was oral in eighteen cases, nasogastric tube in fourteen cases, and percutaneous endoscopic gastrostomy in one case.

Conclusions: It will be helpful for therapeutic optimization in stroke patients to understand the clinical characteristics of stroke-associated pneumonia.

POSTER 278

ABSTRACT 430

THE EFFECT OF REGULAR EXERCISE PROGRAM ON COGNITIVE FUNCTION IN CEREBRAL INFARCTION RAT MODEL

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Background and Aims: Cognitive impairment is one of the most important factors to make trouble with neurorehabilitation program in stroke patients. Regular aerobic exercise improved cognitive function in healthy or aged persons. We aimed to investigate the effect of regular treadmill exercise program on cognitive function in cerebral infarction rat model.

Methods: Twenty-four male Sprague-Dawley rats, weighing 300 ± 50 g, aged 10 weeks were used. After the induction of photothrombotic cerebral infarction in all rats, Morris water maze test was performed before regular treadmill exercise program. All rats were randomly assigned into 2 groups: group A (no treadmill exercise, n = 12); group B (regular treadmill exercise with maximal velocity of 24 m/min, 5 days a week, for 4 weeks, n = 12). After 4 weeks, Morris water maze test were performed and all rats were sacrificed. The activity of SOD (superoxide dismutase) in the hippocampus was measured. Cresyl violet stain and immunohistochemistry for BDNF (brain derived neurotrophic factor) in the hippocampus were conducted.

Results: 1) Escape latencies on hidden platform trial were shorter in group B than in group A ($p = 0.042$). 2) The activity of SOD was more increased in group B than in group A ($p = 0.018$). 3) Damaged neuronal cells in CA3 lesion of hippocampus were less in group B. 4) Immunoreactivity for BDNF was more expressed in group B.

Conclusions: The regular exercise program would be a useful therapeutic strategy for improving the cognitive function in photothrombotic cerebral infarction rat model.

POSTER 279

ABSTRACT 432

THE EVOLUTION OF SELF-AWARENESS AFTER TRAUMATIC BRAIN INJURY: BIOPSYCHOSOCIAL PREDICTORS OF DEFICITS AND CHANGE IN AWARENESS

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Background and Aims: Reduced self-awareness of deficits is common following traumatic brain injury (TBI). It impacts rehabilitation, affecting goal-setting, participation and use of compensatory strategies. This study examines levels and changes in different aspects of self-awareness within the first year post-TBI; and the relative influence of a range of biopsychosocial factors on self-awareness over time.

Methods: To date, 27 TBI participants (20 males) with mean age 46.7 years (*SD* = 17.03, *range* = 16-89) have been recruited. At 3, 6 and 12 months post-TBI participants completed measures of attention, processing speed, memory and executive function, metacognitive and online self-awareness, depression, anxiety, coping style, psychosocial functioning and exposure to feedback about failures. Greater discrepancy between participants self-report of current and predicted functioning in 3 months time on the Sydney Psychosocial Reintegration Scale (SPRS) reflected poorer anticipatory self-awareness which involves judgment about one's abilities and limitations in relation to current and future situations. The interrelationships of biological, cognitive, psychological, social, and environmental factors with self-awareness deficits were examined using Pearson correlations.

Results: Preliminary findings three months post-TBI indicated that higher education level was associated with greater metacognitive awareness ($r = -.437$, $p = .029$). Increased anxiety was associated with poorer anticipatory awareness of impact of deficits on interpersonal relationships ($r = .453$, $p = .030$), independent living skills ($r = .552$, $p = .006$) and overall psychosocial functioning ($r = .427$, $p = .042$). Increased depression were correlated with poorer anticipatory awareness of impact of deficits on independent living skills ($r = .439$, $p = .036$).

Conclusions: These findings show poorer self-awareness is associated with greater level of anxiety and depression early on post-TBI. Further examination of the trajectory of cognitive functions, psychosocial status and self-awareness over the first year after injury will provide a basis for development of better awareness measures and of rehabilitation strategies for patients, families and clinicians to increase self-awareness within hospital and community settings.

POSTER 280

ABSTRACT 447

A MIXED METHODS STUDY OF THE EXPERIENCE OF TRANSITION TO THE COMMUNITY FOLLOWING NON-TRAUMATIC BRAIN INJURY

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Background and Aims: The 'transition' phase from hospital to home following brain injury is well established as a critical period of adjustment for individuals and their families. There is, however, a lack of knowledge about the experience of transition for individuals and their families following non-traumatic brain injury (e.g. stroke, aneurysm), particularly individuals of working age (under 65 years) who comprise a major proportion (40%) of strokes annually. The purpose of this study was to explore the transition experiences of individuals with non-traumatic brain injury and their carers using a mixed methods approach.

Methods: Six individuals with non-traumatic brain injury aged 18-60 years and two nominated carers were recruited from a larger study using maximum variation sampling criteria including hospital experience, success of transition and occurrence of key life events. Individuals and carers participated in semi-structured interviews at 6-months post-discharge and completed quantitative measures pre-discharge and at 6-months post-discharge; Sydney Psychosocial Reintegration Scale (SPRS), Mayo-Portland Adaptability Inventory (MPAI-4), Depression Anxiety Stress Scale (DASS-21) and EQ 5D quality of life measure.

Results: Qualitative content analysis of interviews identified three themes: 1) changes in role performance, 2) support and services, 3) coping with life after brain injury. Themes reflected an overall trend of improved functioning on the quantitative measures and continued difficulties with work, driving, activity participation, and fear of re-injury.

Conclusions: The findings support previous research on the transition experiences of people with stroke over the age of 65 years, however, highlight key differences in life experiences, roles and contexts of younger people with non-traumatic brain injury. The results support the need for individualised structured transition services pre and post-hospital discharge for this group.

POSTER 281

ABSTRACT 448

SELECTION FOR INPATIENT REHABILITATION FOLLOWING SEVERE STROKE: AN OBSERVATIONAL STUDY

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Background and Aims: There is significant variation in selecting patients for rehabilitation following severe stroke. This study aimed to identify factors that were considered important in making the decision regarding suitability for inpatient rehabilitation following acute severe stroke.

Methods: Five acute hospitals in Victoria, Australia participated in this study. Patients were eligible for inclusion if they had suffered an acute severe stroke (Stroke Mobility Scale Score ≤15). Rehabilitation assessors completed a questionnaire, rating the importance (on a 10 point Likert scale) and direction (positive, negative or neutral) of 17 items affecting their decision regarding patients' acceptance to rehabilitation. Following factor analysis, identified factors were entered as independent variables into a logistic regression model with the decision to accept as a binary dependent variable. One hundred and seventeen patients met the inclusion criteria, 86 (73.5%) were referred to rehabilitation and a rehabilitation assessor questionnaire was collected for 75 patients. Sixty-one (81.3%) of these patients were accepted for inpatient rehabilitation and 14 were not.

Results: The five most important factors considered in the rehabilitation decision-making process were [mean(SD)] pre-morbid cognition (7.7(1.5)), pre-morbid mobility (7.7(1.5)), social support (7.5(1.4)), living situation (7.4(1.5)) and motivation (7.3(1.7)). Of the six factors identified in the factor analysis, assessor ratings of patient's current status (excluding mobility) (OR = 9.6, 95%CI = 1.8-52.0, p = 0.008), pre-morbid status (OR = 4.2, 95%CI = 1.3-13.1, p = 0.015), and social factors (OR = 11.6, 95%CI = 1.8-76.1, p = 0.01), were significantly associated with acceptance for rehabilitation. Ratings of mobility/mood, patient/family advocating for rehabilitation and patient's age demonstrated no such association.

Conclusions: In addition to the known prognostic factors of pre and post stroke function, social factors including living situation, social support, rehabilitation goals and motivation are important in the decision making process for acceptance to rehabilitation following severe stroke. Future models developed aiming to improve equity of access need to take such factors into account.

POSTER 282

ABSTRACT 452

WHITE MATTER HYPERINTENSITIES AND COGNITIVE DYSFUNCTION IN PATIENTS WITH INFRATENTORIAL STROKE

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Objectives: Influence of infratentorial stroke on cognitive function remains unclarified. Recently, the relation has been reported between the white matter hyperintensities (WMH) and cognitive decline in patients with infratentorial stroke. The objective of this study is to determine whether cognitive function is associated with the WMH in patients with infratentorial stroke.

Methods: Inclusion criteria for this study were as follows; first-ever infratentorial stroke confirmed by MRI, and ages between 18 and 60 years old. Twenty-four patients with infratentorial stroke were enrolled (22 males, 19 infarction, mean age 48.7 yr). Assessment of WMH severity was performed by a single rater who was blinded to all clinical information. WMH were rated visually on axial FLAIR images using the Fazekas scale and the Scheltnes Scale. Cognitive functions were assessed using the Mini-Mental Status Examination (MMSE), Rey-Osterreith Complex Figure Test (ROCFT), and the Seoul Computerised Neuropsychological Test Battery (CNT) at one month after stroke. All participants were divided into two groups (no-WMH group and WMH group) by the presence of WMH. General characteristics and cognitive functions were analyzed between two groups.

Result: There was no significant difference in general characteristics such as age, stroke type, hypertension history, and education level between two groups. However, MMSE in the no-WMH group was significantly higher than in the WMH group ($p < 0.05$). The verbal learning test score in CNT was significantly higher in the no-WMH group than in the WMH group ($p < 0.05$). Executive function in the no-WMH group tends to be higher than in the WMH group.

Conclusion: Impairment of cognitive function in patients with infratentorial stroke seemed to be associated with WMH. The WMH should be carefully evaluated in rehabilitation setting for the Infratentorial stroke patients.

POSTER 283

ABSTRACT 457

EXERCISE-BASED VIDEOGAMES FOR STROKE REHABILITATION AT HOME: A SINGLE-SUBJECT RANDOMISED TRIAL

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Background and Aims: Videogames are increasingly used in rehabilitation. This study aimed to determine whether 8 weeks of independent exercise-based videogame use at home by a chronic stroke survivor 1) was feasible; and 2) if this intervention improved upper and lower limb motor coordination.

Methods: A single-subject randomised controlled trial design was used. The participant was a 51 year old community-dwelling male stroke survivor with ongoing impairment of upper and lower limb motor coordination. The participant practised exercise-based videogames independently at home over an 8-week period. Upper limb and lower limb videogames were used in separate 2-week intervention periods in random order.

Feasibility was assessed at 8 weeks via the System Usability Scale. The primary motor outcomes, assessed daily, were choice stepping reaction time and arm reach reaction time. Secondary measures included the Activity Measure for Post Acute Care (AMPAC), High-level Mobility Assessment Tool (HiMAT), tandem walk, step test, 6-minute walk, upper limb items of the Motor Assessment Scale (UL MAS), Box-and-Block Test, Action Research Arm Test (ARAT), and videotaped gait assessment. The AMPAC was assessed by a blinded assessor at baseline and 2-week intervals for 8 weeks. Other secondary outcomes were assessed at baseline and at 8 weeks.

Results: The intervention was feasible as indicated by a score of 75 on the System Usability Scale. Analysis of primary outcomes and videotaped gait analysis will be completed in November 2011. Improvements of up to 39% were seen for tandem walk time, step test, items of the HiMAT, and the 'Pinch' subgroup of the ARAT. No changes were observed for the other secondary outcome measures.

Conclusions: Using exercise-based videogames in the home was feasible, and secondary outcome data suggest, was an effective modality for improving motor coordination in this stroke survivor.

POSTER 284

ABSTRACT 471

DEVELOPING SELF-AWARENESS THROUGH GROUP EDUCATION FOR CLIENTS WITH ACQUIRED BRAIN INJURY

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Background and Aims: The importance of developing awareness is increasingly documented as integral to cognitive rehabilitation for clients with acquired brain injury. Based on the hypothesis that clients will develop increased self awareness through participation in a group education program, a 10 week brain injury education program was developed and implemented. The aim of the group is to improve self-awareness including understanding of brain injury and functional implications.

Method: Inclusion criteria were established based on cognitive and receptive communication skills. 6 participants (5 Stroke, 1 TBI) who are clients of Oats Street, take part in weekly education sessions. Sessions includes interdisciplinary presentations including causes of brain injury, impact of brain injury on functional skills, basic neuro-anatomy and neuroplasticity. Client participation is encouraged through interactive exercises, worksheets and homework tasks. Sessions are adapted weekly based on participant's feedback. "The Self Awareness Questionnaire" and a Brain Injury understanding questionnaire are completed as pre/post test measures. A feedback form is also completed by clients at the end of each session.

Results: To date, 5 weeks of the 10 week course have been completed. Feedback forms and attendance rates indicate a high level of satisfaction with information provided. Initial reports from allied health staff report positive feedback from clients and suggest follow on with improvement in client's function. Input from clients during sessions indicates an increase in levels of awareness. Development of self awareness will be measured by re-test of questionnaires at completion of program.

Conclusion: Initial data suggests clients report the group to be 'a lot' useful. Comparison data of self-awareness and understanding of BI will be available at time of conference.

POSTER 285

ABSTRACT 487

FACTORS SHAPING THE CONCEPT OF RECOVERY POST-STROKE: SURVIVOR AND CARER PERSPECTIVES

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Background and Aims: There have been few research studies designed to explore models of stroke management based on patient-identified goals. The aim of this study was to identify the main factors that contribute to post-stroke recovery, and highlight any modifiable aspects that could be addressed in rehabilitation practice from the perspective of stroke survivors and informal carers.

Methods: Qualitative methodology was used via focus group sessions. Participants included 14 community-dwelling individuals: 8 people who have had a stroke, and 6 associated carers. The focus group sessions were recorded and transcribed, and the data was coded using thematic analysis from which emerged main themes and sub-themes from a sequence of categories.

Results: The main theme of Self-identity was apparent from the data. The contributing sub-themes were: Essential elements of recovery, Returning home, and the Environment of rehabilitation. For people who have had a stroke, the term 'recovery' referred to both returning to previously valued activities and observing continued improvement over time. The predominant contentions to arise from this study surround the concepts of 'returning to normality' for the person who has had a stroke, and the 'tension of providing care' for primary informal caregivers.

Conclusion: There is need to acknowledge the views of consumers and carers, and to utilise their perspectives to augment rehabilitation processes, especially during the transition phase from hospital to the home setting. Models of community-based care should adopt a rigorous client-centred approach, incorporating such strategies as individualised goal-setting to target valued activities, and active engagement of carers throughout the rehabilitation process.

POSTER 286

ABSTRACT 488

THE INFLUENCE OF ENVIRONMENTAL CONTEXT ON ADL PERFORMANCE OF INDIVIDUALS WITH COGNITIVE IMPAIRMENT POST STROKE

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Background and Aims: Cognitive impairment is a common consequence following stroke and can impact all areas of an individual's life. Cognitive evaluation informs the clinician's ability to estimate an individual's ability to live alone, fulfil life roles, and maintain quality of life. Discharge planning from an inpatient rehabilitation setting involves consideration of not only activities of daily living (ADL) performance in this environment,

but also prediction of potential independence or safety concerns associated with ADL performance upon returning home. This study investigated the impact of contextual influences on ADL performance of individuals with post-stroke cognitive impairment.

Method: Participants included a convenience sample of 26 stroke survivors with cognitive impairment (range 61 to 93 years). All participants were inpatients on a rehabilitation unit. Individuals with a history of cognitive impairment were excluded from the study. Participants performed the same ADL task in both the hospital and their own home environments. Task performance was measured using the Perceive, Recall, Plan, and Perform (PRPP) System of Task Analysis. Data was analysed using traditional descriptive statistics. Rasch analysis was used to compare performance of ADLs of varying complexities across different contexts.

Results: The mean total error-free performance was higher in the home environment versus the hospital environment (39%, SD = 32.7, versus 58%, SD = 33.7). Errors of timing were the most frequent error-type across settings, and occurred more frequently in the hospital setting (mean = 62.9%) compared with the home environment (mean = 37.2%). For individuals with visual-perceptual impairment, mean performance free of errors of timing (home 47.9%, hospital 29.7%) and omission (home 91.1%, hospital 79.9%) varied across contexts, while errors of accuracy and repetition remained constant across contexts.

Conclusions: Findings reinforce the importance of evaluating performance of ADLs for those with cognitive impairment in the context in which they will be routinely performed after leaving hospital.

POSTER 287

ABSTRACT 491

THE EMERGENCE OF STROKE REHABILITATION IN CHINA: A SYSTEMATIC REVIEW, 5840 PATIENTS, POSITIVE EFFECT BUT QUESTIONABLE QUALITY

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Background/Aim: Rehabilitation is an essential component of organized inpatient care for patients with stroke. Rehabilitation is not standard practice in China, but growing interest in the efficacy of rehabilitation is evident. Trials in China typically compare some rehabilitation with no rehabilitation, something that has never tested in western world. We aimed to systematically review all randomized controlled trials (RCTs) that compare rehabilitation to standard care with no formal rehabilitation after stroke in China.

Methods: We searched 24 databases including Wanfang-data (China) MEDLINE, EMBASE, CENTRAL and Cochrane Stroke Group Register. Data were extracted by a Chinese-speaking doctor. We sought all randomized trials, with or without blinding, of rehabilitation interventions compared with conventional care. The primary outcome of interest was activities of daily living (Barthel Index (BI)) and the secondary outcome was disability (Fugl-Meyer Score (FMS)). Random-effect meta-analysis was performed.

Results: 67 papers were identified, 95% published since 2000. 30 papers were excluded because they were not RCTs or the authors failed to report an outcome of interest. This left 37 trials with a total of 5,840 patients, 60.5% were males and 24.1% patients with haemorrhagic stroke. The rehabilitation interventions were mixed but all included additional exercise therapy. Control patients had no or limited self-conducted rehabilitation. Patients who received rehabilitation showed marked improvements in BI (Standardised Mean Difference (SMD): 1.04, 95%CI: 0.88-1.21) and FMS (SMD: 1.10, 95%CI: 0.82-1.38) compared to controls. However, reporting quality was low (95% score 1/4), with randomization method, blinding, concealed allocation, intention to treat and time to start rehabilitation often unclear or not stated.

Conclusion: China is moving forward in stroke rehabilitation with increased interest resulting in a large number of trials on the topic. Although reporting quality of many RCTs is low, there is evidence of an overwhelmingly positive effect of rehabilitation after stroke.

POSTER 288

ABSTRACT 499

AGE-RELATED DIFFERENCES IN PERCEIVED RECOVERY, DISABILITY AND USE OF HEALTH-CARE DURING THE FIRST YEAR AFTER STROKE

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Background and Aims: Being at a vocational age or retired may potentially influence the perceived recovery and disability as well as use of health care long-term after stroke. Thus, the aims of the study were to explore perceived recovery and disability at 12 months and use of health care during the 1st year after stroke in younger (<65 years) and older (≥65 years) persons.

Method: Included were 185 persons (60 younger and 125 older persons) living at home after stroke. In structured interviews we assessed: perceived recovery and disability (the Stroke Impact Scale); stroke severity (the Barthel Index); and sense of coherence (SOC) (the SOC-scale). Data regarding use of health-care was collected from the Stockholm County council database.

Results: No significant difference in perceived recovery was found between younger and older persons. Hand function and emotions among the younger; and hand function, communication and social participation among the older persons were associated with perceived recovery and explained the variance by 37% and 42% respectively. Stroke severity and SOC explained the variance in perceived recovery by <17% in both groups. The younger persons spent more days in hospital care. Visits to primary health-care (vPHC) was associated with perceived recovery among younger persons and days in stroke unit and rehabilitation together with visits to vPHC was associated with perceived recovery among older persons, explaining 12% and 21% of the variance respectively.

Conclusion: Age-related differences in factors associated with perceived stroke recovery were identified 1 year after stroke. Younger persons used more hospital care, however, hospital care was only associated with perceived recovery in the older group. The diversity of perceived disability in different life phases need to be fully appreciated by health care in order to provide equal care long term.

POSTER 289

ABSTRACT 501

SEDENTARY BEHAVIOUR AND PHYSICAL ACTIVITY WITHIN STROKE REHABILITATION

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Background and Aim: Sedentary behaviour for prolonged periods of the day has been associated with a variety of health risks, independent of time spent in physical activity. The aim of this study was to investigate the patterns of physical activity and sedentary behaviour among patients' managed in 4 Swedish stroke rehabilitation units.

Methods: Stroke patients admitted to 1 of the 4 rehabilitation units were suitable for recruitment in the study. Further inclusion criteria were ≥7 days since stroke onset and ≥18 years of age. Every 10 minutes during 1 consecutive day between 8 AM and 5 PM a trained observer registered the patients' physical activity, location and company using behavioural mapping. Sedentary behaviour was defined as uninterrupted lying in bed or sitting with support for ≥2 consecutive observations.

Results: In total 104 patients were observed, of whom 53% were men. Their mean age was 70.3 (SD 14.4) years and the median time since stroke on the day of observation was 19 days (range 7-142 days). While 72% had an ischemic stroke, haemorrhage accounted for 28%. Overall patients spent 25% (2:15 hours) of the day physically active (e.g. sitting without support, standing). While 38% of patients were engaged in physical activity at 10:40 AM, the same number at 12:40 PM was 12%. Seventy-one percent of the patients spent >4 hours (range 4:01-9:00 hours) of the day in sedentary behavior.

Conclusion: The time patients spend in stroke rehabilitation units may not be used in the most efficient way to promote maximal recovery. A well designed randomized controlled trial is needed to evaluate the effects of increased physical activity within stroke rehabilitation.

POSTER 290

ABSTRACT 503

NO SPECIFIC EFFECT OF WHOLE-BODY VIBRATION TRAINING IN CHRONIC STROKE: A DOUBLE-BLIND RANDOMIZED CONTROLLED STUDY

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Background and Aim: A common impairment after stroke is muscle weakness, which impedes on the ability to perform daily activities. Different training methods are used to improve lower extremity function after stroke and whole-body vibration (WBV) training is promoted as an alternative to other forms of training. However, the evidence of its efficacy in persons with different neurological diseases, such as stroke, is very limited. The aim of this study was to evaluate the effects of WBV training in individuals with chronic stroke.

Method: Thirty-one participants (mean age 62 ± 7 years; 6-101 months post-stroke) were randomized to an intervention group or a control group. The intervention group trained on a vibrating platform with a conventional amplitude (3.75 mm) and the control group on a "placebo" vibrating platform (0.2 mm amplitude); frequency 25 Hz on both platforms. The WBV training was performed two times per week for 6 weeks (up to 12 repetitions and 40 to 60 seconds WBV per session).All participants and examiners were blinded to the amplitudes of the two platforms. Primary outcome measures were isokinetic and isometric knee muscle strength (dynamometer). Secondary outcome measures were balance (Berg Balance Scale), muscle tone (Modified Ashworth Scale), gait performance (Timed "Up & Go," Comfortable Gait Speed, Fast Gait Speed and 6-Minute Walk tests) and perceived participation (Stroke Impact Scale).

Results: There were no significant differences between the two groups after the WBV training. Significant but small improvements ($p < 0.05$) in body function and gait performance were found within both groups, but the magnitude of the changes was in the range of normal variation.

Conclusions: Six weeks of WBV training on a vibration platform with conventional amplitude was not more efficient than a "placebo" vibrating platform. Therefore, the use of WBV training in individuals with chronic stroke and mild to moderate disability is not supported.

POSTER 292

ABSTRACT 516

INTRA- AND INTER-RATER RELIABILITY OF THE ACTION RESEARCH ARM TEST IN PATIENTS WITH STROKE

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Background and Aim: Impaired arm function is a major problem amongst patients with stroke. Action Research Arm Test (ARAT) is an arm-specific measure in English shown to valid and reliable after stroke. The aim is to examine the intra- and inter-rater reliability of the Swedish version of ARAT.

Method: Two specially trained physiotherapists, each blinded to the other, simultaneously scored the 19 items of ARAT at two time points. Twenty-two patients participated in the study (mean age; 62 years, mean time post-stroke; 34 month). A sample of convenience was used. The intra- and inter-rater reliability was tested item for item and the agreement measured with Percentage Agreement (PA). Svensson's rank-invariant method for ordinal data was applied to identify and measure systematic disagreement in position; Relative Position (RP) and concentration; Relative Concentration (RC), separately from disagreement caused by individual variations; Relative rank Variance (RV). The values for RP and RC ranges from –1 to 1 (0 = no difference, 1 = large difference) while RV goes from 0 to 1 (RV <0.1 = negligible).

Result: There was agreement (PA >80 %) within the examiners for 16 of the 19 items and between the examiners for 13 items. Within the examiners, statistically significant systematic disagreement in position was found for three items; RP (CI 95%) –0.1446 (–2.717 to –0.0176), 0.1157 (0.0006 to 0.2309), 0.1674 (0.0324 to 0.3023), and in concentration for one item; RC (CI 95%) –0.215 (–0.40 to –0.03). Between the examiners, systematic disagreement in position was found for one item (RP (CI 95%) 0.1405 (0.0084 to 0.2726)) and in concentration for two items (RC (CI 95%) 0.17 (–0.34 to –0.01), –0.245 (–0.44 to –0.059)). There were no individual variations (RV ≥ = 0,1) within or between the examiners.

Conclusion: The Swedish version of ARAT seems to be a reliable measure after stroke but it needs to be further evaluated before being introduced.

POSTER 293

ABSTRACT 519

MODULATION OF CORTICAL EXCITABILITY WITH BILATERAL NAVIGATED REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) IN CHRONIC STROKE: A PILOT STUDY

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Background and Aims: Repetitive transcranial magnetic stimulation (rTMS) is now established as a useful non-invasive tool for neuromodulation in neuroscience. There are indications that rTMS may improve outcome of stroke rehabilitation. It has been proposed that the mechanism of action is related to changes in cortical excitability. Previous studies have exclusively evaluated effect of either stimulation of the affected hemisphere or inhibition of the unaffected hemisphere. We hypothesise that bilateral rTMS stimulation could be of benefit.

Method: Three male patients, aged 51-65 years with left hemisphere stroke 3 to 5 years prior to the study producing right sided hemiparesis and aphasia were studied. They were stimulated over the hand area (defined by neuronavigation) three times weekly for four weeks. In each session, both the unaffected right and the affected left hemisphere were stimulated: 1500 pulses at 1 Hz and 90% of resting motor threshold (RMT), (ten blocks of 150 pulses) and 2000 pulses at 10 Hz and 90% of RMT (4 blocks of 500 pulses) respectively. Cortical excitability was estimated before, one week and three months after the last stimulation, using navigated transcranial brain stimulation (nTMS). The protocols used were Stimulus response (SR), Silent Period (SP), Short Interval Cortical Inhibition (SICI), Long Interval Cortical Inhibition (LICI) and Intracortical Facilitation (ICF).

Results: Different indices of cortical excitability were affected, involving both hemispheres. In summary, the excitability was decreased in the unaffected as opposed to increased in the affected hemisphere.

Conclusions: This pilot study indicate that a new paradigm using combined low and high frequency rTMS on unaffected and affected brain hemisphere, respectively, can modulate cortical excitability in a desirable and predictable way. This suggests that bilateral brain stimulation could be beneficial in stroke rehabilitation. A randomized placebo controlled rTMS study using this paradigm on chronic stroke patients, is now conducted.

POSTER 294

ABSTRACT 532

DEVELOPMENT OF THE NOVEL ROBOTIC-NEUROREHABILITATION-SUIT-SYSTEM FOR NEUROPATHIC PAIN, SOMATOSENSORY-DEFICIT AND MOTOR-PARALYSIS, ACCOMPANIED WITH LESION OF THE NERVOUS SYSTEMS

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Background: We have conducted neurorehabilitation using visuomotor feedback, namely mirror visual feedback (MVF). MVF is promising, but still not effective for alleviating neuropathic pain in many patients. Neuropathic pain and its alleviation respectively link to shrinkage and expansion of the somatotopic map in the sensorimotor cortices, which corresponds to the affected-limb. Muscular afferents from the residual affected-limb can influence on the organization of somatotopic map and hence we consider, in addition to visuomotor feedback, a more powerful neurorehabilitation strategy using intended motor commands and somatosensory feedback from the affected limb should be developed.

