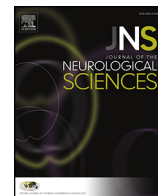




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## Neurorehabilitation 2

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WFN15-0251

### Neurorehabilitation 2

#### Neurological disorders among combat wounded veterans

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**Background:** We followed a cohort of 118 United States servicemen ( $n = 112$ ) and women ( $n = 6$ ) in providing care coordination to veterans discharged from the James A. Haley Veterans Hospital in Tampa, Florida with a primary diagnosis of mild/moderate traumatic brain injury (TBI) incurred in combat theatres in Afghanistan and Iraq. Injuries to soldiers were mostly from blasts or sustained in vehicle accidents or indirect enemy fire.

**Objective:** Objective of the intervention was to determine common neurological disorders among returning wounded warriors with TBI and to render appropriate treatment with neurologists and primary care providers.

**Patients and methods:** Patients were recruited at the outpatient and inpatient facilities in the Polytrauma Center at the hospital. The average age of patients was 32 years (standard deviation 8.4 years). Twenty one veterans were classified as having an 80%–100% functional disability due to combat related injuries. Diagnoses of neurological disorders among this cohort were obtained from patient charts and administrative data bases using the International Statistical Classification of Diseases and Related Health Problems (ICD-9).

**Results:** Post-Traumatic Stress Disorders (PTSD) was the most common comorbidity ( $n = 82$ ) reported among wounded warriors. Other common secondary neurological ailments included chronic headaches ( $n = 46$ ), Lumbago ( $n = 28$ ), Mild cognitive defects ( $n = 26$ ) and issues concerning Gait and Balance ( $n = 16$ ). Three veterans had a diagnosis of Seizures and Epilepsy associated with trauma. Most veterans presented themselves with multiple comorbidities. After a year of treatment, though symptoms lingered, patients reported improved quality of life.

**Conclusion:** The neurological effects of injuries from war are many. Intensive care coordination appears to alleviate severity of symptoms over time.

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WFN15-0309

### Neurorehabilitation 2

#### Outcome of neurologic rehabilitation two years after brain injury

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0022-510X/\$ – see front matter

**Objective:** Aim of the study was to evaluate outcome of patients with severe traumatic brain injury (STBI) after 12 and 24 months.

**Patients and methods/material and methods:** 51 patients underwent a multidisciplinary early rehabilitation treatment until they were discharged from hospital and local ambulatory care was deemed sufficient. The follow-up examination took place 12 and 24 months after the STBI.

**Results:** Data revealed a high level of independence in activities of daily living (mean Barthel Index after one year 92.7 points, after two years 93.7 points). After one and two years, 74.5% and 80.4% of the patients, respectively, were completely independent of need for care. Nevertheless, more than half of the patients had neurological disturbances. Return to work rates improved between one and two years after trauma, as evidenced by the rate of patients being back to full time work at one year ( $n = 14$ , 28%) and two years ( $n = 20$ , 40%) post-STBI. Return to work rates improved between one and two years after trauma, as evidenced by the rate of patients being back to full time work at one year ( $n = 14$ , 28%) and two years ( $n = 20$ , 40%) post-STBI; although, none of these changes reached statistical significance.

**Conclusion:** In summary, there are still changes in both impairment and disability related areas between one and two years post-STBI, but the degree of improvement is variable depending on the area being considered.

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WFN15-0437

### Neurorehabilitation 2

#### Does interactive live music enhance wellbeing, mobility and quality of life for brain and spinal injured patients?

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**Background:** Contemporary research highlights the potential benefits of music therapy for neuro-rehabilitation. However, the methodological quality remains poor.

#### Objectives:

1. Identify any improvement in sense of wellbeing, following the interactive live music intervention.

2. Examine the feasibility of such a study within a neuro-rehabilitation ward.

**Methods:** 26 participants were recruited from a neuro-rehabilitation ward through opportunistic sampling.

**Design:** Prospective, quasi-experimental design. The quasi-independent variable was the quantity of exposure to the live music, as measured by the number of sessions each participant chose to attend. The other independent variable was the separate time points at which the dependant measures were taken. There were five main time points at which patients were measured: these were baseline/Time 1(T1), during the intervention (T2) and (T3), post-music/T4, and follow-up/T5. The primary dependant variable was the wellbeing of patients and staff. The secondary dependant variables for patients were mobility, pain, and cognitive functioning.

Institutional Review Board approval was obtained as necessary.