Methods and Results: We have co-developed with a novel robotic neurorehabilitation suit system with Active-Link. Using artificial muscles and actuators in this system, the affected limb, which may have been paralyzed following nerve injury, can be exercised voluntarily resembling the healthy limb movements when patients intend to exercise the affected and healthy limbs simultaneously in similar manners. Further, we equip "hybrid" exercise training machine which uses forces generated by an electrically stimulated muscle to resist the motion of a volitionally contracting agonist in the affected limb, increasing muscle bulk and strength.

Conclusions: By intending to command and actually commanding the affected and healthy limbs to exercise simultaneously, our novel system enables voluntary movements of the affected limb, and then (1) visuomotor feedback regarding the affected limb movements is acquired, as in MVF, (2) somatosensory feedback of the affected limb movements are derived through the residual limb, finally (3) the somatotopic map corresponding to the affected limb would expand, and we therefore expect this would result in alleviating neuropathic pain, somatosensory deficit and motor paralysis. We report the detail of the system and its theoretical basis of neuropathic pain alleviation.

POSTER 295

ABSTRACT 534

THE DEVELOPMENT AND IMPLEMENTATION OF STANDARDISED OUTCOME MEASURES FOR AN ACQUIRED BRAIN INJURY (ABI) REHABILITATION SERVICE

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Background and Aims: Oats St provides a comprehensive rehabilitation program to both residential and community clients for adults with an ABI. Rehabilitation gains have been documented largely through anecdotal evidence and thus in 2011 a project position was created to develop and implement standardised outcome measures across the service. The goals of outcome measurement are: to demonstrate effectiveness of interventions and services, to guide therapy and to provide numerical values to quantify the rehabilitation program.

Method: An initial review of outcome measures utilised in ABI rehabilitation services worldwide and a literature review was carried out. Selection criteria specific to the service population were developed and a comprehensive list of possible outcome measures were critiqued.

Results: Three outcome measures were chosen for implementation across Oats St. These are the Mayo-Portland Adaptability Inventory–4 (MPAI-4), the Functional Independence Measure and Functional Assessment Measure (FIM/FAM) and the Goal Attainment Scale (GAS). The MPAI-4 and FIM/FAM were then trialled with 4 clients of varying functional abilities retrospectively to assess the validity in this setting. All 4 clients

demonstrated significant gains. In September 2011 the MPAI-4 was implemented across the service. Staff underwent training for the FIM/FAM in October 2011 with the aim of implementation in November. Currently informal goal setting measures are utilised with the aim to implement the GAS within the next 6 months.

Conclusion: Standardised outcome measures are integral to provide numerical data to support rehabilitation programs. A rigorous process was required in order to develop and implement appropriate measures across service. Quantitative research data from the MPAI-4 and FIM/FAM will be available at time of conference.

POSTER 296

ABSTRACT 537

RCT EVALUATING THE EFFECTIVENESS OF ROBOT-ASSISTED TREADMILL TRAINING IN RESTORING WALKING ABILITY OF STROKE PATIENTS

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Background: Effectiveness in improving walking ability of Lokomat therapy (LT) after stroke has been investigated in several studies in different subgroups of patients with various interventions, but results of these studies are presently inconclusive about whether LT is more effective than other therapies.

Aim: To investigate the effectiveness of LT compared to conventional (overground) physical therapy (CPT) in improving walking ability.

Method: Twenty-eight patients (14 men, 55 ± 9 yrs) within 3.5 month after stroke were randomly allocated to an LT group or a control group receiving CPT. Patients were not able to walk independently at the start of the intervention. A 1-hr LT session was administered twice a week combined with 3 times 30 minutes of overground walking for 8 weeks. Patients in the CPT group received 3.5 hrs/wk of overground therapy. Outcome measures assessed before and after the intervention were: walking speed during an assisted 10m-walk test, FAC score, Berg Balance score (BBS), Rivermead Mobility index (RMI), Fugl-Meyer score (FM) and Motricity Index for the leg (MIleg).

Results: For the whole group, significant ($p < 0.05$) improvements were found in walking speed (0.10 ± 0.12 to 0.24 ± 0.21 m/s), FAC (1.4 ± 1.0 to 2.6 ± 1.2), BBS (18.5 ± 12.9 to 32.2 ± 15.3), RMI (4.6 ± 2.0 to 8.4 ± 2.9), FM (11.7 ± 4.9 to 14.2 ± 5.5) and MIleg (27.2 ± 15.1 to 36.7 ± 15.7). However, LT and CPT were not significantly different in their effects on walking speed, or any other outcome measure.

Conclusions: During 8 weeks of rehabilitation, stroke patients significantly improved walking ability, without differences between experimental and control groups. These results indicate that robot-assisted treadmill training is as beneficial as conventional training for increasing walking ability in stroke patients. However, it remains to be establish whether robot-assisted treadmill training is more effective when implemented earlier after stroke onset (<2 months) and whether particular subgroups benefit more from this type of therapy.

POSTER 297

ABSTRACT 538

EFFECTIVENESS OF ROBOT-ASSISTED TREADMILL TRAINING IN STRENGTHENING OF THE LEG MUSCLES OF STROKE PATIENTS: RESULTS OF AN RCT

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Background: During robot-assisted treadmill training (Lokomat), stroke patients can make more steps than during conventional (overground) therapy (CPT) for a given period of time. Therefore, Lokomat therapy (LT) may have the potential to improve muscle strength of the legs relative to CPT.

Aim: To investigate the effectiveness of Lokomat therapy in strengthening the legs of stroke patients.

Method: Twenty-eight patients (14 men, 55 ± 9yrs) within 3.5 month (65 ± 41 days) of onset of stroke were randomly allocated to an LT group (n = 14) or a CPT group. During the eight-week intervention the LT group received 2-hours of LT combined with 1.5 hr/wk of overground therapy. The CPT group received 3.5 hrs/wk of CPT. Before and after the intervention period, maximal voluntary isometric torque of knee extensors (MVCext) and knee flexors (MVCflex) of the paretic and non-paretic leg were measured along with triplet torque and voluntary activation (VA) of the knee extensors as measured using the superimposed stimulation (triplet) technique.

Results: For the whole group, in the paretic leg, MVCext (34 ± 29 Nm to 44 ± 29 Nm, +28%) and VA (31 ± 25% to 47 ± 26%, +49%) improved significantly ($p < 0.05$) but no significant change in MVCflex was found. In the non-paretic leg, no significant changes in MVCflex, MVCext or VA were observed. Furthermore, triplet torque did not change significantly in either the paretic or non-paretic leg. The therapy groups did not significantly differ in therapy response for any of the variables.

Conclusions: Patients significantly improved their paretic MVCext and VA. Since triplet torque did not change, the improvement in paretic knee extensor strength can be attributed to improved activation rather than improved intrinsic muscle strength. Furthermore, since the therapy groups did not significantly differ in therapy response, robot-assisted treadmill training seems not to elicit different muscle adaptations than conventional (overground) therapy.

POSTER 298

ABSTRACT 539

EFFECT OF NEGLECT ON AMBULATION IN LEFT HEMIPLEGIC PATIENTS

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Background and Aims: Unilateral neglect can interfere with rehabilitation processes and lead to poor functional outcome. The purpose of this study was to evaluate the effect of neglect on ambulation in patients with right-hemisphere stroke.

Method: A total of 87 (43 men, 44 women) inpatients with right-hemisphere stroke who were consecutively admitted to our rehabilitation clinic were included in the study. Neglect was evaluated with clinical assessment of personal neglect and paper-pencil tests. 26.4% of patients (n = 23) was diagnosed as having neglect. Lower extremity Brunnstrom motor recovery stage, Functional Ambulation Classification Scale (FAC) and Functional Independence Measure (FIM) motor score were evaluated within 72 hours after admission and 24 hours before the discharge.

Results: Lower extremity Brunnstrom recovery stage on admission was under 3 in 71.4% of neglect patients while it was 34.4% in the other group. At discharge these ratios were 55.6% and 15.8%, respectively. All patients with neglect were not able to ambulate on admission, while 55% of patients without neglect were non-ambulatory according to FAC. After rehabilitation 25% of patients with neglect became ambulatory, while this ratio was 75.9% in patients without neglect. Ambulation level of patients with and without neglect was significantly different ($I = 13.6$ $p < 0.001$ and $I = 14.2$ $p < 0.001$, admission and discharge, respectively). Mean admission FIM motor score was 25.9 ± 15.3 in patients with neglect and 51.5 ± 20.6 without neglect ($p < 0.001$). Mean discharge FIM scores was 37.9 ± 21.9 and 63.3 ± 19.5, respectively ($p < 0.001$). Mean FIM gains were not different between groups after rehabilitation programs.

Conclusion: Results of the study support that the presence of neglect is a negative prognostic factor for ambulation in left hemiplegic patients. Although patients with right-hemisphere stroke patients have similar functional gains after rehabilitation program, neglect patients have lower ambulation levels then patients without neglect.

POSTER 299

ABSTRACT 540

ASSESSING LONGITUDINAL CHANGE IN COORDINATION OF THE PARETIC UPPER LIMB USING ON-SITE 3D-KINEMATIC MEASUREMENTS: A CASE REPORT

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Background and Aims: It is largely unknown how adaptive motor control of the paretic upper limb contributes to functional recovery after stroke. This emphasizes the need for longitudinal 3D-kinematic studies with frequent measurements to establish changes in coordination after stroke. A portable 3D-kinematic set-up would facilitate the frequent follow-up of persons post-stroke. The present case report aimed to quantify the longitudinal kinematic changes in upper limb coordination that were measured at a client's home by using a portable 3D-kinematic system in the first 6 months post stroke.

Method: The Fugl-Meyer Motor Assessment (FMA) of upper limb function, the Action Research Arm Test (ARAT) and kinematic outcomes were obtained from a 41-year-old man with a left hemispheric stroke. 3D-kinematic data of the paretic upper limb were collected during a reach-to-grasp task using a portable motion tracker in 5 measurements during the first 6 months after stroke. Data from a healthy subject were used for comparison.

Results: FMA and ARAT scores showed non-linear recovery profiles, accompanied by significant ($p < 0.001$) changes in kinematic outcomes over time post stroke. Specifically, elbow extension increased (23°), forward trunk motion decreased (12 cm), peak hand speed increased (0.25 m/s), peak hand opening increased (3.6 cm) and peak hand opening occurred sooner after peak hand speed.

Conclusions: The present case report illustrates the feasibility of frequently repeated on-site 3D-kinematic measurements of the paretic upper limb. Early after stroke, task performance was mainly driven by adaptive motor control, whereas adaptations were mostly reduced at 26 weeks post stroke. The presented approach allows the investigation of *what* is changing in coordination and how these changes are related to the non-linear pattern of improvements in body functions and activities after stroke.

POSTER 300

ABSTRACT 541

WII-BASED BALANCE REHABILITATION IS EFFECTIVE IN STROKE: A RANDOMIZED CONTROLLED STUDY

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Background and Aims: Balance difficulties are amongst the most frequent disorders of stroke patients. The recovery of balance is an essential part of the rehabilitation process. Wii-Fit is a Nintendo gaming console used to improve balance, strength, flexibility and fitness. The aim of this study was to investigate the efficacy of Nintendo Wii-Fit based balance rehabilitation in stroke rehabilitation.

Method: Twenty three patients (10 men, 13 women) were divided into 2 groups with block randomization. Study group (n = 12) received 20 minutes of balance exercise for 5 days/week on 4 consecutive weeks with Nintendo Wii-Fit and Wii-Fit balance board in addition to traditional balance rehabilitation. Control group (n = 11) underwent only traditional balance rehabilitation. Primary outcome measures were Berg balance scale (BBS), functional reach test (FRT), postural assessment scale for stroke patients (PASS), timed up and go test (TUG) and static balance index (SBI) measured by KAT 3000. Secondary outcome measures were postural sway assessed with EMED-SX, FIM transfer and ambulation scores. Patients were evaluated before the rehabilitation program, after 4 and 8 weeks.

Results: The results showed significant improvement over time (time effect) in all the measures, but group-time interaction was significant in BBS, FRT, postural sway, FIM ambulation and transfer scores suggesting that both groups improved differently in favour of the study group.

Conclusion: The results suggest that Nintendo Wii-Fit based balance rehabilitation represents an effective alternative to traditional treatment to improve static and dynamic balance in stroke. Wii-based balance rehabilitation also resulted in significant and clinically relevant improvements in functional motor ability in stroke patients.

POSTER 301

ABSTRACT 553

HAS THE INTRODUCTION OF ENDOVASCULAR COILING AFFECTED THE INPATIENT REHABILITATION WORKLOAD AFTER ANEURYSMAL SUBARACHNOID HAEMORRHAGE?

Gentleman D

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Background and Aims: This study assesses the impact on inpatient neuro-rehabilitation services of endovascular coiling having become the treatment of choice for most ruptured intracranial aneurysms.

Methods: The records of a regional neurosurgery service were searched to identify all adults aged 16-65 admitted after an aneurysmal subarachnoid haemorrhage who survived to be treated by clipping or coiling. The subset of patients transferred to the regional neuro-rehabilitation unit was further analysed by a record review.

Results: During 2001-10, 122 patients under age 65 had definitive treatment for a ruptured aneurysm (37 clipped, 85 coiled). Coiling involved transfer to one of two major neuroscience centres 80 and 130 km away, and so was reserved for patients in good neurological grade. Inpatient rehabilitation was subsequently needed by 22 (60%) of the clipped group and 14 (17%) of the coiled group. Only six patients (16%) went directly home from the neurosurgery unit after clipping, four were transferred to other hospitals, and five died post-operatively. After coiling, 64 patients (90%) went home from the neurosurgery unit, four were transferred to other hospitals, and three died. During 2001-05, 16/60 patients (27%) needed inpatient rehabilitation, 14 (88%) of whom had undergone clipping. During 2006-10, 20/62 patients (32%) needed inpatient rehabilitation, 12 (60%) of whom had undergone coiling. Patients whose aneurysm was clipped rather than coiled tended to be in poorer neurological grade, especially in the second half of the decade, and had longer inpatient rehabilitation stays (median 94 vs 45 days).

Conclusions: The introduction of coiling has not reduced the number of aneurysm patients who need inpatient rehabilitation, but it has reduced the overall burden of impairment and length of hospital stay. An irreducible number of patients present in poor neurological grade, often with a clot requiring emergency surgery, and their aneurysms continue to be clipped.

POSTER 302

ABSTRACT 559

SOMATISATION DISORDER CAUSING INAPPROPRIATE ADMISSION TO AN INPATIENT NEUROREHABILITATION PROGRAMME

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Background and Aims: Two patients are described whose presentation with apparent acute stroke led to inappropriate treatment (including admission to inpatient rehabilitation). This illustrates the importance of thorough imaging and record review, and the prompt investigation of unexplained discrepant performance.

Methods: Critical review of case records (including psychiatry records) and brain imaging.

Results: Both men presented with new physical symptoms consistent with acute major stroke. The initial CT scan did not confirm that diagnosis, but in one case was over-interpreted by the radiologist. Both patients were admitted to the acute stroke unit and both had risk factors for vascular disease. One had had a contralateral CT-confirmed cerebral infarct five years earlier. Neither underwent MR imaging. There were inconsistencies from the start in their observed functional performance, but as their symptoms persisted they were admitted to the regional neurorehabilitation unit. Further reports by therapists and nurses of inconsistent performance (often depending on whether the patient was being observed) led to a speculative search for further records. In both cases this yielded a rich seam of multiple contacts with health services over a decade or more for a wide variety of symptoms not substantiated by subsequent investigation. Psychiatric evaluation then led to a reappraisal of the recent illness, reassurance of the patient, rapid improvement in symptoms, and early discharge.

Conclusions: Exaggeration of symptoms is common in clinical practice, but frank simulation of an illness is rarer. Vigilance is needed to identify the occasional patient with a somatisation disorder, using comprehensive imaging, early probing of possible explanations for discrepant performance, and reviewing mental health records. Resources for specialist care and rehabilitation are finite and should be reserved for those who can benefit from them.

POSTER 304

ABSTRACT 570

MAPPING PATIENTS' EXPERIENCES AFTER STROKE ONTO A PATIENT-FOCUSED INTERVENTION FRAMEWORK

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Background: Stroke patients' involvement in the rehabilitation process including decision making has made significant advances clinically over the past decade. However, development of patient-focused interventions in stroke rehabilitation is relatively underdeveloped. Aim of study was to interpret the explanations that patients gave of their experience after stroke and how these may validate an already established patient-focused intervention framework—the Quest for Quality and Improved performance (QQUIP) that includes seven quality improvement goals.

Methods: Purposive sample of eight stroke patients, age range 52-83 years, were interviewed 3-6 months following discharge. Patients' reports of their experience following stroke were obtained using in-dept semi-structured interviews and analysed using Qualitative Content Analysis.

Results: Explanations given by patients were both positive and negative reports of life after stroke. Regardless of consequences as a result of physical impairments, there were other life style disruptions that were reported such as taking new medication and adverse effects of these, experiencing increasing fatigue, difficulties with social activities and having to make changes in their health behaviours. Themes that reflected patients' adaptive strategies were getting help from others, reducing their time investment in daily activities and compensating for loss of some abilities. Themes that reflected what patients were striving for as outcomes were maintaining routine, normality and independence. From the themes emerged, it was possible to identify where patients require intervention using the following QQUIP goals to improve: health literacy and access to health advice, clinical decision-making, self-care, and patient safety, thereby improving the care experience and service development.

Conclusions: Further recommendations are to consider using the QQUIP framework for developing intervention studies in stroke rehabilitation care that are person-centred. This framework provides a template equipped to address some of the main concerns patients may have following the experience of stroke and also focuses on improving quality of care.

POSTER 305

ABSTRACT 573

A CASE STUDY EXPLORING MIRROR BOX THERAPY, ON MOTOR RECOVERY OF THE UPPER LIMB, IN A PATIENT WITH AN ACQUIRED BRAIN INJURY

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Background/Aims: Upper Limb Hemi-paresis is common in patients following an acquired brain injury often impacting on the individual's ability to use it functionally. In the stroke population, evidence suggests that Mirror Box Therapy is especially beneficial for those without detectable motor function of the distal upper limb. However, there is little evidence for its use within the acquired brain injury population. This paper presents a case study exploring the use of Mirror Box Therapy with patients with an acquired brain injury to facilitate distal motor recovery of the hemi-paretic upper limb.

Method: A single subject convenience sample of a 20 year old male with a traumatic brain injury was used. The inclusion criteria were 1-6 months post-injury with sitting tolerance of 30 minutes. Patients were excluded with severe dyspraxia, cognitive deficits, aphasia, visual field deficits, an inability to follow 3 stage commands and severely restricted range of movement on the unaffected side. The Chedoke Arm and Hand Inventory (9 version) was completed on admission and following 6 weeks of mirror box therapy daily for 15-30 minutes.

Results: The results demonstrated an improvement in distal upper limb function following mirror box therapy interventions, with a reduction in the amount of assistance required to complete the 9 activities on the Chedoke Arm and Hand Inventory. The subject also gained sufficient distal movement to participate in further treatment options.

Conclusions: This single case study suggests that for this individual, with an acquired brain injury, mirror box therapy may be a useful therapeutic intervention to aid motor recovery of the upper limb, increasing functional use and aiding participation in further upper limb interventions. Further research is required to explore the use of this approach in other patients with acquired brain injury.

POSTER 306

ABSTRACT 574

MENTAL PRACTICE WITH MOTOR IMAGERY ON FUNCTIONAL MOBILITY IN CHRONIC STROKE: A PILOT RANDOMIZED CLINICAL TRIAL

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Background: 50%-65% of stroke survivors have residual motor deficits; principal among them is hemi paretic gait that limits mobility, increases the risk of falls and promoting sedentary life style. Motor imagery (MI) an active process during which a specific action is reproduced within working memory without any real movements. There are evidences for MI training in enhancing motor learning, neural reorganization and cortical activation in stroke patients. However efficacy of Mental practice training involving lower extremity mobility tasks are limited in literature.

Aim: To investigate the effect of combining mental practice with physical practice on functional mobility in ambulant stroke subjects.

Methodology: 26 hemi paretic patients (>6 months post-stroke) who can able to walk 10 m with good imagery ability in KVIQ-20 ≥60 and Time dependent motor imagery screening test were recruited and randomly allocated into physical practice group (n = 13)and physical + mental practice group (n = 13). Subjects in both groups underwent task orientated training for lower extremity 45 minutes, 6 days a week for 3 weeks. In addition, the experimental group received 15 minutes of Audio-based lower extremity tasks for imagery practice. Functional Gait Assessment (FGA) and Timed Up and Go Test (TUG) were the outcome measures used to measure functional mobility and compared between the groups. The parametric test results within the group, and between the groups were obtained and statistically analyzed using the student's paired and unpaired t-test with $p < 0.05$.

Results: Post treatment, there was a significant difference in FGA and TUG scores were noted in mental practice group. Between groups the mean (SD) differences scores of 4.5 (.55) for FGA and 7.3 (.23) for TUG was statistically significantly after three weeks of intervention ($p < 0.0001$).

Conclusion: The results of this study support lower extremity imagery training provide additional benefits to regular physiotherapy to improve functional mobility in chronic ambulant stroke patients.

POSTER 308

ABSTRACT 576

A PILOT STUDY ON THE FEASIBILITY AND EFFECTIVENESS OF THE ADAPTED 'NIJMEGEN FALLS PREVENTION PROGRAM' FOR PEOPLE WITH STROKE

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Background and Aims: People with stroke are at 3-10 times higher risk of falls than their healthy counterparts. Although exercise programs (e.g. The Nijmegen Falls Prevention Program NFPP) are effective in preventing falls in the elderly, similar evidence for their efficacy in people with stroke is still lacking. The aim of the present study was to develop a falls prevention exercise program for people with stroke and evaluate its effectiveness on balance and gait abilities, as the most important risk factors of falls.

Methods: The NFPP (10 sessions, 5 weeks) was adapted to meet the specific demands and constraints of people with stroke. Twelve persons in the chronic phase after stroke (aged 50-77 years old, 7 male, Fugl Meyer lower extremity scores 44-97%, Motricity Index 44-100) were included. Pre and post-intervention assessments included clinical tests, as well as an instrumented stepping test, requiring online step adjustments.

Results: Scores on the Berg Balance Scale (BBS) and the Trunk Impairment Scale (TIS) demonstrated significant improvements after participation (mean ± SD BBS 52.6 ± 3.3 vs. 50.5 ± 5.0, $p = 0.049$; TIS 19.8 ± 1.9 vs. 17.8 ± 3.3 $p = 0.008$). There was a borderline significant increase in walking speed (3.6 ± 0.3 vs. 3.4 ± 0.8 km/h, $p = 0.066$). During online stepping adjustments, foot placement error and step duration were comparable before and after training. However, there was an increase in speed of correction (0.13 ± 0.03 vs 0.15 ± 0.03 m/s, $p = 0.02$).

Conclusions: The current study provides preliminary evidence for the feasibility and benefits of this exercise program for people with stroke. The results support the conduct of a randomized controlled trial to evaluate the efficacy of the program with respect to the prevention of falls.

POSTER 309

ABSTRACT 577

C-MILL THERAPY IMPROVES GAIT ADAPTABILITY IN THE CHRONIC PHASE AFTER STROKE

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Background and Aim: People with stroke are at increased risk of falling, which may be related to their reduced ability to make step adaptations during standing and walking. The C-Mill is a novel instrumented treadmill with visual context presented via a projector (i.e. targets, obstacles), designed to train gait adaptability in a safe environment. C-Mill therapy is task-specific, repetitive, intensive and provides feedback on performance, thereby adhering to evidence-based guidelines for effective gait rehabilitation. In this proof of concept study we aimed to identify whether and by which mechanisms step adaptations improve after C-Mill therapy.

Methods: A total of 14 community-dwelling persons in the chronic phase after stroke (age 38-61 yrs, FAC 4-5, BBS 48-56) were referred by their physiatrist for C-Mill therapy. Participants received 10 C-Mill therapy sessions (1 hour each, 5 weeks). Pre- and post-intervention tests included the Berg Balance Scale [BBS], Timed Up-and-Go [TUG], 10-meter walking test [10MWT] and Trunk Impairment Scale [TIS]. In addition, we conducted instrumented assessments of obstacle avoidance ability during walking and step adaptability during stance in response to a displacing stepping target.

Results: After C-Mill therapy BBS, TUG and 10MWT improved significantly (all $p < 0.05$), while the TIS did not ($p = 0.584$). The ability to avoid sudden obstacles during walking also improved significantly (success rates mean $\pm$ sd; 59 $\pm$ 16% vs 83 $\pm$ 14%, $p < 0.001$). The steps towards the displacing target showed a non-significant decrease in foot placement error (mean $\pm$ sd; 50 $\pm$ 32 mm vs 44 $\pm$ 27 mm, $p = 0.24$).

Conclusion: These first results suggest that C-Mill therapy is a promising therapeutic tool to improve gait adaptability in people with stroke. It is for future research to investigate its potential benefits on the risk of falling in daily life.

POSTER 310

ABSTRACT 578

ARE PEOPLE WITH STROKE MORE UNSTABLE IN BACKWARD THAN LATERAL DIRECTION AFTER BALANCE PERTURBATIONS?

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Background and Aims: Impaired balance is a common complaint after stroke. During quiet standing, stroke-related impairments are more pronounced in the frontal than in the sagittal plane. In this study we investigated whether this is also true for the ability to withstand external perturbations. To this aim, we compared the stepping thresholds in the frontal and sagittal planes between patients with stroke and healthy controls.

Methods: We applied perturbations of standing balance on a moveable platform in seven community-dwelling persons with chronic stroke (mean age 58 y; Berg Balance scores 53-56; lower extremity Fugl-Meyer scores 26-31) and 8 healthy controls (mean age 63 y). We determined the stepping thresholds (i.e. the highest platform acceleration during which participants were able to maintain their feet in place) for forward, backward, leftward and rightward directions.

Results: For the backward perturbations, stepping thresholds were significantly lower in the participants with stroke than in controls (mean $\pm$ SD 0.65 $\pm$ 0.14 and 0.875 $\pm$ 0.09 mm/s^2 respectively $p = 0.015$), whereas there was no difference in the forward direction. The slightly lower lateral stepping thresholds in the stroke group were not significant. There was no difference in stepping thresholds between perturbations towards the paretic versus the non-paretic side of the participants with stroke.

Conclusions: The lower backward stepping thresholds in the stroke group show that they are less able to control their centre of mass in this direction and that they are forced to a change-of-support strategy earlier than healthy controls. Remarkably, lateral stepping thresholds were less affected. The similar thresholds for perturbations towards the paretic and non-paretic side may be explained by the weight-bearing asymmetry usually adopted by people with stroke, leading to greater stability when being perturbed towards the unloaded leg. Weight-bearing asymmetry after stroke may, therefore, be an adequate compensation to optimally withstand external perturbations.

POSTER 311

ABSTRACT 580

IMPLEMENTING CLINICAL GUIDELINES IN STROKE: A QUALITATIVE STUDY OF PERCEIVED FACILITATORS AND BARRIERS

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Background: The introduction of clinical guidelines have become a standard way of implementing evidence-based practice, however research indicates that health professionals do not always follow and adhere to those guidelines. There has been no documented evidence of health professionals' perceptions or the rationales they consider influential in implementing stroke guidelines in practice. This study aimed to assess stakeholders and health professionals perceptions working in the clinical setting what the facilitators and barriers are to implementing National Stroke Guidelines.

Method: Qualitative interviews using focus groups were conducted with stakeholders and multidisciplinary team members involved in stroke care. All focus groups' interviews were semi-structured using open-ended questions. Data was managed and analysed using NVivo 9 software.

Results: The main themes to emerge from the focus groups with the stakeholders and the hospital multidisciplinary teams were very similar in terms of topics discussed. These main themes were resources, National Stroke Guidelines as a tool for change, characteristics of National Stroke Guidelines, advocacy at local level and community stroke care challenges. There were specific sub-themes that also emerged within the main themes and some examples of these were having specialised and dedicated staff and stroke units to stroke care management, using the guidelines as an audit tool, content related issues with guidelines, appropriate education and training, localised adaptation of guidelines and improving stroke community rehabilitation services.

Conclusions: This study highlights health professionals' perspectives regarding many key concepts which may affect the implementation of stroke care guidelines. The introduction of stroke clinical guidelines at a national level is not sufficient to improve health care quality as they should be incorporated in a quality assurance cycle with education programs and feedback from surveys of clinical practice.

POSTER 312

ABSTRACT 588

HOW TO ASSESS FITNESS TO DRIVE AFTER A STROKE

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Background/Aim: A stroke may affect the fitness to drive and physicians are obliged, by the law, to make a decision on future driving for the stroke patient. In Sweden there are no uniform guidelines on how this should be done. Assessments need to be reliable and time and cost efficient. The aim was to explore the relation of the assessments of fitness to drive according to the Nordic Stroke Driving Screening Assessment (NorSDSA) and an On-road assessment, in order to see if NorSDSA is feasible to use as a first screening of driving after a stroke.

Methods: All patients admitted to the stroke unit Sept 2007–Jun 2009 were considered for inclusion. From a total of 482 patients, 151 were eligible and 50 patients agreed to be assessed. Assessment took part at two occasions: 1st NorSDSA, 2nd On-road assessment. On-road was set as gold standard. Analyse of agreement between the two assessments was performed. From a plot of the results on the two assessments an upper and a lower limit on the NorSDSA could be made. Between the limits there was a disagreement in the assessments, which means a need for further investigation after the NorSDSA screening.

Result: Thirty-eight of the 50 cases were judged in the same way on both assessments, while the assessments differed in 12 cases (24%), a significant difference. With the limits obtained 40 % of the cases could have a decision directly after the NorSDSA and 60% would need to go through an on-road assessment as well. The assessment time with the screening procedure was 150 hours/50 patients. If all instead directly was assessed on-road it would take 125 hours.

Conclusion: The proportion of unambiguous cases assessed with the NorSDSA is not high enough for the screening procedure to be time saving.

POSTER 313

ABSTRACT 590

WHEN MIGHT A CANE BE NECESSARY FOR WALKING FOLLOWING A STROKE?

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Background: For individuals with lateral postural imbalance such as post-stroke patients, the decision to adopt a cane for walking remains difficult because no objective argument supports this decision.

Objective: The present study was conducted to investigate the explanatory values of two posturographic criteria of lateral postural imbalance on the walking abilities of post-stroke subjects.

Methods: Indices of postural asymmetry (% of body weight on the less loaded lower limb) and instability (medio-lateral variance of centre-of-pressure displacements) were measured in 40 healthy individuals required to stand still on a dual force-platform. Cut-off values (mean + 2 standard-deviations) were calculated to determine whether the posturographic data of 52 post-stroke subjects tested in similar conditions 94.2 days after a first hemisphere stroke were normal. Predictive values of both postural indices on walking abilities with or without a cane were then analysed in patients.

Results: Of the patients tested, 34.6% were classified as unstable along medio-lateral axis (variance >7mm²), and 44.2% were classified as asymmetrical (% body weight <40%); 30% needed a technical aid and 35% walked without a cane. For a given patient, the probability of being able to walk without a cane was less than 5% if the paretic lower limb was not loaded over 40%. The postural instability index was less informative.

Conclusions: This study suggests that for patients who do not spontaneously load more than 40% of their body weight on their paretic lower limb, the use of a cane for walking may be recommended.

POSTER 314

ABSTRACT 596

NEURAL BASES FOR THE PERCEPTION OF THE VISUAL VERTICAL AFTER STROKE

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Introduction: The insula seems to be a crucial zone in the perception of the visual vertical (VV). This has been suggested by a qualitative analysis of the cerebral lesions, and has never been statistically confirmed. The aim of this study was to precisely analyse, with modern cerebral imaging, the cerebral area supporting VV perception.

Methods: VV was assessed in 23 subjects with unique hemisphere stroke (52.9 ± 1 years, 3.7 ± 2 months after stroke) and 27 control subjects (54 ± 9 years). Lesion location and extension were analysed using MRI (n = 16) or CT scans (n = 7). The lesions were reconstructed onto standardized brain templates. All lesions were mapped using the free MRIcro software distribution.

Results: As expected, a spontaneous contralesional VV tilt (–4.7 ± 4.7°; $p < 0.001$) was found in hemiplegics. VV did not differ between right and

left stroke. A correlation was found between lesion extension and the magnitude of VV tilt ($r = 0.54$; $p < 0.01$): the longer the extension the more biased the visual vertical towards the contralesional side. The analysis of the cerebral lesions of patients with ($n = 14$) minus patients without visual vertical bias ($n = 9$) showed that the most frequently and specifically damaged cerebral region in patients with biased visual vertical was centred on the insula ($p < 0.01$).

Discussion-Conclusion: The essential role of insula in perception of VV is confirmed. Nevertheless, the absence of right hemispheric dominance, and the influence of lesion extension on VV suggest that verticality representation depends more on the competencies of neural circuits than the property a given brain structure, and that VV would partially test verticality representation, more specifically what deals with vestibular graviception.

POSTER 315

ABSTRACT 599

THE FUNCTIONAL EFFECTS OF RTMS AND HOME EXERCISE PROGRAM COMBINATION ON A SEVERELY DISABLED CHRONIC POST-STROKE PATIENT: A CASE STUDY

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Background and Aims: The researches about the potential benefits of repetitive TMS (rTMS) on functional improvement of stroke survivors were increasing. However experience about severe cases was relatively poor. The aim of this case study was to investigate potential effects of low frequency rTMS on functional recovery of a severely impaired post-stroke patient.

Methods: rTMS (1 Hz, 90% rMT, 20 min to contralesional hemisphere) applied for 5 consecutive days to a chronic ischemic post-stroke female patient (at post-stroke 7 months). Additionally, the patient and her caregiver were trained about home exercise program and instructed to practice at home. The patients' upper extremity functions were assessed with Brunnstrom functional recovery stage, Motor activity log (MAL—amount of use and quality of movement subscales) and Motricity upper extremity index at baseline, at the end of the trial and 2 weeks later (Table 1). The unlesioned hemisphere's rMT was 39 and no MEP was recorded from lesioned hemisphere.

Results: The patient's amount of use and quality of movement subscales of MAL and Motricity index scores were improved, but there was no change at Brunnstrom stages (Table 1). Also MEP was not recorded at the end of trial.

Conclusions: The combination of low-frequency rTMS to contralesional hemisphere and home exercise program provided some significant functional improvements on affected upper extremity of a severely disabled patient even at chronic post-stroke period. But it was important that some assessment instruments might be inadequate to catch the mild to moderate improvements at some cases.

Table 1. Functional Assessment Scores of the Patient

	Baseline	End of Trial	2 Weeks Later
Brunnstrom stage—upper extremity	2	2	2
Hand	1	1	1
Motor activity log—amount of use	0,57	1	1,07
Quality of movement	0,57	1,07	1,21
Motricity upper extremity index	18	34	34

POSTER 316

ABSTRACT 606

PREDICTING FUNCTIONAL STROKE-REHABILITATION OUTCOME BY MEANS OF BRAIN-COMPUTER INTERFACE TECHNOLOGY: THE BCI4REHAB PROJECT

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Background and Aims: Directed and early rehabilitation after stroke aims at promoting neuroplasticity, i.e. inducing (sub)cortical reorganization for minimizing motor impairment. Brain-Computer Interface (BCI) technologies allow monitoring and interpreting brain signals in real-time. BCIs could thus be used to provide feedback on changes in brain activation that positively correlate with functional improvement before changes in motor behavior become evident. The aim of the recently started and ongoing BCI4REHAB project is to develop computational models that predict behavioral motor improvement from changing brain activation pattern. In the first stage of BCI4REHAB, we implemented a clinically feasible experimental set-up, enabling to record high quality non-invasive electroencephalographic (EEG) signals during rehabilitation.

Methods: A longitudinal study design and repeated measurements are required to infer the relationship between EEG, clinical functional scores and time. Weekly measurements during in-patient locomotion and hand rehabilitation over a 4-6 week period provide the database. The robotic gait orthosis Lokomat (Hocoma, Switzerland) and the hand/finger robot Amadeo (Tyromotion, Austria) are used to deliver a constant number of afferent stimuli during treatment and assessment. Changes in brain function, connectivity and microstructure are quantitatively assessed by the use of advanced brain mapping, pattern recognition and machine learning methods.

Results: Preliminary results obtained from 10 healthy individuals during gait training demonstrate focal activity over sensorimotor foot areas. Further detailed analyses will be presented at the congress.

Conclusion: The developed experimental paradigm and the proposed methods so far hold promise to generate results in a clinical setting that are comparable to results obtained in a laboratory environment.

POSTER 319

ABSTRACT 611

ROBOTIC DEVICE (AMADEO) IN HAND REHABILITATION AFTER STROKE A NEW OPPORTUNITY TO IMPROVE THE FUNCTIONAL OUTCOME? PRELIMINARY FUNCTIONAL AND FMRI RESULTS WITH 11 PATIENTS

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Objective: Rehabilitation of finger and hand movements after stroke often remains unsatisfactory with conventional therapy. We developed a mechanotronic device for delivery of well characterised, high frequent, repetitive movement sequences and used fMRI to assess changes in the central movement control of the paretic hand associated with such intervention.

Methods: 11 stroke patients (mean age 62 yrs, interval to stroke 41 to 434 days) with moderate to high-grade paresis of the upper limb underwent fMRI before and after three weeks of hand robot training. The fMRI paradigm at 3T involved active and passive flexion and extension of the digits II-V of both hands. The Motricity Index (M.I.) and force measurements were used to assess gains in functional strength.

Results: After an average of 5000 grip movements on the robot, the patients' strength significantly improved (M.I. pinch grip pre: 23.3 $\pm$ 6.6 vs. post: 26.3 $\pm$ 4.6, $p = 0.03$; finger flexion pre: 7.75 $\pm$ 4.5N vs. post: 11.9 $\pm$ 4.8N, $p = 0.04$). At baseline, movement of the paretic hand activated a more bihemispheric network with additional recruitment of ipsilateral motor areas in the undamaged hemisphere. Subsequent to robot training, significant increases in brain activation in the cerebellum and basal ganglia were observed with movement of the paretic, trained hand, whereas fMRI activation patterns with movement of the healthy (non-trained) hand were unchanged.

Conclusion: These preliminary results suggest distinct changes in sensorimotor networks associated with robotic-assisted rehabilitation of hand function after stroke. The causes and clinical significance of these changes will need further exploration.

POSTER 320

ABSTRACT 627

A 6 MONTH STUDY OF BEHAVIOURAL DEFICIT AFTER STROKE IN RATS

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Background: Despite recommendations to extend studies in animal models of stroke to encompass more chronic timepoints with multiple outcome measures, only a small number of studies have examined behavioural deficits together with histological damage at multiple time points after stroke. This study aimed to track the development of damage and potential for recovery after stroke over 6 months using behavioural and histological measures.

Methods: 132 Spontaneously Hypertensive Rats were randomly allocated to stroke (90 minutes thread occlusion MCAo) or sham surgical groups. Stroke animals were randomised to different recovery times: 1, 3, 7, 14, 21, 28 days, 12 and 24 weeks ($n \geq 11$ per group). Neurological deficit was assessed using a basic behavioural scale (assessment of reflex and mobility) and a sticky-tape removal test (sensory neglect and motor skill). Ischemic damage was assessed macro- and microscopically in H&E stained sections.

Results: Stroke animals showed a CBF decrement of 70.6 $\pm$ 14.6% at MCAo. The basic behavioural test was useful in confirming success of stroke induction. Deficits were specific to stroke animals, yet had resolved in 50% of animals within 7 days of stroke. Of its components, forelimb flexion was affected for the longest duration. The sticky-tape test highlighted continual neglect of the contralateral forepaw both in the acute period and for the 24 weeks following stroke. Macroscopic cortical damage was observed in 91% of stroke animals. Histological assessment revealed ischemic damage within the MCA territory progressing from infarction to cavity formation; and also in unexpected regions, including the hippocampus.

Conclusions: Behavioural tests are useful tools in assessing success of stroke induction and examining long term disability and recovery. Chronic deficits in rats after stroke are subtle. Matching behavioural deficit and recovery with histological damage will be an important step forward in better understanding animal models of stroke and testing of potential therapies.

POSTER 321

ABSTRACT 635

CORTICAL ACTIVATION GUIDED QUANTITATIVE WHITE MATTER TRACTOGRAPHY IN INDIVIDUALS WITH STROKE

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Background and Aims: In clinical practice improvements in recovery following stroke are marked by changes in behavioral outcomes. However, often unappreciated are the neuroplastic changes that occur within the brain. Our understanding of functional reorganization of the brain following stroke is lacking; more encompassing approaches are needed. Our lab has shown that diffusion tensor imaging (DTI) is a reliable method to quantify white matter integrity of the corticospinal tract (CST) in the chronic recovery stage following stroke. The purpose of this study was to apply a multimodal neuroimaging approach to study white matter integrity underlying functionally active cortical regions during motor performance in stroke patients.

Methods: 10 individuals with chronic stroke and 10 healthy controls performed a continuous motor tracking task inside a 3T MRI scanner. Four, 7-minute runs of tracking data were collected. Diffusion weighted data were also collected. Fiber tractography was performed to be used for delineating white matter tracts that subserve cortical gray matter regions active during tracking.

Results: To date, analysis of fMRI data of one patient with stroke and one healthy participant revealed a significant activation of the contralateral supplementary motor area (SMA) ($p = 0.02$; $p = 0.006$, respectively) during skill performance. However, concurrent ipsilateral SMA activation was also observed in the stroke participant ($p = 0.01$). Bilateral seed regions of the SMA region will be used to reconstruct fiber tracts as to evaluate tract integrity (FA values) between hemispheres and groups.

Conclusions: The preliminary results multimodal imaging study reveal fMRI activation maps could allow for a sophisticated method of evaluating brain reorganization of white matter tracts following stroke. Localizing brain areas and associated white matter connections will enhance our overall understanding of brain recovery following stroke and how best to maximize rehabilitation outcomes.

POSTER 323

ABSTRACT 33

FUNCTIONAL OUTCOME OF REHABILITATION IN CHRONIC SEVERE TRAUMATIC BRAIN INJURY PATIENTS: A PROSPECTIVE STUDY

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Objective: To assess functional outcome of rehabilitation in chronic severe traumatic brain injury (TBI) in-patients.

Setting: University tertiary research hospital.

Study Design: Prospective cross-sectional study.

Patients and Methods: Forty patients (34 men) with mean age of 30.1 yrs (range 6-60, SD10.8), severe TBI (Glasgow coma scale 3-8, Duration of coma > 6 hrs, Post traumatic amnesia> 1 day- post injury) were admitted in rehabilitation unit minimum 3 months (mean 7.7 $\pm$ 4.6 months, range 3-22 months) following injury falling in Glasgow outcome scale (GOS) of 3. Functional recovery assessed using Barthel Index (BI) score and Disability rating scores (DRS).

Results: Mean duration of stay was 30.8 days (range 18-91, SD15.6). Significant functional recovery observed in patients comparing BI & DRS scores at admission & discharge (Mean BI admission 50.5 $\pm$ 25.4, range 0-85 vs Mean Discharge BI score 61.1 $\pm$ 25.3, range 0-95, $p < 0.001$, Mean DRS admission score 7.57 $\pm$ 4.1, range 2.5-21.0 vs mean discharge DRS score 6.36 $\pm$ 4.3, range 1.0-21.0, $p < 0.001$).

Conclusion: Patients with severe TBI continue to show functional recovery even in chronic phase with rehabilitation. They are left with significant residual physical & cognitive deficits and would require long term care and assistance from care givers for the daily activities, as suggested by mean DRS score at discharge.

POSTER 324

ABSTRACT 47

EXAMINING THE INCIDENCE OF TRAUMATIC BRAIN INJURY IN NEW ZEALAND, THE BIONIC STUDY (2009-2012)

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Background: Traumatic brain injury (TBI) causes disability and death in young adults and has a significant impact on the injured person, their family, friends, and society. In NZ, annual estimated direct costs of TBI are over $100M. However, the exact costs of TBI are unknown as its true incidence has yet to be established.

Method: A prospective population-based TBI register in the total population of Hamilton and Waikato districts (representative of New Zealand) in 2010-2011 (173,208 residents). All new TBI cases were ascertained over 12-months using prospective and retrospective surveillance. Consenting survivors were followed for 1 year. Complete case ascertainment was assured using multiple overlapping sources of information for all hospitalised/non-hospitalised TBI cases (fatal and non-fatal). This included private and public hospitals, emergency departments (e.g. surgery & neurosurgery departments), CT/MRI records, hospital discharge register, coroner/autopsy records, death certificates, community health services (GP practices, rehabilitation/outpatient clinics), Accident and Medical Centres in Hamilton and Waikato districts, ACC and NHIS databases for all fatal/non-fatal TBIs.

Results: The findings suggest a significantly higher burden for Maori across the life span. In addition, while international literature suggests a peak in incidence from age 15-25, the data suggest an extended peak until age 35 in all New Zealanders. Incidence in those aged 0 to 4 years was also significantly higher than that suggested by previous data on TBI hospitalisations.

Conclusion: This study examined incidence of TBI in a large and well-defined population. The study provides accurate and nationally representative estimates of TBI incidence, and inequalities in incidence. Data regarding risk factors for incidence, natural course of recovery, and factors influencing early and late outcomes are currently being collated and will be of use to inform policy, resource allocation, planning of relevant prevention, therapeutic and rehabilitation services.

POSTER 325

ABSTRACT 69

INDIGENOUS CHILD AND ADOLESCENT TRAUMATIC BRAIN INJURY (TBI) REHABILITATION: A MAORI THEORY AND FRAMEWORK

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Background and Aims: Epidemiological studies show Māori tamariki (children) and taiohi (adolescents) are significantly over represented in TBI populations with poorer outcomes including higher mortality rates. International research shows 'minority' culture and indigeneity are risk factors for TBI and of differential rehabilitation services response. This study asked two questions. Firstly, what do Māori people say about TBI in the context of the Māori cultural belief that the head is the most sacred part of the body. Secondly, how could this information be used to build theory and inform a rehabilitation framework to address the rehabilitation needs of this group.

Methods: Eighteen marae wānanga (culture specific fora in traditional meeting houses) were held in urban, rural and remote locations. Data was analysed using Kaupapa Māori Rangahau (Māori indigenous research methods) and elements of Grounded Theory.

Results: A central aspect of the theory building proposes that TBI not only injures anatomical structures and physiology but also injures wairua, a uniquely Māori dimension of wellbeing characterized by profound spiritual connection. The framework underpinned by this theoretical position called "Te Waka Oranga" (The Healing Canoe), uses the metaphor of a waka, a traditional Māori vessel, as a practical tool to include clinical staff in a Māori space where both Māori and clinical world views and their

interventions can co-exist and be jointly monitored. In this way the cultural aspects of the TBI as well as clinical imperatives are attended to together suggesting opportunity for improved rehabilitation outcomes.

Conclusions: This is the first study to propose and operationalise an indigenous world-view for Māori child and adolescent TBI rehabilitation. Future application of this work includes non-accidental traumatic brain injury and virtual rehabilitation.

POSTER 326

ABSTRACT 89

CHANGING ROUTINE AND ENVIRONMENT CAN CREATE A POSITIVE CHANGE FOR PEOPLE WITH ACQUIRED BRAIN INJURY

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Background and Aims: Despite regular demand from Brightwater clients with Acquired Brain Injury to have access to a short stay holiday, significant financial and accessibility barriers were identified. A grant awarded for a three year Holiday Project from the Gaming Commission of Western Australia enabled the development of a sustainable system providing holiday information to clients. The main aim was to demonstrate that a change in routine and environment will create positive longer term changes for clients. A Project Coordinator developed policies and procedures that provide guidance to staff and clients. The holiday activities chosen were budgeted by the clients, providing broader education in skills such as the importance of money management in everyday planning.

Method: The service was designated to the cohort of 276 clients and residents that were 18-65 years. Over 3 years each of these clients were offered a short stay holiday (2-3 days). Post holiday surveys were completed by clients, staff and coordinators of care as an outcome measuring tool.

Results: A total of 73 clients attended short stay holidays within Western Australia and were encouraged to complete post holiday surveys. 90% of all surveys completed by clients reflected positive feedback. Staff feedback identified that an 80% positive change in clients responses when being away from a residential facility. In addition, a resource manual was developed as a living document, outlining accessible accommodations and activities for people with disabilities in Western Australia.

Conclusion: Post holiday reports provide evidence that a change in routine and environment had a positive effect on clients with ABI, as many clients were willing to engage in social interaction where they might not have prior to the holiday. The resource manual has acted as a beneficial tool while the policies and procedures have been established as approved guidelines within the service, thus increasing the likelihood of sustainability of the Project.

POSTER 327

ABSTRACT 122

CHARACTERISTICS OF A 5-YEAR COHORT DISCHARGED FROM A COMMUNITY BASED BRAIN INJURY REHABILITATION PROGRAM IN PERTH, WESTERN AUSTRALIA

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Background and Aims: The provision of rehabilitation to individuals with an acquired brain injury is a complex process influenced by a variety of factors which would be greatly enhanced by an understanding of the profile of clients on admission to Oats Street rehabilitation program. The aim of the study is to quantify both demographics and co morbidities of a 5 year cohort discharged from a Brain injury rehabilitation facility in Perth between June 2006 and June 2011.

Methods: Details of clients engaged in the rehabilitation program and discharged from the service between 30 June 2006 and 1 July 2011 were sourced from the organization's medical records. This data was compiled into a number of characteristics including age, sex, diagnosis of psychiatric condition, and incidence of substance use. Respite clients were excluded from the results. Diagnosis of a psychiatric condition was made by a psychiatrist; whilst self or family reports were used to capture the category of drug or alcohol abuse.

Results: 81 clients were included in the results. The data showed that males were over-represented in the client population (66% males and 33% females). Furthermore, two thirds of the total group had a psychiatric diagnosis whilst over a third had a history of alcohol or drug abuse.

Conclusions: Understanding the characteristics of clients in a brain injury rehabilitation programme can help with service provision, staff education and future funding to best reflect the needs of this population. The data suggested that access to services including psychiatric, psychological and drug and alcohol care would be appropriate in a programme of this type.

POSTER 328

ABSTRACT 130

DEVELOPING INDEPENDENCE AND EMPOWERMENT THROUGH MEDICATIONS SELF MANAGEMENT AMONGST PERSONS WITH ACQUIRED BRAIN INJURY

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Background and Aims: One of the main foci for Brightwater residents and staff is the ability of all clients to regain a measure of independence in accordance with their abilities post acute rehabilitation phase. One of the areas perceived by staff is the readiness of clients to self manage their medications regimen whilst still within the Brightwater program. The main aim of this project was for clients to gain maximum independence to their level of ability, with medication management from a Webster pack. An overall set of objectives for the project were as follows:

- To improve staff awareness of the rehabilitation aspects of medication management and improve compliance to the process.
- To adequately assess clients suitability to commence independent medication management.
- To individualize the supports put in place for clients to achieve independence.
- To assess and ensure long term sustainability of client independence with use of the Webster packs.
- To identify the value to the client of independently managing their medication.

Methods: The study will utilise an embedded mixed methods (QUAL + QUAN) approach. An impact pre and post evaluation of the intervention is being conducted using a number of measures of client readiness and

willingness to change adapted by the team of RNs to assess clients on an individual basis over a period of 6 months. In addition, a process evaluation of the program will consist of staff documentation daily practice amongst clients in managing medications regimen and management of any adverse events as a result of the self management program are also documented. At the end of the study period, a series of semi-structured interviews with six clients who participate in the program concerning their perceptions of the connection between the self medications management and autonomy and independence will be explored.

Results: Results are being collated at the time of this abstract and will be presented at the conference. This includes the process and impact evaluation results of the intervention.

Conclusions: It is anticipated that the medications self management program will facilitate increased autonomy for clients and a sense of individual empowerment in managing medications. In addition, staff awareness will increase around the importance of medications self management in achieving clients independence and autonomy.

POSTER 330

ABSTRACT 175

COMPONENTS OF NEUROPSYCHOLOGICAL REHABILITATION OF PATIENTS WITH BRAIN INJURIES

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Introduction: It is hypothesized that rehabilitation is most effective when it involves a complex psychological approach aimed at both the cognitive and emotional state of a patient and including work with the patient's family.

Aims: To investigate outcomes of a complex neuropsychological rehabilitation intervention.

Material/Methods: 92 patients with cognitive and emotional difficulties caused by stroke and TBI. Diagnostics methods included the Luria neuropsychological battery, clinical conversation and in cases of severe damage, neurological scales for conscious state estimation. Neuropsychological rehabilitation included three components: Overcoming cognitive deficits, which aimed for restoration of disturbed links of functional systems and identification of compensatory strategies. It was necessary to explain to the patient peculiarities of his new state and help him to accept it, to find new life aims and meanings. Specific work with psychological trauma was carried out, when necessary. Work with family involved gathering information about the patient's premorbid characteristics and changes following his illness. The family was involved actively in the rehabilitation process.

Results: Rehabilitation programme outlined was shown to be effective. The cognitive indices improved and particular compensation strategies were identified. Positive changes in emotional state were observed. The relatives became more aware of the patient's state and made vital contribution to rehabilitation process.

Conclusion: Neuropsychological rehabilitation is maximally effective when it combines interventions addressing cognitive deficits, emotional problems and involves the family.

POSTER 331

ABSTRACT 178

LANGUAGE OUTCOMES AND SCHOOLING AFTER MODERATE-TO-SEVERE TRAUMATIC BRAIN INJURY SUSTAINED BEFORE THE AGE OF 18 MONTHS

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Background and Aims: Childhood traumatic brain injury (TBI) is a significant rehabilitation challenge. Injury severity and young age at injury consistently predict poor outcome. The aim of this study was to assess oral language and modalities of schooling in children injured prior to 18 months of age, once these children have reached school age.

Method: The study took place in a rehabilitation department for childhood acquired brain injury. Between 2000 and 2007, 50 children were hospitalised following moderate-to-severe TBI sustained before the age of 18 months. In 2011, parents were invited to participate in the study, consisting of a standardised oral language assessment. Information on schooling modalities was collected.

Results: Nineteen children (38%) participated in the study [14 males; n = 8 accidental and n = 11 inflicted TBI; mean age 8 years (SD = 1.56)]. Mean age at injury was 6.4 months (SD = .41). As a group, children performed in the low average range for lexical stock extent and semantic organisation [mean z scores –1.36 (SD = 1.45) and –0.86 (SD = 1.2) respectively], with half the group in the clinical range (<–2SD). Performance was in the clinical range for lexical access skills, syntactic comprehension and syntactic expression [mean z-scores –1.94 (SD = 1.96); –2.61 (SD = 3.13) and –2.09 (SD = 1.26) respectively], with 75% in the clinical range. Eight children were in normal education (three had stayed back one year), six had a personal school aid and five were in specialised education. Performance on all language tests (except lexical stock extent) was significantly poorer for children with a personal aid or those with specialised education.

Conclusions: Although the study sample is small, our findings indicate that early TBI causes significant language impairments at school age, impacting on schooling abilities. The highest rates of impairments were found for syntactic aspects of language, especially comprehension. This has implications for screening, long-term follow-up and early intervention.