The music involved musicians playing, with patients encouraged to participate by singing and games. Two 60 minute sessions were given every weekend over a six-week period.

**Measures:**

Warwick-Edinburgh Mental Wellbeing Scale [WEMWBS]  
 Pictorial Depression Intensity Scale Circles  
 EuroQol-5 dimensions-5 levels  
 World Health Organization-5 Wellbeing Index  
 Numbered Graphic Rating Scale [NGRS]  
 Mini Mental State Examination  
 Barthel Index  
 Functional Ambulation Category [FAC]

**Results:** Measures showed substantial changes, eg:

	T1	T4	T5
NGRS:	4.15	2.64	0.50
FAC	3.62	4.17	3.20
WEMWBS	45	47.57	56.83

**Conclusion:** In this study live music improved all aspects of wellbeing and an RCT would be feasible to further investigate.

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**WFN15-0439**

**Neurorehabilitation 2**

**The evaluation of a homecare service for older people in Dhaka, Bangladesh**

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**Background:** A domiciliary peripatetic neuro-rehabilitation service was started in Dhaka in 2008 through the Sir William Beveridge Foundation (SWBF), a United Nations accredited charity based in London.

**Objective:** To characterize the needs and perceived benefits for an elderly population with neuro-disabilities, receiving services provided by SWBF.

**Patients and Methods:** All patients and carers who were receiving a service from SWBF were identified from the register. These families were all living within the community of Dhaka (capital city of Bangladesh).

**Design:** Mixed methods including questionnaire survey and in-depth interviews (pre-piloted for language and acceptability).

An independent researcher administered the questionnaire and interviewed the families. Study duration: July to November 2013.

Follow-up interviews were conducted for 5 families in 2014. Consent was obtained at the outset of the study.

**Outcome tools:** Activities of Daily Living, themes and individual narratives from interviews.

**Results:**

Total individual service users, N=118.

75 patients completed questionnaires.

20 individual narratives emerged from 81 interviews.

35 trained Rehabilitation Care Assistants led by 1 Medical Director provided service. 16 out of 75 patients were under 60 years. 35 patients were stroke survivors. Identified benefits included having free or affordable physiotherapy, sign-posting the need for medical attention during co-morbid illness and valued companionship. Carer stresses were also reduced reflected within the narratives from the interviews. A need was identified to review the referral pathway including age threshold, clinical governance and financial model.

**Conclusion:** Within a void of state and private sector provision in low-income countries, a home based rehabilitation model could be achieved through charitable sector work.

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**WFN15-0518**

**Neurorehabilitation 2**

**Implication of unique NIA (Neural Infant Aquatics) method for the development of babies**

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Babies born premature are at risk for neurodevelopment impairments and brain injury. Young babies with brain injury show typical, clinically correlated, neuro-motor signs, reflecting neural abnormalities long before they are fully pronounced. Early detection and intervention is crucial, especially during peak expression of Cortical Sub Plate, as it may minimize neurologic and functional deficits. Training in water has been found to benefit baby health, being based on their physical properties and physiological outcomes on body functions. Hence NIA (Neural Infant Aquatics) modified for young premature babies may advance brain development.

The objective of this research is to examine, in water and on land, the power of NIA on the neural development of preterm babies.

Effect of NIA on the neural development of preterm babies is defined by comparing developmental indexes of babies who receive NIA with those of infants who do not. 50 babies are video recorded in water and on land, to assess their neural development according to prevalence of early neuromotor signs.

Our results show significant improvement in developmental tracks of babies receiving NIA compared to babies who did not. i.e., delta in developmental tracks, between before and after early intervention, is ~40% higher when babies receive NIA as observed without NIA. Mechanism of early intervention will be discussed.

Conclusions: (1) NIA for young premature babies may be safely applied and regarded as a suitable rehabilitation approach. (2) Early initiation of NIA, during pick activity of cortical sub plate, may be beneficial for development of preterm babies.

I have obtained patient and/or Institutional Review Board (IRB) approval, as necessary.

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WFN15-0733

**Neurorehabilitation 2****Delayed and abbreviated environmental enrichment, a model of preclinical neurorehabilitation, enhances functional outcome after experimental brain trauma**

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**Background:** Environmental enrichment (EE) confers improvements in behavioral outcome and histopathology after experimental traumatic brain injury (TBI) vs. standard (STD) housing. However, as a model of rehabilitation, continuous EE is not clinically relevant due to the timing parameters of the typical EE and thus translatability could be limited. Specifically, TBI patients typically receive rehabilitation only after critical care has been provided and then only for 3–6 hours per day.