POSTER 332

ABSTRACT 179

EVALUATION OF A RETURN TO WORK AND STUDY PROGRAM: ASSESSMENTS AND INTERVENTIONS USED IN AN INTERDISCIPLINARY RETURN TO WORK AND STUDY PROGRAM

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Background and Aims: A targeted, comprehensive, interdisciplinary Return to Work and Study (RTW-S) program supports people following a neurological event to successfully RTW-S. An interdisciplinary RTW-S

program in a neuro-rehabilitation outpatient service aimed to investigate disciplines involved, types of assessment and intervention used, and overall length of program.

Method: A retrospective file audit of clients discharged from the RTW-S program was completed. Discipline involvement (quantity and type) and length of program (days) were identified. Assessment types were categorised as: impairment based, qualitative, functional, task analysis and ergonomic. Types of individual and group intervention were categorised based on a review of existing literature of previous RTW-S programs. This included work simulation, compensatory therapy, impairment based therapy, ergonomics, education, liaison with employer/educator, assistance with forms and team meetings.

Results: At the time of audit, 38 clients had been discharged from the RTW-S program. The median (IQR) duration of program was 144 (92-239) days. Of the disciplines involved 24% (n = 9) of clients had 3 therapists, 32% (n = 12) had 4 therapists and 29% (n = 11) had 5 therapists. The disciplines with the highest frequency of involvement included occupational (95% n = 36) and speech therapy (82% n = 31), neuropsychology (61% n = 23) and rehabilitation consultants (95% n = 36). Of the assessments completed, 82% (n = 31) were impairment based, 58% (n = 22) qualitative, 84% (n = 32) task analysis, 66% (n = 25) functional and 18% (n = 7) ergonomic. Of the interventions completed, 50% (n = 19) undertook work simulation, 89% (n = 34) compensatory therapy, 74% (n = 28) impairment based therapy, 11% (n = 4) ergonomics, 100% (n = 38) received education, 97% (n = 37) liaison with employer/educator, 16% (n = 6) assistance with forms and 100% (n = 38) team meetings.

Conclusions: A targeted, comprehensive RTW-S program which is not restricted in duration demonstrates that the involvement of an interdisciplinary team is necessary in providing a suite of assessment and interventions to clients returning to work and study following a neurological event.

POSTER 335

ABSTRACT 226

RECOVERY PATTERNS IN COGNITIVE DOMAINS AND INDIVIDUAL DIFFERENCES FOLLOWING SEVERE TRAUMATIC BRAIN INJURY

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Background and Aims: A comprehensive body of literature exists confirming the long-term cognitive sequelae following severe traumatic brain injury (TBI), but there is not sufficient information about recovery in the post-acute stage. The aims of the current study were to identify the recovery pattern of specific cognitive domains and to describe individual recovery patterns in the first year following moderate-to-severe TBI.

Method: A prospective cohort of TBI patients (n = 23) was recruited from a Brain Injury Rehabilitation Unit over two years. Following emergence from post-traumatic amnesia (PTA), participants were assessed every month for the first year post-injury on a 1-hour neuropsychological battery. Cognitive domains assessed included attention, executive, language, memory and visuo-spatial ability. The percentage of participants who demonstrated impaired performance (1.5 SD below the mean) was calculated for each cognitive domain for each month post-injury.

Results: Mean age of participants was 33.5 years (range 18-56 years); mean length of PTA was 55.9 days (range 9-128 days). Individual recovery patterns for each participant were quite variable. The language and visuo-spatial domains showed no impairment for any time-point. The memory domain demonstrated a generally linear recovery, with approximately 70% of participants impaired initially and this declined to 20-30% at the 1-year follow-up. The attention and executive domains each demonstrated either minimal initial impairment or a linear recovery pattern, with 0-64% of participants initially impaired and 0-18% impaired at 1 year post-injury.

Conclusions: This is the first study to provide empirical data on a month-by-month basis regarding recovery of cognitive functions. In this post-acute TBI sample, specific cognitive domains were more sensitive to TBI (attention, executive and memory) than others (language and visuo-spatial). Typically, these more sensitive domains displayed a generally linear recovery pattern, however there was a high degree of variability in the participants' individual recovery patterns.

POSTER 336

ABSTRACT 227

IDENTIFYING AND MANAGING CLINICAL RISKS IN THE TBI POPULATION

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Background and Aims: Following a traumatic brain injury (TBI) balance and mobility problems are common and are usually associated with reduced cognitive function. This presents significant safety risks. One role of a rehabilitation service is to provide support to manage and reduce risk. A risk matrix tool is used by one rehabilitation service (ABI Rehabilitation) to identify potential risks across 24 areas of client management (clinical, safety, behavior etc). Risks are identified as low, medium, or high (or N/A) and reviewed on a fortnightly basis to ensure appropriate strategies are employed.

Methods: A retrospective analysis of the risk matrix response efficacy was conducted, including all consecutive moderate to severe TBI clients who had inpatient rehabilitation during a 12 month period (Sept 2010 – Sept 2011) and presented with risks in one or more of the following categories: manual handling, orthopaedic considerations, mobility, and safety awareness. Changes in the level of risk were assessed throughout inpatient rehabilitation.

Results: There were 112 risks identified across 62 clients. Mobility was the most common risk, identified in 40% of cases, followed by safety awareness in 27% of cases. Over an average of 33 days (SD = 38) of inpatient rehabilitation, these risks were reduced in 91% of clients. After a further 33 days (SD = 26) risks were reduced in all clients.

Conclusions: This analysis demonstrates that clinical risks can be successfully managed and reduced during inpatient rehabilitation through a structured assessment process by an interdisciplinary team. Implementation of structured protocols in the clinical setting is essential when clients with reduced cognitive function are unable to perceive risk associated with activities of daily life. Such an approach has been reported to be useful in other neuro-rehabilitation settings. Further research will investigate the relationship between improving cognition and changes in mobility and safety awareness risks.

POSTER 337

ABSTRACT 229

EVALUATION OF A MULTIDISCIPLINARY EARLY INTERVENTION GROUP FOR PATIENTS IN MINIMALLY CONSCIOUS STATES

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Background and Aim(s): The increasing number and complexity of patients admitted to the acute neurosciences unit at the Princess Alexandra Hospital has highlighted a gap in evidence based service provision across the multi-disciplinary team. A multi-disciplinary early intervention group for patients in minimally conscious states has been established by the clinical team and funding obtained to evaluate its outcomes. This project aims to determine feasibility and effect of a multi-disciplinary early intervention group and investigate clinical changes in group participants.

Method: Prospective cohort with historical comparator. Participants attend twice weekly multi-disciplinary early intervention group. Blinded assessors obtain multi-disciplinary outcomes measures at baseline, 2-weekly intervals during inpatient acute care and on discharge from acute care.

Result(s): Patients in minimally conscious states are participating in the multi-disciplinary early intervention group and outcome measures are currently being obtained. Data collection will cease in Feb 2012 with analysis to follow. This is a funded project and dissemination of results must be completed by June 2012. Poster will outline final data.

Conclusion(s): Finding the most appropriate way to provide effective and timely rehabilitation to patients who have an altered state of consciousness is imperative in order to achieve the best outcomes for the patient. Effective service provision would also positively effect acute length of stay, reduce staff anxiety and stress levels and bed management dilemmas. This project aims to asses the effectiveness of a multi-disciplinary early intervention group for patients in minimally conscious states, assisting in the determination of how best manage this complex patient group within the acute ward setting. The project highlights the capacity to implement evidence-based service improvement within the limitations of existing environmental and staffing restrictions.

POSTER 338

ABSTRACT 230

THE REAL COST OF 24-HOUR CARE FOR CATASTROPHICALLY INJURED ADULTS IN NEW SOUTH WALES, AUSTRALIA

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Background and Aims: People with severe disability following traumatic brain injury (TBI) and spinal cord injury (SCI) require assistance to perform tasks they would normally complete themselves. While some require attendant care services for a limited period only, others require 24-hour care indefinitely. Attendant care may enable a person to live in the community, however the real cost of and access to 24-hour paid care in Australia remains unknown. Earlier research suggests that the cost and availability of carers remain a challenge to many families and people with TBI, particularly in rural areas of Australia. The aim of this project was to determine the actual cost of attendant care in NSW, and factors influencing costs for people with TBI and SCI early and longer term post-injury.

Method: Sixty adults with catastrophic TBI (n = 35) and SCI (n = 25) were assessed from both metropolitan (60%) and rural (40%) NSW. Injury severity, co-morbidity and demographic information were recorded. Carer burden and HRQoL were assessed using the Caregiver Inventory and SF6D. Care hours were recorded using a diary. A micro-economics approach to cost analysis is being used with costs calculated from Carer Recall Questionnaire. From these data an average annual cost for each group will be obtained. Linear regression analyses will be performed to identify factors independently associated with cost and HRQoL.

Results: Results will demonstrate the proportion of families who provide additional unpaid care hours to support 24-hour care, and which injury, environmental and social factors either support or hinder HRQoL. Results will accurately determine the costs of care (paid and unpaid) for adults with catastrophic injuries and identify factors which influence these costs.

Conclusions: Findings will provide useful information for informed care planning at both a government and clinical level, and assist with program planning to target interventions to improve HRQoL independent of physical impairment.

POSTER 339

ABSTRACT 246

PITUITARY INSUFFICIENCIES AFTER MODERATE-SEVERE TRAUMATIC BRAIN INJURY (TBI) OR SUBARACHNOID HAEMORRHAGE (SAH): OCCURRENCE AND IMPACT?

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Background and Aims: This prospective study investigates the prevalence of pituitary insufficiency and its relation to functional recovery and outcome after moderate-severe TBI and SAH.

Methods: Patients, aged >17 year, treated in Neurointensive unit at Karolinska Hospital after moderate or severe TBI or SAH (GCS 3-13) are included. Pituitary function is examined at 10 days, and 3, 6 and 12 months after the event. Follow-up at the Department of Rehabilitation Medicine at Danderyd Hospital at 3, 6 and 12 months, includes detailed screening of neurological and global function.

Results: Until now, 78 patients with TBI and 37 with SAH have been included. Thyroidal dysfunction: at day 10 in 33/75 TBI, 17/35 SAH; 3 months in 6/54 TBI, 3/27 SAH, 6 months 2/44 TBI, 2/26 SAH and at 12 months in 0/27 TBI, 4/18 SAH. Overt thyroidal insufficiency was observed in only 2/17 patients with SAH at day 10. Cortisol dysfunction: at day 10 in 8/74 TBI, 10/35 SAH, 3 months in 2/54 TBI, 0/24 SAH, 6 months in 1/44 TBI, 0/25 SAH and at 12 months in 0/27 TBI, 0/18 SAH. Overt cortisol insufficiency was observed in only 1/44 TBI patient at 6 months. 1/27 TBI patient has GH insufficiency at 12 months. Testosterone level was low in 1/20 men with TBI and in 2/5 men with SAH at 12 months. Gonadotropins insufficiency were observed in 2/5 women with SAH at 12 months. Substitution therapy has been clinically indicated in

only 1 patient with TBI and cortisol insufficiency, in 1 patient with TBI and growth hormone insufficiency and in 1 patient with TBI and 2 patients with SAH and testosterone insufficiency.

Conclusions: Data from this on-going study demonstrate frequent, transient pituitary dysfunction mainly early after TBI or SAH. Overt insufficiencies and a need for substitution therapy are less common.

POSTER 340

ABSTRACT 248

CREATIVE & COLLABORATIVE INTERDISCIPLINARY APPROACH TO SLOW STREAM REHABILITATION FOLLOWING ACQUIRED BRAIN INJURY

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Background and Aims: This project developed from the premise that "in the absence of meaningful engagement in chosen life activities, all interventions will ultimately fail." It was aimed to increase client's motivation and engagement in the rehabilitation process through active participation in a meaningful project and the creation of a self-advocacy DVD. This would result in demonstrable functional progress, development of executive functioning skills, and sense of mastery and control.

Methods: Participants were four males with ABI aged between 21- 40 years, recruited as a convenient sample. Two men joined a group process while the other two experienced an individualised approach. Participants A, B & C were assessed using a scaled self-appraisal and staff observations questionnaire with open-ended questions. Participant D was assessed using a single blind study.

Results: Both participants A & B improved their self-confidence, positive self-identity and independence in managing health care tasks. Participant C improved in self worth and expressed decrease in boredom and was more optimistic about life. Behaviours problematic toward others also decreased. Participant D reported more confident and comfortable with care provided by staff who had watched his project DVD. All care staff also reported to be more competent and consistent in providing care after watching the DVD.

Conclusions: Results confirm the importance of developing goals meaningful to each individual and the value in creating a personalised DVD that validates the participant's efforts. The study indicates that a collaborative DVD project approach is a useful rehabilitation tool and that an interprofessional client-centred collaborative process increases quality of care.

POSTER 341

ABSTRACT 288

THE MEASUREMENT OF PHYSICAL INACTIVITY AND REDUCED CARDIORESPIRATORY FITNESS IN ADULTS WITH TRAUMATIC BRAIN INJURY (TBI)

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Background: Physical inactivity and reduced cardiorespiratory fitness are risk factors for developing secondary health conditions such as diabetes and heart disease.

Aims: 1) To determine the reliability of a subjective measure of physical activity (questionnaire) and to determine its validity with an objective measure of physical activity (accelerometer) in adults with TBI; 2) To measure the level of physical inactivity and deconditioning in adults with TBI.

Methods: A descriptive prospective study recruited a convenience sample of 23 community-based adults with severe TBI. Participants completed the Physical Activity Scale for Individuals with a Physical Disability (PASIPD) on two occasions one week apart, and wore an accelerometer (Actigraph GT3XE) for the 7 days between completing the PASIPD. They also completed a peak fitness test with gas analysis to measure peak oxygen uptake (VO_2peak).

Results: The PASIPD test-retest reliability was excellent (Intraclass Correlation Coefficient = 0.76) and the correlation with the accelerometer was similar to other able-bodied and patient populations (R = 0.226). From subjective measurement of physical activity (PASIPD), levels of physical activity were low and similar to other clinical populations (mean (SD) PASIPD 12.2 (7.7) MET hours/day). From objective measurement of physical activity (accelerometer) and fitness (VO_2peak), only one participant met the national physical activity guidelines and participants were on average well below average fitness compared to normative data (mean (SD) peak VO_2peak 29.5 (7.4) ml/kg/min). There was a moderate relationship between objective measurements of physical activity and fitness (R = 0.627).

Conclusions: These findings support the use of an accelerometer to objectively measure the amount of physical activity and the PASIPD to subjectively measure the domains of physical activity in adults with TBI. Adults with severe TBI are generally physically inactive and very unfit. Due to the serious implications of these problems, strategies to increase physical activity and fitness need to be investigated.

POSTER 342

ABSTRACT 317

RECOVERY PATTERNS OF EXECUTIVE DYSFUNCTION AFTER SEVERE TRAUMATIC BRAIN INJURY IN CHILDREN

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Background and Aims: In pediatric trauma in the developing brain outcomes and quality of life after severe traumatic brain injury (sTBI) are the most important parameters. One of the key roles in evaluating the brain injury outcomes is recovery of cognitive functions in injured children. Understanding the dynamics of high mental function recovery allow to develop neuropsychological techniques for early rehabilitation in children after sTBI. So, the aim of our study is to find peculiarities of cognitive dysfunctions and patterns of recovery after pediatric sTBI.

Objectives: 1) To analyze MRI data for revealing the picture of structural brain damage 2) To follow patterns of cognitive function recovery in children (aged 4-17) who had sTBI.

Design: Longitudinal study.

Methods: 51 child with sTBI (GCS ≤8) was evaluated with the Luria Neuropsychological Battery test within the first six months after sTBI. 13 of them were re-evaluated 24 months after their trauma. We processed our data using nonparametric statistic techniques.

Results: 1) Cortical contusions of the frontal lobes and diffuse axonal injuries were the most frequent lesions. 2) Assessment of neuropsychological outcomes has shown that one of the most impaired functions at the early recovery period was an executive function. The longitudinal analysis has shown a general positive dynamics of high mental function recovery; however, statistically significant distinctions ($p < 0.05$) were seen only in one parameter of executive function, namely, in perseveration.

Conclusions: Data of structural brain damage and dynamics of high mental function recovery at an early period correspond to those of adult patients. However, we consider that the difference in dynamics of executive function recovery is determined by the age when the child was injured. This consideration needs further investigations.

POSTER 343

ABSTRACT 324

EFFECT OF ELECTRICAL STIMULATION OF THE SUPRAHYOID MUSCLES IN BRAIN-INJURED PATIENTS WITH DYSPHAGIA

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Background and Aims: Conventional neuromuscular electrical stimulation (NMES) was applied to the infrahyoid muscles rather than the suprahyoid muscles. We investigated whether NMES of the suprahyoid muscles is effective compared to that of the freely selected muscles in brain-injured patients with dysphagia.

Methods: One hundred thirty-two stroke, traumatic brain injury and brain tumor patients in two university hospitals were allocated to two groups (66 patients each): electrical stimulation of the suprahyoid muscles (ESSM) only, and freely selected stimulation sites (FSSS) according to clinical reasoning, mostly one pair of electrode on the suprahyoid muscles and the other pair on the infrahyoid muscles. All patients received electrical stimulation therapy during 2-3 week period. The functional dysphagia scale (FDS) and swallow function score (SFS) were evaluated according to a videofluoroscopic swallowing study before and after the electrical stimulation sessions.

Results: The FDS and SFS before treatment were not significantly different between ESSM and FSSS groups ($p > 0.05$). The FDS decreased from 38.73 ± 20.71 to 33.41 ± 18.64 in the ESSM group, and from 43.86 ± 19.76 to 35.85 ± 20.03 in the FSSS group before and after the treatment ($p < 0.001$, respectively). The SFS increased from 3.35 ± 1.65 to 3.91 ± 1.65 in the ESSM group, and from 2.92 ± 1.90 to 3.70 ± 1.94 in the FSSS group before and after the treatment ($p < 0.001$, respectively). However, the changes in FDS as well as the proportions of patients that showed improved SFS before and after the treatments were not comparable between two groups ($p > 0.05$, respectively).

Conclusions: In the functional dysphagia scale and swallow function score, electrical stimulation therapy of the suprahyoid muscles was not inferior to that of the freely selected muscles. Therefore, electrical stimulation of the suprahyoid muscles can be used effectively to treat dysphagia in brain-injured patients.

POSTER 344

ABSTRACT 329

ENZOGENOL SUPPLEMENTATION FOR IMPROVING COGNITIVE FUNCTION POST-TRAUMATIC BRAIN INJURY: A PILOT STUDY

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Background and Aims: Persistent cognitive deficits are common after traumatic brain injury (TBI), and can profoundly affect a person's day to day functioning, ability to work, and social relationships. The aims of this double blind, pilot clinical trial were to explore trends in effect of Enzogenol (a pinus radiata bark extract) on cognitive function and post concussive symptoms in people post mild-TBI and to assess the feasibility of conducting a full-scale randomised controlled trial.

Methods: Sixty participants (aged 18-64 years) who had experienced a mild TBI in the past 3-12 months, who were experiencing persisting cognitive difficulties (as indicated by a score of >38 on the cognitive failures questionnaire) were recruited into the study. Participants were randomised, using computerised minimisation, to receive either the Enzogenol supplement (two capsules of 500 mg taken once daily, N = 30) or placebo (two microcrystalline cellulose capsules, N = 30) for six weeks. All participants were then given the Enzogenol supplement for the subsequent six weeks. Assessments exploring: information processing speed; verbal and working memory, cognitive failures; post concussion symptoms were conducted at baseline, six and 12 weeks.

Results: There were no significant differences between the groups on demographic variables. Trends in improvement were observed on the WAIS arithmetic task after participants in both groups took the supplement for 6 weeks. Improvements were also observed between 6 and 12 weeks on the WAIS digit span task and self reported cognitive failures questionnaire in the group taking the supplement for the 12 week period, although the findings did not reach statistical significance. No differences were observed in post concussive symptoms, verbal memory or information processing speed between the two groups.

Conclusion: The pilot study was feasible to implement and Enzogenol shows potential to improve cognitive function post mild-TBI. A full-scale trial is required to establish efficacy of the supplement.

POSTER 345

ABSTRACT 344

TRANSITIONING TO ADULTHOOD: NEEDS OF YOUNG PEOPLE WITH AN ACQUIRED BRAIN INJURY AND THOSE OF THEIR FAMILIES

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Background and Aim: Transition into adulthood for people with a childhood onset acquired brain injury (ABI) is identified as critical time of life involving leaving paediatric based health services to be supported in the community through adult based services. This research aims to understand the needs of young people with ABI and their families as they transition into adult based services.

Methods: A mixed method qualitative and quantitative design was utilised. Participants included 150 young people with a childhood onset ABI, between the ages of 18-21, identified from a statewide paediatric rehabilitation service database. Rehabilitation clinicians working in either paediatric (30 participants) or adult (41 participants) metropolitan settings were also recruited. Data were collected using questionnaires and semi-structured interviews designed specifically for this project.

Results: Thematic analysis indicates that young people with an acquired brain injury have difficulty navigating the adult health care system, and experience frustration over the fragmentation of services. Clinicians report that adult services are under-resourced to meet the needs of young people within a developmental context.

Conclusion: Modifications to current transition processes within paediatric rehabilitation maybe required to empower young people and their families to facilitate the accessibility of adult services.

POSTER 346

ABSTRACT 354

DEVELOPMENT OF THE MODEL OF CARE FOR A NEW ACQUIRED BRAIN INJURY REHABILITATION SERVICE

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Background and Aims: The National Health and Hospitals Network–National Partnership Agreement on Improving Public Hospital Services (NPA IPHS) will contribute to improved patient access by improving efficiency and capacity in public hospitals. Under the NPA IPHS, Victoria has allocated funding to support a purpose built state-wide Acquired Brain Injury (ABI) unit which will deliver extended periods of rehabilitation for people who have experienced a moderate to severe/catastrophic ABI. In October 2010, the Victorian Department of Health provided funding to Alfred Health to undertake a project to develop a model of care for this new service. The site for this new statewide service is Caulfield Hospital, Alfred Health, Victoria, Australia.

Methods: The project to develop the model of care has reviewed literature, consulted broadly with Victorian stakeholders and completed site visits within Victoria, New South Wales and also internationally in the United Kingdom and Canada.

Results: This paper will detail the project findings and model developed based on the best available evidence gathered by the project team. The focus has been to develop a service that can complement the existing service system and aims to address identified gaps in the Victorian health system for people with severe ABI. The target group identified for the new service is people who require extended rehabilitation, particularly the group of patients who currently experience extended stays in acute hospital settings, due to the absence of suitable rehabilitation services. The paper will describe these identified service gaps and the planned model of care including three key service components—an admitted service component, a community service and a transitional living service.

Conclusion: A new ABI rehabilitation service is being built for Victoria based on current best practice models and this paper will outline the model of care for the service and provide a status report on this innovative service development.

POSTER 347

ABSTRACT 355

ANTI-LYSOPHOSPHATIDIC ACID ANTIBODIES IMPROVE OUTCOMES OF NEUROTRAUMA

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Background and Aims: Lysophosphatidic acid (LPA) is a bioactive lysophospholipid released by activated platelets and present in serum. LPA targets all cell types of the nervous system through the binding of its specific G-protein-coupled receptors. LPA plays broad roles within the nervous system both during early development and neural injury. In the central nervous system, LPA concentration has been found to increase following the impairment of the blood brain barrier and extravasation into the cerebral compartment. Many studies suggest a detrimental role for LPA in neural injury responses.

Methods: We analysed the impact of LPA in neurotrauma, using a combination of *in vitro* assays and mouse models of traumatic brain injury (TBI) and spinal cord injury (SCI). We also assessed LPA levels in cerebrospinal fluid (CSF) of patients with severe TBI and control individuals.

Results: The molecular analysis of CSF assessed levels of LPA in healthy control subjects and patients with TBI. In addition, we describe a novel mouse monoclonal blocking antibody raised against LPA that potently inhibits LPA's effects *in vitro* and *in vivo*. This antibody, named B3, specifically binds LPA, prevents it from interacting with its receptors and blocks LPA's inhibitory effects on the neuronal differentiation of human pluripotent stem cells, thus demonstrating its specificity toward LPA signalling. When administered post-injury in a mouse model of TBI, B3 significantly and substantially reduces the contusion size measured by magnetic resonance imaging and standard histological assessments. Similarly, in a mouse model of SCI, B3 significantly inhibits astrogliosis and reduces neuronal death.

Conclusion: Altogether, this study describes a novel therapeutic approach for the treatment of trauma to the brain and spinal cord that relies on blocking LPA signalling with the administration of specific antibodies thus raising the prospect of translating a therapeutic strategy targeting LPA into clinical trials.

POSTER 348

ABSTRACT 363

POSTTRAUMATIC AMNESIA IN ACUTE CARE

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Background and Aims: Posttraumatic amnesia (PTA) is a transient phase of recovery and supports a prognostic usefulness in traumatic brain injury (TBI). During acute care, PTA often hinders early rehabilitation while Langhorn et al noted the limited evidence on the effect of early rehabilitation on PTA. The aim of this study is to determine the prevalence of PTA during acute TBI care and discharge outcomes in our Malaysian rehabilitation set-up.

Methods: 30 acute TBI patients referred for rehabilitation were evaluated for PTA using the Westmead PTA Scale (WPTAS). Patients were categorised into brain injury severity by the presenting Glasgow Coma Scores. PTA evaluations were done until patients were no longer in PTA or were discharged. Evaluations on discharge included the PTA status, independence level via the Modified Barthel Index (MBI) scores and discharge destination.

Results: Out of 30 acute TBI patients, 24 were able to complete the WPTAS. 21 patients were in PTA while 3 were not on first assessment. On discharge, 5 had resolved PTA, 15 were in PTA while 1 patient did not complete 3 scores of 12/12 on the WPTAS. The 5 patients with resolved PTA, amnesia duration was 2.8 weeks (standard deviation: 1.8 weeks). PTA duration for those discharged in amnesia ranged from 1 to 10 weeks. PTA was associated with injury severity ($p = 0.005$). Its presence was associated with the level of independence on discharge ($p = 0.038$). Discharge mean MBI scores were also lower in PTA patients (56 versus 72: mean difference of 16.16, $p = 0.18$). 87% of these patients were discharged home.

Conclusions: A large proportion of patients with severe TBI had PTA with majority discharged in amnesia. Patients discharged in PTA were also more dependent on carers. With limited discharge dispositions, most patients had no choice but to go home. Although PTA is transient, the need for immediate post discharge attention for patients in PTA is much needed.

POSTER 349

ABSTRACT 381

WHY DOES HER RT. SHOULDER ELEVATE ASSOCIATING WITH SWALLOWING AFTER TRAUMATIC BRAIN INJURY AND ATLANTOAXIAL SUBLUXATION? A CASE REPORT

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Background: The traumatic brain injury and stroke are cause of dysphagia. The swallowing function after stroke is influenced by range of motion of neck and movement of shoulder girdle. We report that a case study of a preliminary experience with motor point block using BOTOX for treatment of rt. shoulder elevation associated with swallowing in a 14-year-old woman after traumatic brain injury.

Case Presentation: The patient was a 14-year-old woman who was a junior high school student. She received brain hemorrhage, traumatic subarachnoid hemorrhage and atlantoaxial subluxation for the traffic accident eight years ago. Although the quadriparesis and lt. hemiparesis were remained after injuries, she could spend her student life without APDL problem. She has noticed that her rt. shoulder elevated associating with swallowing after injuries.

Treatment and Course: EMG was recorded on her bilateral trapezius, anterior belly of digastric muscle, sternohyoid and masseter muscle from surface electrode. The synchronization between sternohyoid and rt. trapezius was found on the EMG recordings. Additionally, there was no spasm on EMG recordings of rt. trapezius. The motor points of trpezius were searched using stimulator. The injection of BOTOX into these points after finding out three motor points of trapezius. Rt. shoulder elevation associated with swallowing was improved.

Conclusion: We rarely experienced that the patient with traumatic brain injury and atlantoaxial sublaxation had rt. shoulder elevation associated with swallowing. Rt. shoulder elevation associated with swallowing might be misdirection of re-innervation of lower cranial nerves.

POSTER 350

ABSTRACT 410

PUBLIC UNDERSTANDING OF MILD TRAUMATIC BRAIN INJURY

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Background: The general public's understanding and expectations following a traumatic brain injury (TBI) influences their response to an injury event. However, there is a lack of agreement in the literature regarding how traumatic brain injury (TBI) should be defined. For example, terms such as head injury, concussion, brain injury and brain injury are often used interchangeably. This situation is particularly apparent in the literature regarding mild TBI, creating considerable confusion regarding what outcomes might occur and the appropriate response to these injury events.

Aims: The aim of this study was to examine the understanding of general public regarding traumatic brain injury and its outcomes.

Method: Individuals from the general public were randomly assigned to two groups. Responses were elicited to questions about expected problems following brain injury or head injury for each group. Both groups were then asked to rate a series of 10 statements relating to symptoms that might be expected following an injury event.

Results: Of the 102 participants, 15 endorsed experiencing a brain/head injury. However, a further 17 participants endorsed having experienced a concussion but did not also indicate that they had a head/brain injury. Participants were significantly more likely to associate brain injury rather than head injury with the words kind, distractible, eager and diligent.

Conclusions: There is considerable uncertainty regarding the terminology associated with TBI. This uncertainty may have serious consequences as over 90% of TBI fall within the mild range and require the individual, parent or caregiver to make the decision regarding whether or not medical treatment is necessary. This decision will be made based personal knowledge and the seriousness with which they perceive the injury to be.

POSTER 351

ABSTRACT 418

POST-TRAUMATIC AMNESIA IN CHILDREN: NATURAL HISTORY OF RECOVERY

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Background and Aims: Despite post-traumatic amnesia (PTA) being regularly assessed in children after traumatic brain injury (TBI), to date no published study had before examined the natural history of its recovery in this population. The aim of the current study was to (i) determine the sequence of resolution in disorientation and amnesia, and (ii) examine relations between chronological age and PTA resolution in school-aged children.

Methods: The study included 44 children (aged 8 to 15 years) who were consecutively admitted to the Sydney Children's Hospital between 2008 and 2010. Subjects were assessed using the Westmead PTA Scale (containing orientation and memory items) by one of the investigators (JB) until they emerged from PTA.

Results: Disorientation was found to resolve before amnesia ($t(42) = 3.08$, $p < .01$). Within disorientation, the sequence of recovery was in the following order: person, place, then time. Orientation to time was regained significantly later than orientation to person and place ($F(9,84) = 16.72$, $p < .01$). Within memory, memory for the examiner occurred first, and memory for the pictures second. The difference between days taken to remember examiner and remember pictures, however, was not significant. Finally, correlations between chronological age and days taken to regain orientation and memory were not significant.

Conclusion: This study shows that in children who experience PTA following TBI orientation recovers before memory. Moreover, our results suggest that the chronological age does not impact duration of disorientation and amnesia (as measured by the Westmead PTA scale) in school aged children.

POSTER 352

ABSTRACT 439

ROUTINE SCREENING FOR HYPOPITUITARISM FOLLOWING SEVERE TRAUMATIC BRAIN INJURY: IS THIS ESSENTIAL?

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Background/Aims: Traumatic Brain Injury (TBI) poses significant risk of hypothalamic and pituitary insult, with previous studies reporting pituitary dysfunction in up to 50% of patients. The current study aimed to assess the incidence of altered hormonal levels secondary to hypopituitarism in patients with severe TBI.

Methods: Routine hormonal screening was performed, as per consensus guidelines, in a series of 14 patients (79% males) with severe TBI who were presenting for a speciality inpatient brain injury rehabilitation within a 3 month period. The blood tests performed were: serum Cortisol (morning), Thyroid Function Tests (FT3/FT4/TSH), Insulin-Like Growth Factor (IGF1), Gonadotropins (FSH, LH), Testosterone/Oestradiol and Prolactin. Median age of the patients was 24 and median time from injury was 2.75 months. 64% of patients had TBI secondary to MVA, 22% secondary to fall and 14% secondary to assault.

Results: In only 2 patients there was pituitary dysfunction evidenced by high Prolactin. In contrast, 6 patients had high gonadotropins. IGF1 was within the normal, age-specific range in all patients; serum Cortisol was high in 1 patient; 1 patient had high TSH with normal FT3 and FT4.

Conclusion: Overall, the incidence of hypopituitarism in this pilot sample is less than expected from previous reports. Further research is indicated in the future with larger sample and long term follow up.

POSTER 354

ABSTRACT 455

HIPPOTHERAPY IN ADULT PATIENTS WITH CHRONIC BRAIN INJURY

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Background and Aims: Hippotherapy is performed on horseback under the direction of a licensed health professional. It has been mainly investigated in rehabilitation of children with cerebral palsy and has a beneficial effect in balance and emotion of children with cerebral palsy. The aim of this study was to determine the effect of a hippotherapy for adult patients with brain injury.

Methods: Eight chronic brain injury patients (7 male, mean age 42.4 ± 16.6 years) were recruited. Mean duration from injury was 7.9 ± 7.7 years. The diagnosis were stroke (n = 5), traumatic brain injury (n = 2), and cerebral palsy (n = 1). Hippotherapy sessions were conducted twice a week for eight consecutive weeks in an indoor riding arena. Each hippotherapy session lasted 30 minutes. All participants were evaluated by Berg balance scale, Tinetti performance-oriented mobility assessment, 10 m gait speed, Functional Ambulatory Category, and Beck depression inventory. We performed baseline assessments two times; at 2 months and just before starting hippotherapy. We also assessed the participants immediately after and at 2 months after hippotherapy.

Results: All participants showed no definite change in balance, gait function and emotion between 2 baseline assessments before hippotherapy. During 8-weeks of hippotherapy, all participants showed neither adverse effect nor any accidents, and had a good compliance. After hippotherapy, there were significant improvements in balance and gait speed in comparison with baseline assessment ($p < 0.05$) and these effects sustained for 2 months after hippotherapy. However, there was no significant difference in emotion after hippotherpy.

Conclusions: In this study, we could observe a potential of hippotherapy to be a safe and effective rehabilitative method for adult patients with brain injury in improving balance and gait function, and would recommend further investigations.

POSTER 355

ABSTRACT 460

MEASUREMENT PROPERTIES OF THE HIGH-LEVEL MOBILITY ASSESSMENT TOOL FOR TRAUMATIC BRAIN INJURY

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Background and Aims: The High-Level Mobility Assessment Tool (HiMAT) was developed to quantify balance and mobility problems after traumatic brain injury (TBI). To our knowledge the HiMAT has not been tested on the mild TBI (MTBI) population. The aim of the study was to examine the reliability, validity and responsiveness of the Norwegian version of the HiMAT in a MTBI population.

Methods: 92 MTBI patients, 69% men, mean age 37.1 (SD 13.8), were recruited from the Department of Physical Medicine and Rehabilitation, Oslo University Hospital. HiMAT (range 0-54, worst-best) was tested at a mean of 3.3 (SD 1.1) months post-injury. 51 patients were retested at 6-months. A subgroup of 25 patients was selected for the reliability testing. Balance function reported on the Rivermead Post Concussion Questionnaire was chosen as gold standard. Criterion related validity was studied with correlation analysis (Pearson's r). The intra class correlation coefficient (ICC) was used for analyses of inter- and intrarater reliability. Minimal detectable change (MDC) for the HiMAT was estimated. Responsiveness was assessed with ROC curve analyses.

Results: Mean HiMAT sumscore was 46.3 (CI 44.4-48.1). HiMAT had a ceiling effect of 22.8%. The correlation between HiMAT and self-reported balance problems were large ($r = –0.62$, $p < 0.001$). Inter- and intra-rater reliability for HiMAT sumscore was high (Interrater ICC = 0.99, intrarater ICC = 0.95). The MDC was identified as 4 points. Responsiveness was good, and HiMAT discriminated well between patients with self- perceived improved versus unchanged balance function (AUC = 0.81).

Conclusions: In our study, the HiMAT demonstrated satisfactory measurement properties for patients with MTBI. This result is in agreement with previous studies of the HiMAT. Our findings suggest that the HiMAT can be used as an outcome measurement of balance and mobility problems in patients with MTBI.

POSTER 356

ABSTRACT 461

FUNCTIONING AND DISABILITY IN PATIENTS IN VEGETATIVE STATE AND IN MINIMALLY CONSCIOUS STATE: RESULTS FROM A NATIONAL STUDY

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Backgrounds and Aim: A national observational cohort study was conducted in Italy to evaluate functioning and disability of people with Disorders of Consciousness (DOCs). The project called "Functioning and Disability in Vegetative State (VS) and Minimally Conscious State (MCS)" collected ICF-based data on patients.

Method: Rehabilitation centres and Nursing Home, NGOs of family associations participated in this study that was conducted in 16 Italian regions coordinated by Foundation IRCCS Besta and supported by a Ministry of Health grant. Three research protocols have been developed, one for DOCs patients based on ICF Classification, one for caregivers and one for health and social workers. An ICF course, dedicated to a newly developed SV and MCS-ICF checklist, was completed by each health professional that worked in the project.

Results: Total patients' sample was of 602 subjects: 419 patients in VS and 183 in MCS. 159 patients had a post-traumatic aetiology, 166 patients a haemorrhagic vascular aetiology and the majority of patients (185) had aetiology of post-anoxic origin. 64% of patients were in Nursing Home, 26% in post-acute ward and 10% were at home. Functioning and disability profiles of these patients were defined and ICF results on activities and participation highlight the main facilitating role of environmental factors in specific domains such as mobility, self-care, domestic life and major life areas.

Conclusion: The information collected allows the gathering of better knowledge and understanding of functioning and disability and of the complex reality of patients with DOCs defined as paradigm of people with very poor functioning and very high need of facilitators and opens to further scientific and ethical considerations on the issue.

POSTER 357

ABSTRACT 469

OUTCOMES FROM AN EMERGING CONSCIOUSNESS PROGRAMME IN NEW ZEALAND

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Background and Aims: Clients in vegetative or minimally conscious states, collectively termed 'states of emerging consciousness', are extremely medically complex. Rehabilitative services aimed at minimising disability and improving awareness and function require specialised assessment and treatment. In New Zealand, service provision for this client group is complicated by the lack of an established care and treatment pathway. Despite this, in our experience a significant proportion of clients in states of emerging consciousness go on to show meaningful improvements.

Methods: All clients who were admitted to an inpatient neuro-rehabilitation service (ABI Rehabilitation) in a state of emerging consciousness following severe brain injury in the larger Auckland and Wellington regions between 2008-2011 were included in a retrospective analysis. Key assessment and outcomes tools included the Glasgow Coma Scale (GCS), the Wessex Head Injury Matrix (WHIM) and the Func Independence Measure (FIM), along with length of stay and discharge destination. Descriptive statistics and linear regressions were calculated.

Results: 36 clients in states of emerging consciousness were identified. The mean FIM gain during inpatient rehabilitation (average duration: 164 days), was 42.4 points (range: 0-91). Higher FIM gains were associated with higher GCS at admission ($R^2 = 0.31$, $p < 0.001$) and with shorter lengths of stay in acute care ($R^2 = 0.27$, $p = 0.004$). WHIM scores within the first 90 days of rehabilitation were generally predictive of a client's eventual discharge destination. After discharge, 16 clients (44%) returned home with family and external support, 18 clients (50%) entered a residential care facility, and 2 clients (6%) died.

Conclusions: Outcomes from this emerging consciousness programme are comparable to those reported in the international literature and suggest that a substantial proportion of such clients have the potential to make considerable recoveries. Assessment tools can prove extremely useful in clinical decision-making. The service delivery elements of an emerging consciousness programme will be discussed.

POSTER 358

ABSTRACT 470

FUNCTIONING AND DISABILITY OF CHILDREN AND YOUTH WITH DISORDERS OF CONSCIOUSNESS

Sattin D, Giovannetti A, Cerniauskaite M, Covelli V, Koutsogeorgou E, Meucci P, Pagani M, Quintas R, Schiavolin S, Raggi A, Leonardi M

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Background and Aim: The ICF-CY represents an update of ICF classification in a developmental perspective. Aim of the present presentation is to describe functioning and disability of children and youth in Vegetative State (VS) and Minimally Conscious State (MCS) through a direct application of ICF-CY categories.

Material and Method: Children in VS and MCS were enrolled in post-acute and long-term facilities as well as at home. ICF-CY questionnaires were administered by researchers that received a specific ICF-based training. Information were derived from available clinical documentation as well as from direct observation of children and from information derived from parents or legal representatives of children and adolescents.

Results: A total of 36 children, of whom 22 in VS, were included; 25 were males and the majority developed VS and MCS following a non-traumatic event, none of them were in long-term care institutions. Mean age was 114.8 months and mean duration of condition was 50.1 months. Percentage of utilisation of ICF-CY Body Functions categories were from the chapters of mental functions and mobility. Among Body Structures, most of the categories were from the chapter of movement-related structures. Activities & Participation categories were from the first chapter and Environmental Factors categories were equally distributed between four chapters and were described as facilitators.

Conclusion: The use of ICF-CY enables to obtain a realistic and specific profile of functioning for each child that can be coupled with known issues such as loss of brain functions and provision of life-sustaining interventions.

POSTER 359

ABSTRACT 483

ASSESSING COGNITIVE STRATEGY USE IN ADULTS WITH BRAIN INJURY DURING EVERYDAY FUNCTIONAL TASKS

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Introduction: Ecologically valid assessment linking cognitive strategies to observed functional performance has been strongly advocated. This study examines the validity of one such assessment: The Perceive, Recall, Plan and Perform (PRPP) System of Task Analysis.

Method: Occupational therapists observed videoed patient performance of personal and instrumental activities of daily living, then used the PRPP System of Task Analysis to identify task performance errors and to attribute these errors to underlying cognitive strategy deficits. Multi-faceted Rasch analysis was used to generate a hierarchy of test items and to propose a linear continuum along which the difficulty of test items, raters, patients and tasks could be simultaneously measured. The generated hierarchy was examined for congruency with theories of information processing and neurorehabilitation.

Results: Test items, raters, patients and tasks demonstrated "fit" with the Rasch model. Construct validity was well supported by strong parallels between the Rasch generated hierarchy of PRPP items and conceptual models of information processing and occupational performance.

Conclusion: The PRPP System of Task Analysis is a valid measure of cognitive strategy use during occupational performance of adults with brain injury, demonstrating high levels of fit with Rasch modelling for test items, raters, and patients.

POSTER 360

ABSTRACT 486

COGNITIVE FUNCTIONING AND DISABILITY OUTCOMES OF CHILDREN IN VEGETATIVE STATE AND MINIMALLY CONSCIOUS STATE

Pagani M, Giovannetti A, Covelli V, Sattin D, Meucci P, Cerniauskaite M, Koutsogeorgou E, Quintas R, Schiavolin S, Raggi A, Leonardi M

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Background and Aims: Disorders of Consciousness (DOC), including Vegetative State (VS) and Minimally Conscious State (MCS) are conditions that may be temporary, marking a stage in the recovery from brain damage, or permanent. Current epidemiological and clinical information related to VS and MCS are mainly based on adult patients' and few available data investigated children with DOC. Aim of this presentation is to report differences between children in VS and MCS with regard to arousal, cognitive functioning and disability outcomes to guide sensible rehabilitative interventions.

Methods: Children were consecutively enrolled in Italian centres devoted to care and rehabilitation of DOC. The Glasgow Coma Scale (GCS), the Glasgow Outcome Scale (GOS), the Disability Rating Scale (DRS) and the Level of Cognitive Functioning scale (LCF) were administered. Mann-Whitney U test was used to assess differences between children with VS and MCS.

Results: 36 children (22 in VS, 11 females), age 9.6 years (SD = 4.5), time from acute event 4.2 years (SD = 4.0) were enrolled. Compared to MCS, children in VS reported lower scores in GOS (mean 2.1 vs 2.8; $p < .001$), LCF (mean 1.9 vs 2.7; $p = .002$) and GCS (mean 7.9 vs 8.5; $p = .23$), and higher scores in DRS (mean 22.4 vs 21.4; $p = .045$).

Conclusions: Preliminary results obtained on this small sample of children with DOC indicated a lower cognitive profile of functioning and more marked level of disability for children in VS, corroborating evidence on adult population. Tailored rehabilitative programs are therefore required to enhance clinical condition and quality of life of children with DOC.

POSTER 361

ABSTRACT 489

EVALUATING COGNITIVE ASSESSMENT: THE CLINICAL REASONING AROUND COGNITIVE ASSESSMENT FOR INDIVIDUALS POST STROKE AND TBI

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Introduction: An important role of the Occupational Therapist (OT) when working with individuals following stroke or traumatic brain injury (TBI) is to assess the impact of cognitive impairment on an individual's ability to engage in occupations and resume important life roles. While OTs use a variety of methods to evaluate cognition, the literature has largely focused on the application of standardised cognitive assessments, with a lack of emphasis around both the utility of observational cognitive

assessment methods and the clinical reasoning guiding selection of various assessment tools. The aim of this study was to (1) to investigate OT's clinical reasoning surrounding the selection, administration, and interpretation of various cognitive assessment methods, and (2) to explore both the difference in application of assessment methods and challenges experienced by OTs throughout the cognitive assessment process across the continuum of care.

Methods: Following an extensive review of the literature regarding cognitive assessment methods, a survey was developed. 207 Australian OTs completed the survey by post or internet. Participants included clinicians working across acute, inpatient rehabilitation, and community settings. Data were then analysed using traditional descriptive statistics.

Results: Results highlighted the utility and importance of functional observational techniques when assessing cognition, along with the limitations associated with lack of ecological validity of many standardised assessment methods. While the reasons for selection of assessments were mostly consistent across the continuum of care, different challenges existed for therapists conducting these assessments at various points along this continuum.

Conclusions: This survey highlights the importance of using observational methods of cognitive assessment for individuals post stroke and TBI. The importance of using a collaborative approach to assessment through using a combination of cognitive screens, batteries, and observational methods within the multidisciplinary team was also evident, emphasising the importance of applying a client-centred and holistic approach to cognitive rehabilitation.

POSTER 362

ABSTRACT 492

OUR EXPERIENCE CONCERNING NEUROREHABILITATIVE OUTCOMES IN PATIENTS WITH POSTACUTE TBI TREATED WITH CEREBROLYSIN

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Background and Aim(s): To assess neuroreahabilitative outcomes in patients with traumatic brain injury (TBI) treated with recommended doses of Cerebrolysin.

Method: Retrospective study on 110 inpatients at the Physical and (neural-muscular) Rehabilitation Medicine Clinic Division of our hospital, between January 2005–April 2011, at their first admission divided in two lots: 54 treated with Cerebrolysin (15 females, 39 males; mean age 34.46 years, standard deviation [st.dev.] 14.82) and 66 controls (12 females, 54 males; mean age 39.44, st.dev.15.33) considering opportunity of Cerebrolysin administration (aside similar standard treatments) as major inclusion criterion; assessment of 9 (see below the main ones) rehabilitative parameters. Glasgow Coma Scale has for cases stratification by TBI severity and then for responsiveness to Cerebrolysin doses (10, 20 or 30 ml/day, per 12 days treatment sessions).

Results: For the Cerebrolysin lot, the average of the difference between discharge Functional Independence Measure (dFIM) and admission (aFIM) was significantly bigger (mean 48, st.dev. 33.21) versus controls (mean 25.08, st.dev. 29.9), $p = 0.000$. The patients in the Cerebrolysin lot reached in fewer days then controls to: knee extension (mean 10.53 versus 11.24, st.dev. 9.67 versus 10.46; $p = 0.000$), walk between parallel bars (mean 8.84 versus 12.40, st.dev. 11.11 versus 14.87; $p = 0.000$), cane assisted walk (mean 7.73 versus 13.2, st.dev. 8.89 versus 17.13; $p = 0.000$), independent walk (mean 8.08 versus 12.25, st.dev. 11.81 versus 18.34; $p = 0.000$), independent ascend/descend stairs (mean 11.81 versus 13.20, st.dev. 12.79 versus 17.13; $p = 0.000$). The dose of 20 ml/day was the only with statistical sinficance for bettering the outcome in patients with (status post) moderate TBI (mean dFIM-aFIM 50.01 versus 39.15, st.dev. 30.26 vs 28.51; $p = 0.001$) and mild TBI (mean dFIM-aFIM 53.17 versus 39.36, st.dev. 39.79 versus 30.15; $p = 0.023$).

Conclusion: Cerebrolysin contributes to improving—including achievement hastening—neurorehabilitative outcomes in treated patients.

POSTER 363

ABSTRACT 493

ASSESSMENT OF DISCOURSE AFTER TBI: INTERNATIONAL SPEECH PATHOLOGY PRACTICE

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Background and Aims: Research into the effects of traumatic brain injury (TBI) on the language and communication abilities of individuals has highlighted the importance of evaluating discourse as part of a Speech Language Pathology (SLP) assessment. This study examined the extent to which SLPs were using discourse analysis as part of a routine assessment with individuals who have acquired cognitive communication disorders after TBI.

Methods: SLPs (n = 265) from Australia, New Zealand, United States of America and United Kingdom working in TBI completed an online survey. The survey examined assessment practices for discourse analysis (formal versus informal assessments as well as types of genres used to assess discourse) and the SLPs perceptions of discourse assessment and its relevance in assessment and treatment of communication impairments in adults after a TBI.

Results: Preliminary results indicate a focus on informal assessment procedures providing a general overview of the client's abilities in an interview conversation type format between the client and clinician (90% of SLPs recruited). Other genre styles for discourse analysis were not as frequently used. SLPs rated informal assessment and observation as the frequently used tool of assessment for determining a client's communication ability and as an outcome measure for ongoing therapy needs.

Conclusion: Results indicate that SLPs continue to avoid formal discourse assessments in favour of informal observations between the client and clinician as well as standardised single word or sentence level assessments. The implications for these practices in assessing the individual within their real word context will be discussed and comparisons between international colleagues will be highlighted.

POSTER 364

ABSTRACT 511

EVALUATING THE QUALITY OF LIFE IN ADOLESCENTS WITH TRAUMATIC BRAIN INJURY

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The neuropsychological alterations caused by traumatic brain injury (TBI) is widely discussed in the rehabilitation field, however, some factors need to be better analyzed in regards to its relevance in an individual's quality of life and of his/her family. This study investigates the participants' perception of their quality of life based on a rehabilitation program that provides to each adolescent an environment with autonomy and active participation in their own rehabilitation process. The adolescents were asked to answer the Sarah Quality of Life Questionnaire to obtain the perception of each participant on different aspects: familiar, cognitive, social, psychological and physical. In this study, 27 adolescents were analyzed in different rehabilitation programs to investigate the nature of the activities and the interaction models of each group. In the experimental group, 12 individuals participated in a group intervention in Metacognitive Neuropsychological Dimension project (MND), 5th Dimension version developed by Rede SARAH. The control group, composted of 15 participants, had individual follow-ups with rehabilitation professionals every four months, with specific adaptations in the family or school routines when necessary. The family members were advised to facilitate interaction with the adolescents, promoting collaborative learning. The results obtained at the beginning of the intervention were compared with the results obtained four months later, when the participants were asked to complete the Quality of Life questionnaire for the second time. It was concluded in this study that the experimental group, part of the MND project, presented higher level of individual perception related to quality of life, whereas the control group presented a lower level of this perception. The experimental group scored higher in five different domains related to quality of life: familiar, cognitive, social psychological and physical. The results were based on clinical observations, and were also noticed by the participant's family members.

POSTER 365

ABSTRACT 517

NEUROPSYCHOLOGICAL OUTCOME FOR SYMPTOMATIC AND NON-SYMPTOMATIC PATIENTS FOLLOWING A MILD TRAUMATIC BRAIN INJURY

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Background and Aims: A recent meta-analysis of long-term (i.e. more than three months post injury) cognitive consequences of mild traumatic brain injury (mTBI) showed no effect on neuropsychological performance, including studies where recruitment of patients are based on a history of mTBI rather than self-reported symptoms. A problem, pointed out by Iverson, is that even meta-analysis can obscure individual differences, hiding the effect of a small group of people who actually do sustain cognitive impairment. The aim of the current study was therefore to compare neuropsychological performance for two subgroups of mTBI patients, those with and without persisting symptoms.

Method: In a prospective cohort study, 121 adult patients were recruited on admission to hospital emergency department within 24 hours after an mTBI. At three months follow-up, 88 patients (27 % withdrawal rate) completed the Rivermead Post Concussional Questionnaire (RPQ) and completed a neuropsychological assessment. A control group of healthy volunteers (n = 32) were recruited for reference data.

Results: Three or more symptoms on RPQ were chosen as cut-off for inclusion into the symptomatic group (n = 28). On the WAIS-R subtest Information, symptomatic patients had significantly lower results (M = 19.5, SD = 4.5) than non-symptomatic patients (M = 22.0, SD = 4.3) and controls (M = 22.8, SD = 3.2), $p < 0.01$, controlled for education and age. On Consistent Long Term Retrieval from the Selective Reminding Test, both symptomatic patients (M = 77.2, SD = 35.1) and non-symptomatic patients (M = 78.7, SD = 32.3) performed worse than controls (M = 98.6, SD = 34.6), $p < 0.01$.

Conclusions: Since Information is highly correlated with general intelligence, the test is conceived as a "hold-test", not easily affected by brain injury, the results of this study might indicate a possibility of a premorbid vulnerability in cognitive functioning in patients with persisting symptoms after mTBI.

POSTER 366

ABSTRACT 554

SLEEP AND VEGETATIVE STATE (VS): A DESCRIPTIVE POLYSOMNOGRAPHIC STUDY

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Background and Aims: Sleep is a physiological cyclic modification of consciousness. Vegetative State (VS) is a pathological modification of consciousness in which cyclical pattern of wake-sleep is preserved. Aim of this study is to describe the polysomnographic patterns of VS patients with a heterogeneous etiology of the brain lesion. Previous observations showed, in VS patients, a significant reduction in REM sleep phasic activities with no differences between those who recover and those who don't.

Methods: We evaluated the patterns of polysomnographic exams of 15 patients (mean age 51.5 ± 20.8; range 17-79; 10 Males and 5 Females) with a diagnosis of VS due to different origin (6 anoxic-ipoxic damage, 6 traumatic injuries, 3 strokes) and with a mean Glasgow Coma Scale range of 6.3 ± 2.2.

Results: We could perform a conventional sleep assessment in 6 patients. EEG patterns of the other 9 patients did not fulfill the international scoring criteria and consequently we did perform only arbitrary analisys. We registered a total amount of: REMs (Rapid Eyes Movements) in 6 subjects; K complex and/or Spindles in 11 patients; slow synchronized activities (Theta and/or Delta) in 13 patients; a normal cyclic wake-sleep pattern in 12 subjects. Clinical Outcomes were: 3 deaths; 5 VS patients; 7 minimally conscious state patients (MCS).

Conclusions: Our study describes the polysomnographic EEG patterns in a heterogeneous group of VS patients. We found how it is difficult to consider common scoring criteria both due to clinical situation and environmental conditions. Despite this we could perform conventional scoring in 40% of the patients. Remaining observations revealed different patterns as "dissociated patterns" with the presence of phasic rhythms. We observed that 5, out of 6 Patients, with REMs evolved to a MCS.

POSTER 367

ABSTRACT 555

THE EFFECT OF PREVIOUS FRONTAL LOBE INJURY ON REHABILITATION AFTER A SUBSEQUENT ACQUIRED BRAIN INJURY (ABI)

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Background and Aims: Frontal lobe injury from any cause can adversely affect many aspects of cognitive function and behaviour, such as attention, executive function, insight, mental flexibility, and social skills. Attempted rehabilitation after a subsequent ABI can be made more challenging by this legacy. A series of six patients with a clear history of single-incident frontal lobe injury is described to illustrate this clinical problem.