**Objective:** To mimic the clinic, the goal of this study was to determine whether delaying EE by three days and providing only six hours per day would provide benefits similar to continuous EE.

**Methods:** To address this rehabilitation relevant issue, isoflurane-anesthetized male rats were subjected to a controlled cortical impact (2.8 mm depth at 4 m/s) or sham injury and randomly assigned to TBI+EE (continuous), TBI+EE (3 day delayed, 6 hr day), and respective sham controls. Motor function (beam-balance/beam-walk) was assessed on post-operative days 1–5. Spatial learning/memory (Morris water maze) was evaluated on days 14–19.

**Results:** The data showed that EE, regardless of timing, improved motor and cognitive function compared to STD housing ( $p < 0.0001$ ). Moreover, there were no differences between the TBI+EE (continuous) and TBI+EE (3 day delayed, 6 hr day),  $p > 0.05$ .

**Conclusions:** These data demonstrate that delayed and abbreviated EE produces motor and cognitive benefits similar to continuous EE after TBI and thus further supports EE as a preclinical model of neurorehabilitation. Ongoing studies are evaluating the effects of longer delays in implementing EE after TBI.

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WFN15-0995

**Neurorehabilitation 2****How do the Task Constraints affect the Performance of Aiming Movements after Stroke?**

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**Background:** Discrete and cyclic movements are differentially controlled by the central nervous system, which influences the performance of aiming movements. Direction of movement also influences performance. Cyclic and ipsilateral movements are faster and smoother than discrete and contralateral movements. The effects of task constraints over paretic arm performance were less explored.

**Objective:** This study analyzed the influence of the task constraints in paretic arm performance after stroke.

**Method:** A cross-sectional study was conducted with 10 post-stroke and 10 healthy individuals. Participants performed aiming movements over a digitizing tablet in different ways: discrete and cyclic movements and for ipsilateral and contralateral direction of the moving limb. The

paretic arm was used by all patients. Temporal (reaction time, movement time and peak velocity) and spatial (smoothness, trajectory length and resultant constant error) variables were analyzed. Analysis of variance was used considering a significance level of 5%.

**Results:** Patients were slower to react and less smooth and accurate than the healthy group. Cyclic and ipsilateral movements were faster and less accurate than the discrete and contralateral movements for both groups. Additionally, patients could not reach the same trajectory length of the healthy group in cyclic movements.

**Conclusion:** Individuals after stroke modulate the paretic arm performance according to the task constraints similarly to that of healthy individuals. Both groups prioritized accuracy in discrete movements and speed in cyclical movements and were faster and smoother in the ipsilateral direction. Cyclic movements were, however, more difficult to be completed by the paretic arm.

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WFN15-1004

**Neurorehabilitation 2****The activation of lower-extremity muscles during walking in different stage of Parkinson's disease**

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**Background:** In the progression of Parkinson disease (PD), gradual derangement of the usage of lower extremity muscles are disabling. Therapeutic exercises has been effective on the mobility and balance. But the change of muscle activation pattern with progression of PD might give important information for therapeutic exercise implementation.

**Objective:** The purpose of this study was to investigate the activation of lower-extremity muscles according to Hoehn-Yahr scale during gait.

**Patients and methods / material and methods:** Thirty six Parkinson's patients (Hoehn and Yahr stage 1; 13, 63.1±7.8, stage 2; 15, 67.1±6.4, stage 3; 8, 63.7±8.7) participated in this study. Gait analysis was done with GAITRite system. We recorded EMG signals of the tibialis anterior (TA), medial gastrocnemius (MG), lateral gastrocnemius (LG), soleus (SOL), rectus femoris (RF), vastus lateralis (VL), semitendinosus (ST) and biceps femoris (BF) using Noraxon 16 channels EMG system during walking at preferred speed. Rectified EMG signals were normalized to reference voluntary contractions (RVC) over a gait cycle at the preferred speed.

**Results:** In loading response, TA showed gradual attenuation throughout H&Y stages, but MG, LG showed gradual increment ( $p < 0.05$ ).

In mid-stance and terminal stance, there was no significant changes except VL between H&Y stage 1 vs 3 in mid stance ( $p < 0.05$ ).

In initial swing phase, TA and in terminal swing phase MG showed gradual attenuation throughout H&Y stages ( $p < 0.05$ ).

**Conclusion:** In progression of PD, muscular exercise programs needs to focus on pretibial and calf muscles for good control over gait cycle.

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