Methods: The records of a regional ABI rehabilitation unit for adults aged 16-65 were reviewed to identify patients with pre-existing frontal lobe injury who had been treated for a subsequent ABI during 2008-10. Goal attainment during rehabilitation was reviewed, with particular emphasis on aspects reflecting frontal lobe function.

Results: Six (4%) of 140 consecutive ABI patients admitted during these three years had previous frontal lobe injury from trauma (three cases), trans-cranial pituitary surgery (two cases), and ruptured aneurysm (one case), and had frontal gliosis or atrophy on CT or MR scans. These events had occurred 11-37 years before a new intracranial event, which was trauma (three cases) and infarct, aneurysm rupture, and hypertensive haemorrhage (one case each). All six patients had shown little insight into the consequences of the recent ABI and all had offered over-optimistic accounts of their previous performance. All showed severely impaired frontal lobe function on neuropsychological assessment. They had poor rehabilitation outcomes, with two of the six (33%) requiring discharge to institutional care compared to only one (0.7%) of the other 134 inpatients during those three years.

Discussion: This series illustrates that an old frontal lobe injury can cast a long shadow, even in people who are apparently living independently in the community. Rehabilitation outcome from a subsequent ABI can be much poorer than predicted.

POSTER 368

ABSTRACT 557

RISK FACTORS FOR DISCHARGE FROM INPATIENT REHABILITATION TO INSTITUTIONAL CARE IN YOUNGER ADULTS WITH ACQUIRED BRAIN INJURY (ABI)

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Background and Aims: This study seeks to identify predictive factors for inpatient rehabilitation in younger adults with recent acquired brain injury (ABI) to be followed by discharge to institutional care.

Methods: The records of a regional neurorehabilitation service for adults aged 16-65 were used to identify the discharge destination of all inpatients with ABI during 2001-10. The case records of all patients who were discharged to institutional care were then reviewed to identify factors responsible for the failure to achieve discharge home.

Results: Over the decade, 358 patients aged 16-68 were admitted for inpatient rehabilitation of complex disability from a recent ABI (91% trauma, stroke, or subarachnoid haemorrhage). Three patients died during rehabilitation and 17 were discharged to other hospitals for various reasons (two died, the other 15 eventually went home). Only 12 (3.5%) of the remaining 338 patients were discharged from rehabilitation to long-term institutional care. The rest went to their original home, a new home, or to live with a relative. Factors associated with institutional discharge included severe or complex persisting disability after rehabilitation, protracted rehabilitation, other disabling physical or mental health problems, absence of family support at home, evidence of borderline independence before the ABI, and previous substance misuse. Most of the 12 had more than one of these factors. Age and the type of pathology causing the ABI did not influence the risk of institutional discharge.

Conclusions: Predicting the outcome of inpatient rehabilitation for severely disabling ABI is not an exact science, but a number of risk factors increase the risk of institutional discharge. Identifying them in individual patients may allow earlier intervention to reduce that risk and assist discharge planning.

POSTER 369

ABSTRACT 560

PREDICTORS OF DISCHARGE TO HOME FROM BRAIN INJURY ACUTE CARE IN MALAYSIA

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Background and Aims: Discharge to home after brain injury is normally preferred as it implies patients' good recovery and ability to be independent in their previous surroundings. Most studies assessing predictors of discharge to home focus at rehabilitation discharge in countries with well-established post-acute care services. The aims of this study were to identify the discharge destinations and to examine sociodemographic and clinical factors that influence discharge to home from acute care in Malaysia.

Methods: A prospective study of 185 patients admitted to acute wards, University Malaya Medical Center for stroke or traumatic brain injury. Inclusion criteria were ≥18 years old, independent before the onset of brain injury and reside at home prior to hospital admission. Patients excluded were those transferred to other hospitals or died before they were discharged from acute wards. Patients' sociodemographic and clinical factors were examined. Predictors of discharge to home were determined separately using univariate analysis followed by multivariate analysis. *P*-values ≤0.05 were considered statistically significant.

Results: 119 (64.3%) patients were discharged directly to home, 36 (19.5%) patients to sibling's or children's homes, seven (12.4%) patients to inpatient rehabilitation ward and 23 (3.8%) patients to nursing facilities. Predictors associated with discharge to home after acute care were: living in an extended type family (OR 29.24, 95% CI 6.60-129.7; $p < 0.001$), living in a nuclear type family (OR 26.60, 95% CI 6.68-105.9; $p < 0.001$) and mild brain injury (OR 2.52, 95% CI 1.11-5.74; $p = 0.03$). Age, sex, ethnicity, marital status, diagnosis, number of comorbidities, length of hospital stay and functional status at discharge were not significant predictors.

Conclusion: Living with family members and having a mild brain injury were significant predictors of discharge to home after acute care. This knowledge could assist health professionals to facilitate home preparation for discharge while still in the acute care.

POSTER 370

ABSTRACT 569

ICF BRIEF SCORE SET FOR TBI PATIENTS

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Background and Aim: The aim of this study was to assess the possibility of linking medical records of Traumatic Brain Injuries (TBI) patients to International Classification of Functioning, Disability and Health (ICF) brief score set, as a valuable language between health and social services.

Method: The retrospective patient record study was conducted. Medical records of 25 TBI patients admitted to the East Tallinn Central Hospital post-acute rehabilitation department from January 2009 to July 2011, were linked to the ICF brief score set for TBI. Medical records were comprised of medical data, reports from physiotherapists, occupational therapists, psychologists and speech therapists.

Results: More problems were reported within body functions, especially high-level cognitive functions, energy and drive functions, memory and attention functions. In activity and participation, there were more problems in complex interpersonal interactions and conversations. To assess the possibility of acquiring and keeping a job was complicated according to the severity of illness and the time from injury. The same problems were to determine the environmental factor importance.

Conclusions: The ICF is useful tool that describes the conditions and needs of TBI patients. This study identified the most common problems occurring in rehabilitation of TBI patients. The ICF is a shared language between health and social services.

POSTER 371

ABSTRACT 583

ACUPUNCTURE FOR HYPERSALIVATION IN TRAUMATIC BRAIN INJURY: A CASE REPORT

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Background and Aims: Acupuncture is a complementary modality used for various ailments. Most researches on pain management show improvements and it is questioned whether these would apply to other clinical settings, such as regulation of saliva production. Acupuncture is used in dry mouth, but its use in hypersalivation is rare. We presented a case with hypersalivation treated with acupuncture.

Methods: A patient with traumatic brain injury, 24-year old, was admitted for rehabilitation two months after the accident. Initial computerized tomography showed epidural hematoma compressing the right temporoparietal lobe; right cerebral hemisphere edema causing cerebral shift. Hematoma drainage and craniotomy was emergently applied. He remained unconscious for two months. In the evaluation before rehabilitation, rancho los amigo score was 3. No cooperation, verbal answer or mouth, tongue movement were noted. Hypersalivation was present; severity score: 5-profuse and frequency score: 4-constantly (drooling assessment system). Functional independence measure (FIM) and functional ambulation classification scale (FACS) scores were 18 and 0, respectively. During rehabilitation he was able to communicate via writing, FIM and FACS scores progressed to 68 and 2, respectively. However hypersalivation did not change, therefore acupuncture was planned.

Results: Acupuncture sessions were applied daily, 20 minutes/day. Local points used were St4 and Ren24 and general body balance points used were DU-23, Kid 10, Kid 3. After 5 sessions, severity and frequency of hypersalivation scores improved to 2-mild and 2-occasionally, respectively. Then Du22, Ren24, H7, L1-4, Kid 3 points was added to the treatment. After a total of 10 sessions, hypersalivation was completely eliminated.

Conclusions: The mechanisms of acupuncture in the regulation of saliva production are unknown. There are few trials suggesting its use in salivation disorders, and randomized controlled trials with large number of patients are needed to support our finding.

POSTER 372

ABSTRACT 589

FACTORS AFFECTING PARTICIPATION AFTER BRAIN INJURY

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Background and Aims: Participation in the society is one of the main goals in rehabilitation. However, several studies have shown a low level of participation after traumatic bran injury. There are few studies on which factors that are important for engagement and participation. The aim of the study was to explore which factors that affect participation after a brain injury.

Methods: The study cohort was made up of all patients with traumatic brain injury (N = 129) aged between 18 and 65, admitted to the emergency room at Sahlgrenska University hospital, during a two year period . Four years after injury the patients were asked to reply to four questionnaires; Impact on Participation and Autonomy (IPA), The European Brain Injury Questionnaire (EBIQ), EQ5D (Standardized instrument for measuring health outcome) and a national tool for collection of data to a Swedish quality register. In order to explore factors important for participation a regression was made.

Result: On the EQ-5D VAS scale (max 100) the mean for the trauma group was 68, four years after trauma, compared with Swedish norm of 83 (SD 16), a result below the 25th percentile. The IPA subcale Social life, Family role, Autonomy outdoor and indoor showed a significant relation with the EBIQ questions concerning ability to participate in conversation, domestic activities, interest in news and desire to live from the domains depression, communication, motivation and consequences.

Conclusion: Result show that other factors than factors directly related to the brain injury, such as cognitive and somatic, are most important for participation in society . We also find that the trauma group reports a lower overall health-related quality of life four years after trauma than Swedish norm.

POSTER 373

ABSTRACT 595

SILENT EPIDEMIC: THE EFFECTS OF NEUROFEEDBACK TRAINING ON POST CONCUSSION SYMPTOMS AND QUALITY OF LIFE

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Background and Aims: Traumatic Brain Injury (TBI) a "Silent Epidemic" has been recognized as an affliction of humankind since the Stone Age. TBI leads to significant impairments disrupting biological, social and occupational functioning. Patients with TBI experience concussion symptoms, as a result their quality of life reduces. In India, the most vulnerable are young males in their productive age. The aim of the present study was to examine the efficacy of Alpha–Theta Neurofeedback Training (NFT) for Post Concussion Symptoms (PCS) and Quality of Life (QOL) in TBI.

Methods: The assessment was carried out for 102 patients after obtaining informed consent. The final sample comprised of 60 patients, 30 each in the Intervention group (IG) and Waitlist group (WG) at random. The mean number of years in IG was greater than WG and majority were from urban background. Rivermead Head Injury Follow-up Questionnaire (RHIFQ), Rivermead Post Concussion Symptoms Questionnaire (RPQ), Visual Analog Scale (VAS) and Quality of Life scale (QOL) were administered. Patients in IG received alpha theta NFT (20 sessions). The pre post intervention design was adopted.

Results: Data was analyzed using the SPSS 15.0. Results indicate that PCS were correlated negatively with QOL. RPQ was correlated positively with VAS. QOL was negatively correlated with VAS. There was no significant correlation between the scales with alpha and theta amplitudes. There was statistically significant reduction in PCS and enhancement of QOL in IG when compared to WG. On inspection there was improvement in the alpha theta amplitudes.

Conclusion: There was improvement in both groups in the post assessment. But the improvement in the IG was significant when compared to WG. NFT is effective in ameliorating deficits in PCS and enhancement of QOL in patients with TBI. The challenges and future directions would be discussed.

POSTER 374

ABSTRACT 626

GAIT VARIABLITY STUDY USING DUAL TASK PARADIGM AMONGST HEALTHY AND MILD TRAUMATIC BRAIN INJURY SUBJECTS

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Background and Aim: People with mild traumatic brain injury (mTBI) show a wide range of symptoms. The purpose of this study is to investigate the effect of divided attention on gait during treadmill walking among healthy and mTBI subjects. Individual stride-to-stride variability of temporal gait parameters, the vertical ground reaction force and range of motion of the knee in the Sagital plane will be investigated under the normal and the two dual task walking conditions.

Methods: Fifteen able-bodied and four mTBI subjects participated in this research. Each subject performed normal walking, backward counting of the months of the year and backwards counting of odd numbers. A dual belt instrumented treadmill measures ground reaction force and temporal gait parameters. Inertial gyroscopes were used to measure knee angle by numerically integrating the angular velocity. Statistical analysis was used to analyze the data.

Results: The average values of the gait variables studied were different in the three walking trials for most of healthy and mTBI group. The variance analysis revealed stride-to stride variation ($P < 0.05$) in mTBI and even in some of the healthy subjects. A significant knee joint stride-to-stride flexion-extension variation was observed among the mTBI group.

Conclusion: The dual task gait protocols used were shown to have an effect on both healthy and mTBI group. Some mTBI subjects even show very little stride-to-stride variation making the diagnosis and evaluations of mTBI using gait analysis very challenging.

POSTER 376

ABSTRACT 36

CHANGES IN ENDPOINT KINEMATICS CHARACTERIZE POST-STROKE RECOVERY AFTER ROBOT-AIDED ARM TRAINING

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Background and Aims: Upper-limb (UE) paresis is an important issue because it plays a critical role in daily activities. Movement impairments after stroke can be assessed by changes of UE endpoint kinematics and used for clinical applications. The research is aimed to investigate UE endpoint kinematics for characterizing post-stroke recovery after robot-aided training for a subject after stroke.

Methods: A 58-year-old man with left hemiparesis, 3 months post-stroke, participated in the study. The subject received both conventional therapy and movement training by using a robotic-aided system to provide interactive motor activities for the UE. Robot-aided training consisted of two 40-min sessions per week for 6 months. Changes in clinical scale (Fugl-Meyer test) and endpoint kinematics were obtained at the start (T_1) and per month during intervention (T_2~T_6). Robot-aided measures were calculated from averaged absolute deviation of path (AAD) and normalized jerk cost (NJC). Spearman's correlation test was used to discover the association between clinical scale and robotic-aided measures.

Results: Increased movement accuracy and decreased NJC were shown during recovery. Results of Spearman's correlation test revealed strong relationships between clinical scale and robotic-aided measures ($p < 0.01$).

Conclusions: Motor recovery after stroke can be assessed through integrated neuromuscular control and robot-aided technology. Robot-aided measures are highly associated with clinical scale and may be significant to fundamental movement sciences and clinical applications for stroke rehabilitation.

POSTER 377

ABSTRACT 41

CHALLENGES IN REHABILITATING OVERWEIGHT AND OBESE SPINAL CORD INJURED PATIENTS: AN EXPERIENCE FROM MALAYSIA

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Background: Obesity can be considered to be a factor which can contribute to impaired functional outcome in spinal cord injured (SCI) patients compared with those of a similar neurological injury level without obesity.

Aim: To determine factors which may affect the rehabilitation programme in overweight and/or obese spinal cord injured (SCI) patients.

Methods: A descriptive study was performed in two rehabilitation wards in Hospital Kuala Lumpur from 15/9/08 to 15/10/08. Questionnaires were given to SCI patients who were overweight (BMI of 25kg/m^2 or above) and obese (BMI of 30kg/m^2 or above) and those with the waist circumference of 102cm or above (male) and 88cm or above (female).

Questions included: diagnosis, procedures during hospital stay, time taken to complete therapy/procedures, rehabilitation equipment used, length of stay (LOS), functional independence and psychosocial issues.

Results: Nine spinal cord injured patients participated in the study. Factors which affected the rehabilitation programme in these patients were multiple medical issues, limited functional independence, psychosocial issues, equipment-related issues, increased LOS and the need for extra time for therapy and transfers.

Conclusions: Obese and overweight SCI patients face many medical, functional and psychosocial challenges. Additional considerations are necessary to ensure the success of the rehabilitation programme in overweight and obese SCI patients, as they have special rehabilitation needs.

POSTER 378

ABSTRACT 53

INFLUENCE OF NECK AND TRUNK MUSCLES DURING UNSTABLE SITTING AFTER WHOLE-BODY VIBRATION IN A SQUATTING POSITION

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Purpose: Stimulation of the whole body by low frequency vibration (10 to 50Hz) was known to have clinical benefits, including increased joint flexibility and improved posture control in Parkinson's disease. Increased muscle activity in extremities during whole-body vibration (WBV) is thought to be induced mainly by tonic vibratory reflex (TVR). However, it is unknown whether the effects of WBV for neck and trunk muscles have an important role in posture control. The purpose of this study was to investigate the influence of posture sway during unstable sitting after WBV in a squatting position.

Methods: Eighteen young people (20 to 28 years old) participated in this study. We asked the subjects to sit with folded arms on an unstable board which we put on the forceplate. Under these unstable sitting conditions for 30 sec, we measured head sway using a triaxial accelerometer, electromyography (EMG) from neck and trunk muscles, and the center of pressure. The same measurements were performed after WBV (frequency 12.5 Hz, amplitude 10 mm, holding period 5 min) under a squatting position. Muscle activities of the right Rectus Abdominus, Obliquus Externus and Erector Spinae muscles (both cervical and lumbar parts) were recorded using a surface EMG. An EMG analysis was performed to implement regulation of movement on the basis of the amount muscle activity at maximal isometric voluntary contraction.

Results: Comparing the data after WBV with those before WBV, the head sway during unstable sitting was significantly increased and the mean integrated values of muscle activities obtained from abdominal muscles were significantly higher after WBV. In the change over time for unstable sitting, the initial intervals of 25% after the start of motion showed a greater difference before and after WBV.

Conclusion: These results suggest that WBV changes balance activities during unstable sitting by affecting neck and trunk muscles.

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ABSTRACT 80

USING AN EXTENDED AROC DATASET TO BENCHMARK REHABILITATION OUTCOMES IN THE TREATMENT OF BRAIN INJURY

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The Australasian Rehabilitation Outcomes Centre (AROC) provides a national benchmarking system whose aim is to improve clinical outcomes of rehabilitation. Brain injury (BI) rehabilitation enables those who have experienced a brain injury to maximise their abilities and achieve optimal functioning. BI rehabilitation comprises some 3.5% of rehabilitation episodes submitted to AROC each year. A benchmarking workshop facilitated by AROC in September 2008 provided an open forum for discussion of functional outcomes pertinent to brain injury rehabilitation. One of the key points raised at the workshop was the desire to collect additional BI specific outcome items that could be used to inform current clinical practice. A BI adjunct (extended) dataset was developed post workshop and both targets and adjunct module were published in July 2009. The BI targets include goals for time since onset, Length of Stay (LOS), FIM change, and discharge destination. The adjunct dataset includes PTA score and comment, an opportunity to capture chronic amnesia information, as well as reasons for delay in discharge (date ready for discharge, delays and date episode ended). At present seven designated BI units in Australia are collecting this data. Analysis of this data in conjunction with the core AROC dataset will be presented. It is hoped that the adjunct data will contribute to improving the specificity of the BI target outcomes as well as the understanding of BI outcomes in Australia.

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ABSTRACT 142

GETTING PEOPLE BACK TO WORK: OCCUPATIONAL OUTCOMES OF AN INTERDISCIPLINARY RETURN TO WORK AND STUDY PROGRAM

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Background and Aims: A successful return to work and study (RTW-S) following a neurological event can have a positive effect on a person's quality of life, social integration and home, leisure and financial status. An interdisciplinary RTW-S program in a neuro-rehabilitation outpatient service aimed to identify changes in occupation, work duties and income following targeted RTW-S intervention.

Method: Data was collected via a retrospective file audit and added to existing data for clients discharged from the RTW-S program. Data collected included: Demographic, ANZSCO Occupational Category, Work Duties and Income Source. Occupation Category and Work Duties were assessed at pre-injury. Income Source was assessed at program entry. All were compared again at program discharge. Work Duties were categorised using the following variables; same duties, modified duties, alternate duties, same employer, different employer, unemployed, volunteer and retired. Income Source was defined as a client's main source of income at the time, and included work, government benefits, family support, sick/annual leave, insurance, savings/superannuation, compensation and fundraising.

Results: Currently, there have been 38 clients discharged from the RTW-S program. At program discharge, 74% (n = 28) of clients returned to the same Occupation Category as their pre-injury status. Of this group, 79% (n = 22) returned to the same employer with 64% (n = 14) performing the same, duties, 27% (n = 6) modified and 9% (n = 2) alternate duties. At time of program entry, 90% (n = 34) of clients were reliant on income other than work including 32% (n = 11) each for government benefits and partner/family supports, 5% (n = 2) insurance and 15% (n = 5) each for sick/annual leave and savings/superannuation. At time of program discharge, this had reduced to 37% (n = 14) with the majority of this group receiving government benefits (n = 5) or partner/family support (n = 7).

Conclusions: Participation in an interdisciplinary RTW-S program indicates substantial benefits in outcomes related to successful return to work and study.

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ABSTRACT 161

FUNCTIONAL AMBULATION: STANDARD TREATMENT VERSUS ELECTRICAL STIMULATION THERAPY (FASTEST) TRIAL: EARLY DATA

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Background and Aims: Evidence for functional electrical stimulation (FES) to treat post-stroke foot drop is limited by poor controls, blinding, and follow-up. The Functional Ambulation: Standard Treatment versus Electrical Stimulation Therapy (FASTEST) Trial aims to compare the effect of the FES (Bioness L300) versus an ankle foot orthosis (AFO.)

Methods: FASTEST is an industry-sponsored, 11 center, randomized, controlled, single-blind, clinical trial. Selected inclusion criteria include age ≥18 y, time post-stroke ≥3 mo with foot drop requiring AFO, gait speed ≤.8 m/sec and ability to safely walk 10 meters. Selected exclusion criteria include electrical or metal implants, ≤6 w from botulinum toxin injection, ≥3 h FES in past 6 months, no FES response and >5° plantarflexion contracture (affected ankle). Subjects were randomized to 30 weeks of walking with FES or AFO. AFO group then received 12 weeks of FES. Both groups received physical therapy during the first 8 weeks. The primary endpoint was gait velocity (GV) at 30 weeks with the devices on. Secondary endpoints included Timed up and Go, Berg Balance Scale and Stroke Impact Scale.

Results: To date, 164 subjects have been randomized, 82 to each group, with 62 subjects having completed the 30 week assessment. The mean age of all subjects is 61 (±11.8) yrs with 39% female, 43% non-Caucasian, and 91% ≥6m post stroke and a mean, baseline GV of 0.42 (±.2)m/sec. There are no baseline differences between groups. Raw GV scores improved for both groups at 30 weeks. Raw changes appear greater in the FES group for selected secondary outcomes.

Conclusions: To date, the randomization process is successful. Early data support a positive impact in FES and AFO groups. These preliminary data are unaudited and limited by an inadequate power (to date) to disprove null hypothesis and no formal statistical comparisons. Study design and these early finding will be discussed.

POSTER 382

ABSTRACT 166

SUPPORT IN EVERYDAY ACTIVITIES WITH SMART HOME TECHNOLOGY FOR PERSONS WITH COGNITIVE IMPAIRMENTS

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Background: Advances in new technology in recent years have opened new possibilities for persons with cognitive impairments. In previous studies we have found that a set of electronic memory aids in a training apartment in a hospital and in two prototype apartments could support persons with cognitive impairments to carry out everyday activities.

Aim: In this study we have examined the possibilities of a newly developed electronic memory aid with a wireless design and individually spoken reminders as support to carry out everyday activities.

Methods: This was a single-subject study with a multiple baseline AB design. Five persons with memory impairments received an electronic memory aid in their own home as support to remember to carry out self-selected activities. There were automatic computer registrations of completed activities during the intervention of 12 weeks. Assessments of functioning and quality of life were conducted before and after the intervention and at follow-up after 2 months.

Results: Four participants improved in completing most of the activities. Performance and satisfaction with performance and quality of life improved, memory was not improved. The participants perceived that the electronic memory aid was useful and they wanted to keep it after the intervention.

Conclusions: The results indicate that electronic memory aids may play an important role in facilitating everyday activities and improve quality of life for persons with cognitive impairments.

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ABSTRACT 184

THE MID-TERM ADVICE AND REPORT THERAPY (SMART CARD) PROJECT: A RANDOMISED CONTROL TRIAL AT THE SACRED HEART REHABILITATION SERVICE

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Background and Aims: Until now innovations have focused on physical aspects of stroke rehabilitation with less attention paid to psychological and emotional aspects. Better understanding by stroke survivors of their functional abilities during inpatient rehab could result in more accurate predictions for future capacity and reduce stress for caregivers, who assume their role suddenly and unexpectedly. This project aims to assess whether tailored and ongoing information and support can enhance outcomes while decreasing carer burden and strain. We will examine whether providing more concise and relevant discharge information and assistance in coordination of community services results in improved quality of life for survivors and caregivers, fewer health and social care costs, shorter hospital stays, fewer admissions to residential facilities and fewer re-admissions to hospital.

Method: Beginning in January 2012, 20 patients and families/carers undergoing stroke rehab at the Sacred Heart Rehabilitation Service (SHRS) will form the control and participate in family conferences. A set of questionnaires including the DASS, SF-36, the Stroke Knowledge Test, GAS scores and others measuring expectations of carer burden, pain and fatigue will be given to stroke survivors and caregivers on day three of rehab admission and then again just prior to discharge. At 12 weeks post-discharge patients and caregivers will receive separate phone calls from a single blinded assessor who will measure satisfaction with the rehab process and carer strain. 40 stroke survivors at SHRS will be randomised to Intervention Group R or S, and will participate in family conferences. Both intervention groups will receive an admission pack, including rehab information, schedules and tests, and will complete questionnaires as per the control group. Caregivers will receive a postcard five weeks post-discharge offering reassurance, followed by a phone call from the Social Worker at week six providing support and additional information. 12 weeks post-discharge telephone calls will be made as per control group. Intervention Group R will also be provided a Report Card half way through their admission, with details of balance assessments, muscle strength, dexterity, mood/anxiety, activities of daily living, continence, and medical progress.

Results: Data will be obtained on inpatient progress as above, as well as outpatient services used, hospital/residential facility admissions, GP visits, and overall outcomes. Progressive results will be available in May 2012 to disseminate at the WCNR.

Conclusions: Stroke survivors and caregivers have additional education and support needs beyond what is already provided in rehabilitation facilities across Australia, according to the 2010 AROC Audit and a SHRS literature review (unpublished). Addressing concerns pre-emptively and providing tailored feedback may reduce stress, improve knowledge retention, and allow better engagement in rehab and decision-making.

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ABSTRACT 197

CHARACTERISTICS OF PREMOTOR POTENTIAL DETECTED PRIOR TO THE SECOND LUMBRICAL COMPOUND MUSCLE ACTION POTENTIAL IN NERVE CONDUCTION STUDIES FOR CARPAL TUNNEL SYNDROME

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Background and Aims: In nerve conduction studies for carpal tunnel syndrome (CTS), a small potential prior to the second lumbrical compound muscle action potential (2L-CMAP) called the premotor potential (PMP), is sometimes detected and may complicate detection of the onset of the 2L-CMAP. The purpose of this study was to determine the characteristics of the PMP and to precisely detect the onset of 2L-CMAP.

Methods: We studied 60 hands of 30 healthy volunteers and 120 hands of 77 patients with CTS. After PMP was detected in motor conduction study mode (MCS; 2 mV/div), latency and amplitude were measured at a magnification of 100 μV/div. The sensory nerve action potential of the index finger (SNAP) was detected in sensory conduction study mode. The correlation of the latencies and the significance of differences in amplitude between PMP and SNAP were evaluated.

Results: PMPs were detected in all healthy hands, and in only 29% hands with CTS. The PMP was visible in MCS when the amplitude was higher than 60 μV. In healthy hands, the PMP latencies (1.5 ± 0.3 ms) were significantly correlated with the SNAP latencies (2.9 ms ± 0.3 ms). In hands with CTS, the PMP latencies (2.4 ± 0.5 ms) were also significantly correlated with the SNAP latencies (3.8 ms ± 0.1 ms). The PMP amplitude was significantly higher than the SNAP amplitude in both the healthy (98.3 ± 27.6/25.3 ± 10.5 μV) and CTS (52.9 ± 23.1/13.2 ± 6.8 μV) groups, respectively.

Conclusion: The PMP and SNAP latencies were significantly correlated in both the healthy and CTS groups. The PMP amplitudes were significantly higher than the SNAP amplitudes in both the healthy and CTS groups, suggesting phase cancellation of sensory nerve. Those findings are consistent with the hypothesis that the PMP is a "sensory nerve action potential." In the detection of 2L-CMAP, the presence of PMP should be considered.

POSTER 386

ABSTRACT 207

SOCIAL COGNITION AND THE AWARENESS OF SOCIAL INFERENCES TEST (TASIT), DUTCH TRANSLATION

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Background and Aims: Social cognition refers to those brain processes that enable us to recognize emotions, evaluate the mental state of others and react to social input. Acquired brain injury (ABI) can result into impairments in these functions, and consequently in daily life social behaviour. McDonald et al. (2003) developed The Awareness of Social Inference Test (TASIT), which measures aspects of social cognition in dynamic situations: recognition of emotion, distinction of sarcasm and sincere behaviour and distinction of sarcasm and lies. The present research aimed to investigate whether the Dutch version of TASIT is a valid measure for social cognition problems in an acquired brain injury (ABI) patient population.

Methods: A group of healthy controls and a group ABI patients were tested with the Dutch version of TASIT and results were compared to the recognition of static emotional faces with the Facial Expression of Emotions–Stimuli and Tests (FEEST).

Results: Substantial differences were found between performances of both groups on TASIT. Moreover, significant correlations were found between static (FEEST) and dynamic (TASIT) tests for perception of emotional expressions and social inferences.

Conclusions: We conclude that the Dutch version of TASIT is sensitive to the social cognitive problems of ABI patients, as they perform worse than healthy controls. Moreover, results demonstrate the concurrent validity of TASIT.

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ABSTRACT 217

SELF-PERCEIVED DISABILITY IN PERSONS WITH POST-POLIO SYNDROME FOLLOWING INTERDISCIPLINARY REHABILITATION

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Background and Aim: Rehabilitation programs for persons with post-polio syndrome (PPS) need to focus on areas that are perceived as a problem and promote access to a supportive environment to enhance the participants' participation. The aim of this study was to assess self-perceived disability before, after and at follow-up following a comprehensive interdisciplinary rehabilitation programme for persons with PPS.

Method: Sixty-six persons (mean age 64 years) with prior polio and clinically verified PPS participated in an outpatient interdisciplinary rehabilitation programme (average length 6 months). The focus of the programme was to reduce self-perceived disability by providing a variety of interventions and thereby maximize each individual's physical, mental and social potential. All individuals answered the Reintegration into Normal Living Index (RNL Index) at admission, after the programme and at follow-up (on average 6 months after rehabilitation). The RNL Index is an 11-item instrument that assesses self-perceived participation and autonomy, with a focus on reintegration into society.

Results: The average score of the RNL Index indicated that the 66 persons were moderately disabled. There were no significant differences after the programme and at follow-up compared with at admission for the whole group. However, there was a significant correlation between the scores of RNL Index at admission and the improvements ($r = –0.54$; $p < 0.001$) and the number of interventions needed ($r = –0.29$; $p < 0.05$), respectively, and a significant correlation ($r = –0.25$; $p < 0.05$) between the number of interventions needed and the improvement in RNL Index following the programme.

Conclusions: Persons with PPS who perceive pronounced disability at admission and the need for many interventions can experience significant improvements in their participation and autonomy following interdisciplinary rehabilitation.

POSTER 388

ABSTRACT 234

THE PREVALENCE AND AWARENESS OF FATIGUE IN A MULTI-ETHNIC ASIAN POPULATION OF DISABLED ADULTS

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Background: Fatigue is well described in patients with stroke, traumatic brain injury and spinal cord injury. Its prevalence in Asians and its awareness in this population are less well known.

Aim: We aim to describe the demographics of 100 consecutive multi-ethnic Asian patients attending a rehabilitation medicine outpatient clinic with the diagnosis of stroke, traumatic brain injury or spinal cord injury. We want to determine the prevalence of fatigue and the awareness of this issue in patients.

Method: 100 consecutive patients with the diagnosis of stroke, traumatic brain injury or spinal cord injury attending rehabilitation medicine outpatient clinic who consented and were able to complete the Brief Fatigue Inventory (BFI) were recruited. This questionnaire was administered at the end of the clinic visit. The medical records were reviewed and the following data collected: Diagnosis, time since onset of illness, current functional status, motor FIM, presence of sleep disorders or depression and if the patient had voluntarily complaint of fatigue, tiredness or similar complaints.

Results: The percentage of Chinese, Malay, Indian and Eurasian patients were 70%, 24%, 4% and 2% respectively. 67% of the patients were male. Mean age of the patient was 58.7 years. The mean BFI score of the Chinese, Malays, Indians and Eurasians were 3.38, 2.50, 2.39 and 5.61 respectively. The mean BFI score of the patients with the diagnosis of stroke, traumatic brain injury and spinal cord injury were 3.24, 1.91 and 3.06 respectively ($p > 0.05$). 41%, 37% and 10% of all patients had mild, moderate and severe fatigue respectively. Only 2% of patients had brought up the issue of fatigue during the clinic consultation. There was no correlation found between BFI score and anaemia, sleep disorders, depression, functional status or time since onset of illness.

Conclusion: Although fatigue is a common issue after stroke, traumatic brain injury and spinal cord injury in Asians, there is little awareness of it. The administration of questionnaires may assist the clinician in assessing fatigue. A structured intervention programme is needed as the prevalence of fatigue is high.

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ABSTRACT 235

EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION COMBINED WITH PATTERNED AFFERENT ELECTRICAL STIMULATION ON THE PLASTICITY OF SPINAL INTERNEURONS IN HEALTHY PERSONS

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Background and Aims: Motor cortex excitability could play a role in spinal plasticity. Recently, Fujiwara (2011) indicated that application of transcranial direct current stimulation (tDCS) before patterned electrical stimulation (PES) modulated the effects of PES on spinal reciprocal inhibition (RI) in a polarity specific manner. In this study, we applied tDCS and PES simultaneously in healthy persons and examined the effects on RI.

Methods: Nine healthy adults participated in this study. We applied electrical stimulation to the common peroneal nerve with a train of 10 pulses at 100 Hz every 1.5 s for 20 min using intensity equal to the motor threshold of the tibialis anterior. tDCS (1 mA) was simultaneously applied for the first 10 min of PES. One electrode was positioned over the lower limb motor cortex. The other electrode was placed on the contralateral supraorbital area. All subjects participated in three sessions: (1) PES alone; (2) anodal tDCS and PES; (3) cathodal tDCS and PES. We assessed RI using a soleus H-reflex conditioning-test paradigm. The magnitude of RI was measured before, immediately after, 10 min and 20 min after the stimulation.

Results: Simultaneous combination of anodal tDCS and PES increased the magnitude of RI until 20 min after. PES alone also increased the magnitude of RI until 10min after but this effect did not last 20 min after.

Conclusions: Combination of anodal tDCS with PES could increase the magnitude of RI. It is supposed that combination of tDCS and PES could be a useful tool for the rehabilitation program for gait disturbance and spasticity caused by central nervous system lesions.

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ABSTRACT 243

IREHAB: THE USE OF PDA'S AND IDEVICES IN COMMUNITY BASED REHABILITATION

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Background and Aims: The use of electronic assistive technologies in particular the use of personal digital assistants (PDAs) has increased significantly over the past decade. Idevices which include the Apple iPad and iPhone have been at the forefront of this technology revolution. As of July 2010 Apple Inc had sold 73.5 million iPhones worldwide since its release in 2007. As the communities' use of this technology expands it is important for rehabilitation clinicians to respond. The aim of this project is to increase clinicians understanding of how this technology works, how it is being used and how to best utilise it in a rehabilitation setting.

Methods: In 2010 the Caulfield Community Rehabilitation Service (CCR) purchased an iPad for use with clients. In 2011 a needs analysis was conducted with all Occupational Therapist's across the organisation which focused on developing an understanding of how iDevice technology is currently being utilised, and the barriers clinicians perceive as impacting on their use of this technology in rehabilitation.

Results: In addition to this needs analysis a project team comprising the authors and 3 Latrobe University Masters of OT practice students conducted a comprehensive literature review and in-depth exploration of the current iDevice applications available. As a result an extensive resource was developed for the service that provides clinicians with a summary of over 100 iDevice Apps. The resource categorises the Apps based on performance issues and provides clear guidelines on the therapeutic use of each App in a community based rehabilitation setting.

Conclusions: This paper will provide an outline of the project including the results of the needs analysis, review of the literature and process of choosing suitable Apps for inclusion in the resource. The paper will also provide examples of how the resource is currently being used in practice with community based rehabilitation clients.

POSTER 391

ABSTRACT 255

INFLUENCE OF NOISE STIMULATION ON GATB TASK PERFORMANCE: A PILOT STUDY

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Purposes: In patients with traumatic brain injury (TBI), not only impaired cognitive function but also affective and behavioral disorders sometimes become problems in returning to work. It is not rare that noise at the workplace enhances attention deficit and irritability and reduces task performance. With the scope of examining the influence of noise in patients with higher brain dysfunction, it was investigated how noise influenced task performance in healthy subjects.

Subjects and Methods: The subjects comprised 25 healthy individuals (16 males and 9 females; average age, 34.9 years [24-54]). Changes in General Aptitude Test Battery (GATB) scores were evaluated in quiet and noisy environments. Noise from construction sites was given at 80-90 dB measured with the S-62 ordinary sound level meter.

Results: The average score of all categories under noisy environments was 91.7 $\pm$ 11.38 points. Compared with the quiet environment, the score decreased in all categories. There was no significant difference in the rate of score reduction among the categories (ANOVA). The average of the three subcategories was 103.7 $\pm$ 16.3 points in the quiet and 93.5 $\pm$ 17.1 points in the noisy environment, and task performance decreased in the noisy environment ($P < 0.01$). However, there was a decrease by 10% or more in the average score in 16 of 25 cases (64%), which suggested a large individual difference in changes of task performance by noise stimulation in healthy subjects.

Discussion: Noise stimulation decreased GATB task performance in healthy subjects. Meanwhile, some cases showed no decrease in GATB task performance, which suggested that healthy subjects had the capacity to achieve the task by blocking noise stimulation. These results in healthy subjects would be useful as a reference to compare the change in GATB task performance by noise stimulation in patients with higher brain dysfunction.

POSTER 392

ABSTRACT 295

A STRATEGY TO IMPROVE PROSPECTIVE MEMORY PERFORMANCE: 'GOOGLE CALENDAR'

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Background and Aims: Traditional strategies include the use of diaries; however these strategies are passive in nature because the individual needs to remember to look at their diary. Strategies which have an active component e.g. an auditory alert reduce this need. The research will focus on the use of an active compensatory strategy called 'Google Calendar' to support individuals with a prospective memory deficit following acquired brain injury. 'Google Calendar' is based on an on-line calendar linked to receival of SMS; free of charge. The aim is to study the effectiveness of 'Google Calendar' for enhancing satisfaction and independence in daily activities.

Methods: The study involves the following steps: a short assessment session; an informal interview with the participant and their significant other; a period of training in how to use the 'Google Calendar' system; gathering a baseline of participants daily activities; employ 'Google Calendar' system; regular review of implementation of 'Google Calendar' system; follow up interviews and brief assessment with the participant and their significant other. The proposed design is a series of single case studies with a multiple baseline design. The dependent variable corresponds to the systematic measurement of engagement in target behaviours that have been identified by each participant. The independent variable corresponds to the use of 'Google Calendar', which will be implemented at different time points (after four data points have been gathered), across the target behaviours.

Results: Two of the three participants who have completed the study to date indicated increased independence and satisfaction in daily activities.

Conclusions: Participants employing 'Google Calendar' systematically are likely to participate in a greater percentage of activities independently and with a higher level of satisfaction in comparison with baseline. Additional compensatory strategies need to be considered to support initiation of action following receival of SMS for those with a severe brain injury.

POSTER 395

ABSTRACT 341

DAYTIME NAPPING BEHAVIOUR AND THE SYMPTOM EXPERIENCE IN PEOPLE WITH FIBROMYALGIA SYNDROME

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Background and Aims: Fibromyalgia syndrome (FMS) is characterised by chronic widespread pain, fatigue, sleep disturbance and cognitive difficulties. Previous qualitative research has revealed that people with FMS frequently engage in daytime napping and describe finding napping beneficial. However, the effects of napping remain unexplored within this population. This study aimed to explore the effects of daytime napping on sleep quality and symptoms in people with FMS.

Method: Participants aged over 18 years, with a diagnosis of FMS (N = 1548, 1423 females and 125 males) were asked to complete an online assessment of napping frequency and behaviour, in addition to measures of sleep (MOS Sleep outcomes scale), pain (McGill Pain Questionnaire) memory (Everyday Memory Questionnaire), fatigue (Fatigue severity scale) and mood (Hospital Anxiety and Depression Scale).

Results: Napping behaviour was reported by 84% of respondents, with 39% reporting regularly napping once a day or more. Napping frequency was positively associated with increased FMS symptoms. Short naps of 15 minutes or less appeared not to negatively affect sleep or fatigue, but individuals who reported taking short naps also experienced the least beneficial effects from napping on awakening, compared to those taking longer naps.

Conclusion: More frequent daytime napping is linked to more severe symptoms, although causality could not be determined in the present study. Implications for rehabilitation will be discussed.

POSTER 396

ABSTRACT 382

MEASURING HAND PERFORMANCE FOLLOWING BOTULINUM TOXIN-A INJECTIONS: A NOVEL COMPUTERISED APPROACH

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Background/Aims: Hand performance is negatively affected by acquired brain injury (ABI) due to the interplay of both positive and negative features of the upper motor neuron (UMN) syndrome. These features, commonly referred to as spasticity and muscle weakness, are difficult to measure objectively and sensitively using current clinical measures, for example, the Modified Ashworth Scale, the Tardieu Scale, or the Action Research Arm Test. This is a significant issue when attempting to measure change following interventions such as Botulinum Toxin-A (BTX-A) injections for upper limb spasticity.

Objectives: This presentation evaluates the sensitivity to change following upper limb BTX-A using Dynamic Computerised Hand Dynamometry (DCD), a method that simultaneously evaluates both positive and negative UMN features.

Methods: 27 adults with UMN syndrome were assessed pre and post BTX-A injections using DCD. Paired t-tests were used to calculated the statistical significant of change from pre to post-intervention. The associated treatment effect sizes were calculated using Cohen's *d*. Minimum Clinically Important Difference (MCID) was calculated for elements of hand performance measured by DCD: Isometric Force, Grip work and task duration.

Results: Performance changes following BTX-A injections included improved finger flexor relaxation ($p < .01$), corresponding to a moderate sized treatment effect (Cohen's $d = 0.64$) and a MCID of 0.5 kg. The improved relaxation time improved by a mean of 0.2 seconds ($p = .014$; Cohen's $d = 0.38$; MCID = 0.02 seconds). In addition to improved relaxation ability and reduced time, participants demonstrated a large increase in voluntary effort towards grasp and release task ($p = 0.01$; $d = 0.69$; MCID = 4%). Approximately two thirds of participants exceeded each of the MCID levels.

Conclusions: DCD was sensitive to change in grasp and release following BTX-A injections in adults with UMN syndrome. Using this method of assessment, minimum clinically important differences were identified on various aspects of motor performance such as force generation, speed, and voluntary effort. This sensitivity may enable researchers and clinicians to better identify so-called "golden responders", those who benefit the greatest from BTX-A injections.

POSTER 397

ABSTRACT 390

REHABILITATION OF AFRICAN TRYPANOSOMIASIS MENINGOENCEPHALITIS

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Background and Aims: Human African trypanosomiasis (HAT) or sleeping sickness is caused by the protozoan parasites Trypanosoma brucei (T.b.) gambiense (West African form) and T.b. rhodesiense (East African form) that are transmitted by the bite of the tsetse fly. One case of West African HAT which has caused meningoencephalistis has been managed in the Medical Rehabilitation Unit at St Joseph's Hospital Sydney Australia. The acute medical management of this case has already been presented. A literature search revealed no reports of the rehabilitation outcomes of West African HAT. As such a brief outline of the outcomes of both in and out patient rehabilitation including neuropsychological testing are presented here.

Methods: This patient was a 25 year old Sudanese female refugee who had been in Australia for 2 years. She presented with a 2 month history of headaches and weight loss. Her investigations at that stage were consistent with TB meningitis for which she was treated and improved. She represented a month later with generalised neurological deterioration. West African HAT was diagnosed and she was treated accordingly. When medically stable she was transferred to an interdisciplinary inpatient rehabilitation unit with ongoing confusion, somnolence, expressive dysphasia, right sided weakness and intention tremor.

Results: On admission to inpatient rehabilitation she was: able to be roused but was not oriented, very slow to respond and needed prompting for even basic self care. After extensive in and out patient rehabilitation over about a 1 year period, further detailed below, she had returned to independent living and formal studies.

Conclusion: In this one case of West African HAT extensive interdisciplinary rehabilitation was associated with a good functional outcome.

POSTER 398

ABSTRACT 406

THE EFFECT OF KINESTHETIC ILLUSION INDUCED BY A MOVIE ON THE CHANGE OF MUSCULAR OUTPUT FUNCTION AFTER SHORT-TERM IMMOBILIZATION

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Background and Aims: Studies have reported that neural factors affect the decline of muscle output function after immobilization. We consider that activation of the motor cortex region without muscle contraction could prevent the decline of muscle output function during short-term immobilization. A study has documented that kinesthetic illusion induced by a movie (illusion) facilitates the corticomotor pathways. Therefore, we examined the effects of this illusion on the change in muscle output function after short-term immobilization.

Methods: Subjects were 30 healthy males. They were divided into 3 groups: the immobilization group, the illusion group, and the control group. During immobilization and illusion, subjects were immobilized for 12 hours. In the illusion group, illusion was induced by displaying a movie for 10 minutes every 3 hours. A monitor showing an index finger motion (abduction and adduction) was placed on the subject's distal forearm. All subjects performed MVC with isometric abduction of the index finger and force modulation. Standard deviation of force trajectory was calculated as an index of fluctuation of the force. Twitch force at rest was also measured. These measurements were obtained before and after the experiment. We performed a two-way (time × group) ANOVA with repeated measures.

Results: The repeated measures ANOVA for MVC revealed interaction. The simple main effect showed that the immobilization group significantly decreased after the experiment. Both fluctuation of force and twitch force showed main effects for time, and there was no interaction.

Conclusions: The results of present study indicated that illusion could maintain the MVC after 12 hours immobilization. In contrast, fluctuation of force during force modulation increased after 12 hours immobilization, even if the illusion was used.

POSTER 399

ABSTRACT 407

DEFICITS IN SENSORY ORGANIZATION FOR POSTURAL CONTROL IN CHILDREN WITH TOURETTE SYNDROME: A PRELIMININARY STUDY

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Background and Aims: Tourette syndrome (TS) is a childhood-onset developmental disorder characterized by involuntary motor and vocal tics. Previous studies indicated that children with TS demonstrated postural control anomalies in standing. Lemay et al. proposed that their postural control anomalies might either due to impaired access to sensory information or having difficulties in sensorimotor integration. The aim of this study was to compare postural stability under normal and altered sensory conditions in children with TS and healthy control (HC) children.

Methods: A convenience sample of seven children with TS (5 boys and 2 girls; 9.6 ± 1.5 yr) and 7 HC age-gender matched children (9.2 ± 1.3 yr) was participated in this study. The Sensory Organization Test (SOT) was used to assess postural stability under six altered sensory conditions (1. normal vision, fixed support; 2. eyes closed, fixed support; 3. vision sway-referenced, fixed support; 4. normal vision, support sway-referenced; 5. eyes closed, support surface sway-referenced; 6. vision and support surface both sway-referenced) by using the SMART Balance Master 8.2 (NeuroCom International, Inc, Clackamas, OR, USA).

Results: Significantly differences between two groups were noted in condition 1, 2, 5 and 6 ($p = 0.007$, 0.002, 0.000, and 0.007 respectively). The composite score in children with TS were significantly lower than the HC children ($p = 0.002$).

Conclusions: Despite the small sample size, the results suggested that children with TS had greater difficulty in maintaining postural stability, especially when inaccurate somatosensory and/or vestibular feedbacks were given. The results of this study may provide the evidence to support the possible deficits in sensorimotor integration of postural control in children with TS.

POSTER 400

ABSTRACT 416

REHABILITATION MANAGEMENT OF LYME NEUROBORRELIOSIS: A CASE REPORT

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Background: Lyme disease is a multisystem infectious disease caused by Borrelia Burgdoferi (a flagellated spirochete). The disease is transmitted from small mammals to humans via bites from infected ticks. Clinical manifestations are variable. Late stage neuroborreliosis may result in diverse neurological impairments including radiculoneuritis, peripheral neuropathy, encephalomyelitis, and ataxia. The disease has a relatively high prevalence in the North America and Europe, but is rare in Australia. The purpose of this paper is to provide an overview of the diagnostic dilemma and rehabilitation management of neuroborreliosis in non-endemic areas.

Method: Case report

Results: A 42-year-old Sydney man presented in February 2010 with generalised weakness and gait disorder. Initial investigations (including brain and spine magnetic resonance imaging) were unremarkable, and he was thought to be suffering from motor neuron disease. Deterioration of his symptoms occurred including development of worsening limb weakness, tremor, spasticity, and falls. The diagnosis of Lyme disease was suspected on review of his history of hiking in the USA in October 2009. The disease was confirmed with serology testing, and he has been treated with an extended course of intravenous Ceftriaxone. Rehabilitation interventions have included strengthening exercises, gait retraining, spasticity management, environmental adjustment, adaptive equipment, falls prevention and psychological support. Improvements have been achieved in Functional Independence Measure, gait parameters, spasticity, and number of falls.

Conclusion: Late stage neuroborreliosis is rare in Australia, but should be considered in returned travellers with neurological syndromes. Rehabilitation management plays an important role in functional recovery.

POSTER 401

ABSTRACT 443

THE EFFECTS OF SWALLOWING MANEUVERS ON THE SWALLOWING DYNAMICS ANALYZED BY COMPUTED TOMOGRAPHY

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Background and Aims: The new evaluation method of swallowing, 320-row area detector computed tomography (320-ADCT) provides three-dimensional observation and an accurate quantitative kinematic and morphological basis for the evaluation of swallowing. The purpose of this study was to use this methodology to assess two different swallow maneuvers, super-supraglottic swallow and Mendelsohn maneuver, on the temporal aspects of swallowing.

Methods: The subject was an experienced SLP who is proficient to swallow maneuvers. She received a 320-ADCT scan while swallowing 4-mls of nectar thick liquid barium in 45-degree reclining position on a Toshiba Aquilion ONE scanner. The scanning included a swallow without using any maneuvers (control), followed by one with the super-supraglottic swallow (SSGS) and one with the Mendelsohn maneuvers (MM). The scanning range was 160mm from the skull base to the upper esophagus, with scan parameters of 0.5-mm slice thickness, 320 rows, 0.35 sec/rotation, 120kV and 40 mA. 3D images were created in 29 phases at an interval of 0.10 seconds (frame rate 10fps) over 2.90-seconds. The onset, termination, and duration of movements of hyoid bone, soft palate, epiglottis, laryngeal vestibule (LV), true vocal cords (TVC), and upper esophageal sphincter (UES) were measured.

Results: In the SSGS, relative to the control, the onset of closing of TVC and LV were earlier and the duration of closing of velopharyngeal, LV, and TVC were longer. In the MM, the duration of velopharyneal closure, LV closure, TVC closure, and hyoid antero-superior elevation were longer. Onset, termination, and duration of UES opening did not show any variation among swallows.

Conclusions: By using 320-ADCT, motion of all the structures during swallowing could be analyzed visually, simultaneously, and quantitatively. These results provided not only evidence supporting the finding of previous studies, but also demonstrated excellent potential for elucidating the effect of swallowing maneuvers in a clinical setting.

POSTER 402

ABSTRACT 456

ARM HAND SKILL TRAINING PREFERENCES IN CENTRAL NEUROLOGICAL PATHOLOGIES

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Background/Aim: Client-centred care is an important feature of rehabilitation nowadays and there is evidence that it is beneficial to incorporate client-centred components in technology assisted training. Although a multitude of upper extremity rehabilitation technologies have emerged in the last decade, implementation of such technologies seems to be difficult. Firstly, because technologies so far are mostly developed targeting a specific pathology and secondly because most technologies offer training on the ICF function level, resulting in poor transfer of training effects to activities of daily life. To allow for technology-supported cross-pathology training to be client-centered, an overview of skill training preferences of different patient groups is necessary. The present study aims to asses the skill training preferences across patients with different neurological pathologies.

Methods: Cross-sectional survey study in which the Canadian Occupational Performance Measure (COPM) was used to identify patients' rehabilitation goals regarding upper extremity functioning. Each activity was recoded towards the ICF classification. Skill preference scores were calculated based on frequency and importance of the activity.

Results: 74 patients (24 stroke, 27 MS and 23 Spinal cord injured patients (SCI)) participated. In stroke and MS 4 of the 5 most preferred activities were in the domain of self-care. Eating and dressing were the 2 most preferred activities in both patient groups. Preliminary results in persons with SCI show that the most preferred skills were in different ICF domains in which dressing (ICF domain self-care) and preparing meals (ICF domain household) were most often preferred.

Conclusion: Preliminary results indicate that some, but not all, activities in the top 5 list of most preferred arm hand skill training preferences across different patient groups are similar. These activities may be useful to take into account while developing rehabilitation technologies for patients with different pathologies in order to improve implementation in the rehabilitation setting.

POSTER 403

ABSTRACT 468

EFFECT OF OBSERVING ERROR MODEL ON IMITATION MOTOR LEARNING

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Background and Aim: The effect of action imitation has been confirmed in previous studies on stroke rehabilitation. Nonetheless, the observed action in previous studies almost used correct one only. However, an error model may include some useful information so that individuals can apply it to improve their performance. The purpose of present study is to examine the effect of observing error model on imitation motor learning.

Methods: Seventeen health young adults (34 hands) participated in our experiment (age: 26.8 $\pm$ 5.6, female 9). We divided the 34 hands into two

groups randomly which were control group and error observed group. Subjects were asked to do the pre-instructed force pinching task, which is at 8 newton, when they watched the action of pinching. In control group, the observed pinching actions were on the target force of 8 newton. In error observed group, half of total times observed pinching action was changed into two types pinching action, which were the force at 4 newton and 24 newton. We assessed the difference between the execution force and the target force before and after the intervention block. And then normalized the difference of after intervention block in a percentage value using that of the before one. Thus, the percentage value presents the effect of imitation motor learning, which means that the smaller value expresses a better effect.

Results: The percentage value in error group (62.98% ± 38.23%) was significantly smaller than that of control group (90.45% ± 30.41%) (Paired-*t* test, $p < 0.05$). However, there were no significant difference of execution force among each observed pinching action ($p > 0.05$).

Conclusions: Our results indicated that observing models mixed with some error models could provide useful information that improved the effect of imitation motor learning. It also suggested that in clinical rehabilitation, observing some failure action may make further efforts on imitation motor learning.

POSTER 404

ABSTRACT 476

SENSORY PROCESSING IN CHILDREN WITH TOURETTE SYNDROME

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Background and Aims: Tourette syndrome (TS) is a developmental disorder characterized by involuntary and repeated motor and phonic tics. Leckman et al. reported that some atypical sensation showed before tics appearance called premonitory urge. Sensory processing problems in children with TS were not a well-studied area. Cheung et al. reported that children with disabilities, including children with attention-deficit hyperactivity disorder, exhibited significantly more sensory processing issues than children without disabilities. The aim of this study was to explore the sensory processing ability of children with TS.

Methods: A convenience sample consisted of 169 children with TS (145 boys, 24 girls; mean age 100.78 ± 18 months). The sensory processing abilities were reported by their primary caregivers by using the Sensory Profile- Chinese Version (SP-C). In addition, their medical records, the Disruptive Behavior Rating Scale and the Yale Global Tic Severity Scale were reviewed.

Results: Sensory processing difficulties affected some, but not all, children with TS, and they ranged from 7.1% to 15.4% among the 14 sections, as well as from 5.1% to 20.1% among the 9 factors. Children with more severe disruptive behavior reported a greater deficits on auditory processing, visual processing, vestibular processing, touch processing, multisensory processing, oral sensory processing, modulation related to body position and movement, modulation of movement affecting activity level, modulation of visual input affecting emotional responses and activity level, emotional/ social responses, and behavioral outcomes of sensory processing among sections ($p < 0.05$).

Conclusions: The results of this study indicated that the sensory processing difficulties were noted in some children with TS. There are potentially factors, such as disruptive behavior, that increase the risk of co-occurring problems of sensory processing difficulties in children with TS. Future study is warrant.

POSTER 405

ABSTRACT 479

FACILITATION OF CORTICOSPINAL EXCITABILITY OF VIRTUAL REALITY EXERCISE FOLLOWING ANODAL TDCS

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Objectives: As a preliminary study, we tested whether increased corticospinal excitability would be sustained after virtual reality (VR) wrist exercise following tDCS in healthy volunteer.

Methods: The participants consisted of 15 right handed healthy subjects. Transcranial Magnetic Stimulation (TMS) was applied at the nondominant (Rt) motor cortex and motor evoked potentials (MEPs) in the Lt extensor carpi radialis were provided as a measure of corticospinal excitability. Four different conditions were provided in random order on the separate day : 1) voluntary wrist exercise program (15min) 2) VR wrist exercise program (15min), 3)VR wrist exercise program (15min) following anodal tDCS (2 mA, 20 min), and 4) anodal tDCS without exercise. Mean MEP amplitudes were obtained in rest, immediate after tDCS, during exercise, immediate after exercise, 10min after exercise and 20min after exercise. Task speed and distance were recorded during exercise.

Results: There were immediate and sustained increase of percentage MEP (% amplitude at rest)amplitude in four conditions. However, the increment of MEP amplitude after tDCS-VR exercise was greater than other three conditions (1: 130 ± 12%; 2: 138 ± 22%; 3: 151 ± 12%; 4: 130 ± 12%, $p < 0.001$). Furthermore, increment of amplitude of VR wrist exercise following anodal tDCS was sustained for 20 min after exercise compared to anodal tDCS without exercise condition (interaction effect: $p = 0.001$). There's no significant differences of task speed and distance between three exercise conditions.

Conclusion: The corticospinal facilitation effects of anodal tDCS and VR exercise was greater than exercise without tDCS and tDCS without exercise. Furthermore, these synergistic facilitations were sustained after exercise compared to anodal tDCS without exercise. The facilitation effects of VR motor training after tDCS, indicates that a motor learning and retraining program can co-exist with tDCS-induced changes in corticospinal excitability, and supports the concept of combining brain stimulation with VR motor training to promote recovery after stroke.

POSTER 406

ABSTRACT 480

THETA BURST STIMULATION (TBS) AND FUNCTIONAL ELECTRICAL STIMULATION (FES) IN POST-STROKE MOTOR REHABILITATION: A RANDOMISED CONTROL TRIAL

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Background: Conventional physiotherapy (PT), presently the mainstay for the stroke rehabilitation has limited efficacy in improving the functional outcome. Preliminary studies on repetitive Transcranial Magnetic Stimulation (rTMS) and Functional Electrical Stimulation (FES) have been shown to improve the neuronal plasticity and motor control.

Aims: To explore the efficacy of PT, FES with PT and TBS with PT in improving the upper limb motor functions of patients with acute stroke.

Methods: 27 consecutive patients with first time acute ischemic stroke in anterior circulation and who had a first dorsal interosseus power of 3 or less were block randomised into three groups (19 ± 8days after stroke). The Group A (TBS): PT and TBS for 4weeks, Group B (FES): PT and FES for the affected upper limb for 4 weeks and Group C: PT alone. Patients were assessed at baseline and after 6 months with National institute for health stroke scale (NIHSS), modified Rankin scale (mRS), Fugl-Meyer assessment of physical performance (FMA), Barthel index, Resting Motor Threshold (RMT) and Cortical Silent Period (CSP).

Results: As compared to conventional physiotherapy alone, adjuvant TBS and FES showed trend of improvement in the clinical assessment scales over the six months follow up ($p < 0.01$). RMT reduced by 10% in TBS group and 13% in FES group as compared to 5% in conventional physiotherapy at end of 6 months. FMA scores in all the three groups showed significant difference before and after intervention, mean difference in TBS group is 45.55 ($p \leq 0.001$) , FES group the mean difference is 43.77 ($p \leq 0.001$) in physiotherapy group the mean difference is 25.11 ($p \leq 0.001$), repeated measure ANOVA was done to substantiate the above results in which was ($p \leq 0.001$)

Conclusion: Adjuvant functional stimulation (TMS and FES) may be useful adjuvant for post-stroke motor rehabilitation.

POSTER 407

ABSTRACT 485

PERFORMANCE MEASURES AS PREDICTORS OF FRAILTY IN OLDER PEOPLE

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Background and Aims: Frailty is a common geriatric condition that is multisystem deterioration and loss of physiological reserve. The traditional physical phenotype of frailty comprises 5 key findings: weakness, sarcopaenia, weight loss, lower activity and slowness. However, the physical performance frail factor is unclear. The aims of this study was to determine what kind of physical performance measures could early detect who elderly people will be became frailty in future 18 mouths.

Methods: In Taiwan outpatient clinic, subjects aged ≥65 years were enrolled in a prospective observational study between September 2007 to October 2008. Fried's phenotype was used to characterize the elderly1. Non-frail or pre-frail elderly were included and frail elderly were excluded. Physical performance, including grip strength, chair rise up test (3 times/10s and 1 time/2s), walking speed, time up and go test, were assessed at baseline and 18 mouths follow up. Data were analyzed using forward stepwise binary logistic regression model that performance measure as independent variables and frailty status (frail or non-frail/pre-frail) as dependent variable.

Results: After 18 mouths follow up, 126 aged 65 and older peoples were analyzed in this study. In the presence of all, 92(73%) participants maintained their status (no change) and 34 (27%) participants change their status that from non-frail/pre-frail to frail or non-frail to pre-frail. In logistic regression model, grip strength (B = 1.403, OR = 4.067, 95%CI = 1.746-14.920, p = 0.001) and chair rise up test (3 times/10s) (B = 1.226, OR = 3.409, 95%CI = 1.088-10.676, p = 0.035) are significance predictor.

Conclusions: We developed a prediction model using physical performance measurements. Among these measurements, grip strength and chair rise up test (3 times/10s) are of considerable clinical importance in the context of an aging population and an increasing awareness of the far-reaching consequences of frailty. These are available for early detect high risk people frail.

POSTER 408

ABSTRACT 521

ON REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (RTMS) AND DIVIDED ATTENTION IN HEALTHY SUBJECTS

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Background and Aims: Repetitive transcranial magnetic stimulation (rTMS) is now established as a useful non-invasive tool in neuroscience. The effect of rTMS in treatment of depression has been investigated extensively with stimulation of the left dorsolateral prefrontal cortex (DLPFC). Several studies have demonstrated a close connection between divided attention and the activity of DLFPC. This study was designed to determine whether 5 or 20 Hz rTMS over the DLPFC have an effect on divided attention in healthy subjects.

Method: Twenty voluntary subjects (17 female; 3 male; mean age 57 (50-64) years with no history of neurological or psychiatric diseases were recruited for the study. Five Hz or 20 Hz rTMS-stimulation were administered in a randomized way at DLPFC to all subjects during two separate days. The test "Divided attention" from the computer-based test battery "Test for attentional performance" (TAP) was used for measuring the effects of rTMS stimulation. The divided attention test was administered four times in a series of four test blocks. Sham or active rTMS-stimulation was given during two of the test blocks.

Results: No statistically significant group differences were found for any of the variables "auditive and visual reaction times," "omissions" or "erratic." At the 5 Hz stimulation, a higher number of omissions were indicated for the sham stimulation, however the differences between the groups were not significant after correction. A second analysis was made according to the order of the administration of the TMS-stimulation. In these analyses no statistically significant group differences were found for any of the variables.

Conclusions: This study could not detect any statistical significant effects on divided attention after rTMS (5 Hz- and 20 Hz-stimulation) given over the cortical area frequently used clinically in antidepressive treatment (DLPFC) as compared to sham stimulation, neither facilitating nor inhibiting.

POSTER 409

ABSTRACT 533

OBSERVATIONAL ASSESSMENTS AND MATERNAL REPORTS OF MASTERY MOTIVATION IN TODDLERS WITH MOTOR DELAY

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Background and Aims: Mastery motivation (MM) is a better precursor of later cognitive function than standardized children's developmental quotients for toddlers with developmental delays. Many previous studies showed children with cognitive impairiment were invariably deficit in MM. However, there are few evidences for toddlers with motor delays (MD). The aim of this study was to examine differences in instrumental MM and expressive MM between toddlers with MD and developing typically (DT) of same mental age.

Methods: 24 children with MD aged 24-47 months and 24 children DT aged 15- 29 months were recruited for a matched case-control study. Instrumental MM and Expressive MM were measured by the observational assessments of structured tasks and maternal report of the Dimensional Mastery Questionnaires (DMQ) within a day. The DMQ was rated by the mother based on her perception of the child's MM. Two types of structured tasks (Puzzles, Cause-Effect toys) with moderately challenging level were conducted by a tester in a laboratory setting and recorded by videos. Paired t tests were used to examine the differences in instrumental MM between two matched groups, and Wilcoxon signed rank tests were used for differences of expressive MM ($\alpha = 0.05$; two-tailed).

Results: Children with MD were rated lower instrumental MM on DMQ than the DT group ($p < 0.001$), but not significantly lower on 2 types of structured tasks ($p = 0.75$, 0.43 respectively). There were no significant differences in expressive MM between the two groups on either measure ($p = 0.05$, 0.81, 0.61 respectively).

Conclusions: Children with MD might not really be impaired in MM compared with mental age matched DT group. To provide tasks with appropriate difficulty level during intervention is important for MM enhancement.

POSTER 410

ABSTRACT 564

ETHICAL DYSPHAGIA MANAGEMENT: TREATING THE UNTREATABLE

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Background and Aims: Eating and drinking difficulties following acquired brain injury are common. Risk of aspiration is often cited as a reason for keeping patients nil-by-mouth for extended periods, although this may be at odds with patient and family wishes. Current trends in dysphagia research look at what 'risk of aspiration' actually means, and challenges those treating dysphagia to take a more aggressive approach to overall management. This paper aims to examine 3 subjects who made decisions to resume eating and drinking despite medical advice.

Methods: Three male subjects with severe oro-pharyngeal dysphagia and confirmed aspiration on all consistencies following acquired brain injury underwent an intensive swallowing therapy programme. Subjects were 1-2 years post injury and all indicated desire to take food/fluids in spite of the risks. All 3 subjects had been informed that it was 'unlikely their swallow would recover', by external assessors. Subjects underwent capacity assessment and resumed oral intake within a treatment programme with full understanding of the risks involved.

Results: 2/3 subjects resumed full oral intake following a 3 month period of swallow therapy and had their feeding tubes removed, with no medical complications as a result of aspiration. 1 patient withdrew from the treatment programme due to ongoing health issues associated with swallowing.

Conclusions: Patients with severe dysphagia can make significant gains with intensive therapy and resume full oral diet. Patients have the right to make decisions that may be in conflict with professional opinion, and the consequences of these decisions may result in a positive outcome.

POSTER 411

ABSTRACT 567

COGNITIVE FUNCTION IN PATIENTS WITH BURNOUT

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Background and Aims: The experience of cognitive dysfunction is a central complain among patients suffering from burnout following high levels of stress, but there is an uncertainty whether these impairments can be established in objective tests. The present study investigates if tests of selective attention and sustained attention are affected in patients with burnout.

Methods: 25 persons (mean 43,6 years [SD 9,4]; 18 females and 7 males) suffering from burnout were consecutively recruited from the Institute for Stress Medicine in Gothenburg and their results in neuropsychological tests and in questionnaires were compared with a normative sample. *Questionnaires of cognitive dysfunction and fatigue:* Prospective and Retrospective Memory Questionnaire (PRMQ) and The Cognitive Failure Questionnaire (CFQ). *Test of selective and sustained attention:* Conners' Continuous Performance Test II (CPT-II). The following variables were conducted: 1) reaction time, 2) number of errors, and 3) number of omissions. Further tests of working memory, prospective memory, executive attention are also included but not yet analysed.

Results: Compared to the normative sample the group with burnout had approximately 1,3 SD faster reaction times but had a tendency toward an increased number of incorrect responses—36% had results <1 SD of the average of the normative sample. Furthermore, a negative correlation was observed between the reaction times and the number of incorrect responses. That is, fast reactions (decreasing reaction time) were correlated with increased number of errors.

Conclusions: Stress is likely to affect areas of the brain that are important for executive control and may result in more automated cognitive processes. Such a change in combination with a more performance-oriented response style among people with burnout, may explain the relationship between fast reactions and increased number of errors in the present study.

POSTER 412

ABSTRACT 592

EFFECTIVENESS OF GRADED MOTOR IMAGERY AND MIRROR THERAPY IN PATIENTS WITH UNILATERAL UPPER EXTREMITY COMPLEX REGIONAL PAIN SYNDROME TYPE-1: A PILOT QUASI-EXPERIMENTAL STUDY

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Background and Aims: Complex regional pain syndrome (CRPS) type-1 or reflex sympathetic dystrophy is a chronic disabling painful condition occurring secondary to trauma that presents commonly in chronic pain clinics. Central sensitization was identified as a predominant pain mechanism in CRPS-1. The aim of this study was to evaluate the effectiveness of graded motor imagery (GMI) and mirror therapy (MT) in physical therapy management of patients with unilateral upper extremity CRPS-1.

Methods: Pilot quasi-experimental study of sixteen consecutive patients (9 female; 7 male) with age 48.16 (6.4) years, all right-handed, with affected side (14 left, 2 right) upper extremity, medically diagnosed with CRPS-1 and fulfilled the International Association for the Study of Pain diagnostic criteria were treated with GMI and MT treatments for two weeks. Home programme of self-treatment was prescribed and patient log was given to ensure compliance. The outcome measures included pain on 0-10 cm visual analogue scale (VAS), Radboud skills questionnaire (RSQ), Patient satisfaction with therapy questionnaire (PSTQ) and patient- and clinician-rated global clinical impression scales (GCIS) for pain, grade of hand tenderness, emotion, function, activity limitation and participation restrictions according to the International classification of functioning, disability and health (ICFDH) were taken at four levels: pre-treatment (t1); post-treatment (1-week), t2; post-treatment (2-weeks), t3; and follow-up (3-months), t4.

Results: Pair-wise comparisons using one-way ANOVA in SPSS version 11.5 showed statistically significant changes ($p < .05$) in all the measures at t3 and t4 compared to t2/t1 and t3/t2/t1 respectively. The clinical improvements correlated well with GCIS measures ($r = .68$) suggesting clinically meaningful improvement in the outcomes.

Conclusion: Physical therapy treatment techniques comprising of GMI and MT were effective to relieve pain, improve function and patient satisfaction in patients with CRPS-1 when treated along a mechanism-based approach to chronic pain. Future controlled clinical trials are necessary to extrapolate the study findings.

POSTER 413

ABSTRACT 602

SHORT TERM REHABILITATION OUTCOMES OF PATIENTS WITH RASMUSSEN ENCEPHALITIS AFTER HEMISPHEROTOMY

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Background and Aims: Rasmussen's encephalitis (chronic progressive epilepsia partialis continua) is a rare childhood disorder characterized by unilateral brain dysfunction, refractory focal seizures, progressive motor and cognitive impairment. Seizures usually fail to respond to antiepileptic drugs; and immunosuppressives are alternative medications. In severely refractory patients, surgical intervention can be performed. We described rehabilitation outcomes of two patients with Rasmussen encephalitis after hemispherotomy.

Methods: Case 1: An 11-year-old boy had a history of clonic activity restricted to right side of the body which started as right eyelid twitching seizures 2 years ago. Seizures were not controlled by antiepileptic drugs and deterioration with increasing frequency of seizures were noted. Case 2: A 22-year-old woman had right sided clonic seizures for 6 years that was oral-buccal twitching in nature initially. Seizures were refractory to various antiepileptic drugs and intravenous immunoglobulin. Clinical and imaging findings supported the diagnosis of Rasmussen encephalitis. Left hemispheretomy, amygdalohippocampectomy and collosotomy were performed. Postsurgical rehabilitation consisted of electrical stimulation, motor and visual imagery, computerized balance training and cognitive rehabilitation in addition to conventional rehabilitation techniques.

Results: There were no seizures during follow up. Physical examination and other evaluation results of two cases before and after a 2-month rehabilitation program are shown in the Table.

Table

	Case 1		Case 2	
	Pre-rehab	Post-rehab	Pre-rehab	Post-rehab
Functional indepence measure				
- Motor	32	59	48	63
- Cognitive	10	20	27	28
- Total	42	79	75	91
Minimental state examination	15	25	15	22
Gulhane Aphasia Test				
- Auditory comprehension	90	100	90	100
- Reading comprehension	40	66	26	33
- Repetition	52	79	15	68
- Naming	10	54	0	38

Conclusions: Patients with Rasmussen encephalitis which is a subject of serious management challenge achieved improvements in cognitive and functional impairments after a comprehensive rehabilitation, even in short term.

POSTER 414

ABSTRACT 605

HYBRID ASSISTIVE NEUROMUSCULAR DYNAMIC STIMULATION (HANDS) THERAPY IMPROVED UPPER EXTREMITY MOTOR FUNCTION AND MODULATED THE INTRACORTICAL INHIBITION AND SPINAL RECIPROCAL INHIBITION

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Background and Aim: HANDS therapy was developed as a new therapeutic approach to facilitate the use of the affected upper extremity in daily living by combining closed loop EMG controlled neuromuscular electrical stimulation (IVES) with a wrist splint for patients with moderate to severe hemiparesis (Fujiwara et al, NNR 2009). We applied HANDS therapy to patients with moderate and severe hemiparesis and study the functional recovery and physiological changes, induced with HANDS therapy.

Methods: Participants were 100 patients with chronic hemiparetic stroke (their mean time from onset was 20 months). Participants used IVES combined with wrist splint for 8 hours a day for 3 weeks. We assessed Fugl-Meyer upper extremity motor score (FM), modified Ashworth scale (MAS) and Motor activity log-14 (MAL14) at baseline, post HANDS therapy and 3 month after the end of HANDS therapy (3 months follow-up). We assessed short intracortical inhibition (SICI) with transcranial magnetic stimulation (TMS) and spinal reciprocal inhibition (RI) with conditioned –test H reflex paradigm.

Results: HANDS therapy improved FM score and MAL-14, and decreased MAS significantly. Three month follow-up assessment showed that these improvements were maintained for 3 month. HANDS therapy induced disinhibition of affected hemisphere SICI and modulation of RI in the paretic forearm.

Conclusions: The effectiveness of HANDS therapy was confirmed with both clinical and electrophysiological study. HANDS therapy induced functional recovery of paretic upper extremity motor function with cortical and spinal plastic changes.

POSTER 416

ABSTRACT 637

WHY MAY ELECTRICALLY-INDUCED MUSCLE CONTRACTIONS FACILITATE CHRONIC PARAPLEGICS SUBJECTS TO MEET THE BODY DEMAND WHEN WALKING AT A CONSTANT SPEED DURING A PROLONGED GAIT CONDITION?

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Background and Aims: The purpose of this study was to determine why complete spinal cord injury (SCI) patients through electrically-induce [EI] walking had a better reflex response to regulate for the body needs to meet the body demand (heart, lung, metabolic and physiological) when stress at a constant gait effort for a prolong period of time. We hypothesize that prolong walking need an efficient muscle pump activity to facilitate for blood return as such EI muscle contraction may facilitate better responses to counteract for the gait effort and the lack of afferent control.

Methods: Design: SCI gait-trained individuals sample-comparison. Setting: Neurorehabilitation-Research center. Participants: Two groups of SCI subjects and AB; 10 (5+5) paraplegics and 5 control able-bodied (AB). Intervention: Three trials at 45 minutes walking on a treadmill at the preferred maximum speed in m/min at zero degrees of inclination between EI and mechanically-induce[MI]) SCI walkers and AB walkers. Main outcome measures: HR, age-predicted maximum HR, RER, VE, RR, VO2 mL/Kg, VO2 mL/min, O2-pulse, BP (blood pressure). EKG before and after the testing condition.

Results: Significant ($p < 0.01$), ($p < 0.05$) differences were noted for VE, RR, VO2 mL/Kg, VO2 mL/min, O2-pulse analysed between the groups; higher for the EI group. Steady-state (S-S) for most variables analysed begin after 5 minutes and lasted for no more than 30 minutes, before and lasting longer for the EI-group. Blood-return differences between MI and EI users were found, O2-pulse was higher for EI-group ($p < 0.01$). MI blood-return progressively decrease and was $p < 0.01$ lower than AB and EI subjects.

Conclusions: The study highlight the importance of a time limited variable that need to be considered when evaluating physiological and metabolic responses to the effort in neurologically impaired individuals. Regardless of the submaximal gait effort and contrary to some researchers opinion 2-3 minutes in this study wasn't enough time to reach S-S. EI muscle contractions through muscle pump activity facilitate blood-return. In complete paraplegic during a sustain gait effort biohumoral responses seems to be driven by an effective blood-return and may help central command systems to better meet the body demand. The time-dependent effect may be related to the elapsing time needed for the biohumoral responses to propriciate for a regulatory response. The time-limited effect may be represented by the EI muscle pump activity and limited-lasting blood-return.

POSTER 417

ABSTRACT 638

PROLONGED WALKING DURING AN ELECTRICALLY OR MECHANICALLY INDUCED WALKING CONDITION IN GAIT TRAINED CHRONIC PARAPLEGICS CAN BE JEOPARDIZING TO HEALTH?

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Background and Aims: The purpose of this study was to determine if complete spinal cord injury patients following an electrically-induce [EI] and/or mechanically prolong walk can put at risk their health when artificially walking for a prolong period of time. We hypothesize that gait trained SCI subjects during prolong walking may be able to reach the homeostatic state and compensate well for the effort as such at none risk of developing a health problem.

Methods: Design; SCI gait-trained individuals sample-comparison. Setting; Rehabilitation-Research center. Participants; Two groups of SCI subjects and AB; 10 (5+5) paraplegics and 5 control able-bodied (AB). Intervention; Three trials at 45 minutes walking on a treadmill at the preferred maximum speed in m/min at zero degrees of inclination. Main Outcome Measures; HR, age-predicted maximum HR, RER, VE, RR, VO2 mL/Kg, VO2 mL/min, O2-pulse, BP (blood pressure), EKG, the Borg RPE (rate of perceived exertion) scale.

Results: Significant ($p < 0.01$), ($p < 0.05$) differences were noted for VE, RR, VO2 mL/Kg, VO2 L/min, O2-pulse analysed between the groups;

higher for the EI group. Steady-state in the EI SCI group was achieved as an average earlier (5 minutes) and lasted longer (average 30 min). No ST-segment depression, no ventricular arrhythmias or abnormal symptoms occurred during the 45 minutes testing condition in both SCI walking groups. The gait effort was perceived according to the Borg RPE scale as somewhat hard to hard by both SCI groups. No fainting, dizziness, muscle pain or shortness of breath was reported.

Conclusions: 45 minutes artificially SCI treadmill walking represent a time limited submaximal effort in gait trained paraplegics. Even though complete thoracic paraplegics had difficulties in achieving steady-state EI 45 minutes walk is considered to be a controlled gait effort, good for cardiorespiratory and vascular fitness and better than MI walking. EI and MI walking under controlled conditions appears at none risk for medical complications in healthy gait trained paraplegics subjects. Mechanically prolong walking despite some positive cardio-respiratory results put at risk the paraplegics subjects to develop orthostatic feet edema because poor blood return after prolong walking.

POSTER 418

ABSTRACT 639

IT'S POSSIBLE FOR CHRONIC PARAPLEGIC SUBJECTS TO MEET THE BODY DEMAND DURING AN ELECTRICALLY OR MECHANICALLY INDUCE SUBMAXIMAL WALKING EFFORT?

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Objective: The purpose of this study was to determine if gait trained (GT) complete spinal cord injury (SCI) patients through artificially (electrically-induce [EI]) and mechanically-induce[MI]) walking can meet the body demand (heart, lung, metabolic and physiological) to gait stress at a constant speed. We hypothize that neurological impaired systems may have difficulties to reach the steady-state at short and long-time walking.

Design: SCI gait-trained individuals sample-comparison.

Setting : Neurorehabilitation-Research center.

Participants: Two groups of SCI subjects and AB; 10 (5+5) paraplegics and 5 control able-bodied (AB).

Intervention: Three trials at 6 and 45 minutes walking on a treadmill at the preferred maximum speed in m/min at zero degrees of inclination.

Main Outcome Measures: HR, age-predicted maximum HR, RER, VE, RR, VO2 mL/Kg, VO2 mL/min, O2-pulse, BP (blood pressure).

Results: Significant ($p < 0.01$), ($p < 0.05$) differences were noted for VE, RR, VO2 mL/Kg, VO2 mL/min, O2-pulse analysed between the groups; higher for the EI group. 6 minutes walking was not enough time to meet the body demand for all the variables in question in SCI individuals. Steady-state had a different behaviour between the SCI groups; prolong in the EI group but time limited.

Conclusions: These findings highlight the importance of steady-state in evaluating neurologically impaired individuals. Six minutes walking at self-preferred speed represented a time limited submaximal effort. This 6 minutes walking test does not facilitate cardio-pulmonary and blood return variables to achieve steady-state and as such is of questionable importance when used to compare walking systems in SCI subjects. Despite the gait training effects during prolonged SCI walking, steady-state was achieved for most of the biological system responses studied in no less than 10 minutes and lasted no more than 30 minutes.

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ABSTRACT 640

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ABSTRACT 641

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ABSTRACT 642

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ABSTRACT 643

A VERY EARLY STROKE REHABILIATION TRIAL (AVERT): AN ONGOING PHASE III RANDOMISED CONTROLLED TRIAL

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Background/Aims: Getting patients out of bed very early after stroke (<24 hours) may be an important component of effective stroke unit care. Within a multi-centre, single blind, randomised controlled trial, we hypothesise that very early mobilisation out of bed will reduce death and disability and be cost effective.

Methods: Medically stable patients reaching hospital within 24 hrs of a stroke, first or recurrent, infarct or haemorrhage, including those treated with thrombolysis are eligible to participate. Patients with severe pre-morbid disability are excluded. Randomisation is concealed, and stratified by site and stroke severity. Intervention is delivered by a physiotherapist/nurse team, commences within 24 hours of stroke onset and continues at least twice daily until discharge or for a maximum of 14 days. Control patients receive standard care. The primary outcome is the modified Rankin Scale at 3 months (disability and death) which has been used in many other acute stroke trials. Secondary outcomes include time to walking unassisted, mood, quality of life, physical and ADL function. Patients are followed up at both 3 and 12 months post stroke, with assessors blind to group. Sample size: 2014.

Results: 40 hospitals in Australia, United Kingdom, Malaysia, Singapore and New Zealand participate. At October 2011, 1112 patients (6% of all admitted patients) have been recruited. Subjects average age is 70.4 (SD13.2) years, 45.9% have moderate-severe stroke (NIHSS>7), 80.9% first stroke, 96.7% were living at home pre-stroke. 219 (19.7%) have been treated with rtPA. Major reason for ineligibility is hospital admission > 24 hours post-stroke (40.2%).

Conclusions: Currently there are no clear guidelines to help guide therapists interventions very early after stroke and opinion is divided about the safety of very early out of bed activity. AVERT will help development of clinical practice guidelines and health funding policy regardless of the final result.