

JOURNAL OF CLINICAL AND HEALTH SCIENCES

JCHS

SUPPLEMENTARY ISSUE

JUNE 2019
VOLUME 4 ISSUE 1 (SUPPLEMENTARY)

Evolution in Rehabilitation Practice
10th Annual Malaysian Rehabilitation Medicine Conference
29-31 October 2018
10th AMRMC @ The Everly, Putrajaya

**10TH ANNUAL MALAYSIAN REHABILITATION
MEDICINE CONFERENCE**
29-31 October, The Everly Hotel, Putrajaya

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Official Journal of
Faculty of Medicine
Universiti Teknologi
MARA



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eISSN-0127-984X

**10TH ANNUAL MALAYSIAN REHABILITATION MEDICINE
CONFERENCE
29-31 OCTOBER 2018**

'Evolution in Rehabilitation Practice'

**THE EVERLY HOTEL, PUTRAJAYA
MALAYSIA**

Organized by:

Malaysian Association of Rehabilitation Physicians

&

**Department of Rehabilitation Medicine
Faculty of Medicine
Universiti Teknologi MARA
Malaysia**

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FREE ORAL COMMUNICATIONS

FP-01

Developing A Training Kit with Written Information for Carers after Discharge from A Rehabilitation Ward

Khaidatul Mohamed Zabidi

Hospital Rehabilitasi Cheras

Introduction: Patients struck by acute illnesses such as a stroke or brain injury may have permanent disabilities and are often dependent on their families for their daily needs. However, carers may not always have the skills to prepare them for the role of a caregiver. Written information in addition to verbal information is shown to increase knowledge of carers, the confidence of patients and carers to manage at home and improve adherence to hospital aftercare. **Objective:** To assess the need and potential usefulness of a 'Carer Training Kit' as a reference to be given to carers on discharge. **Methods:** A two-part online survey was carried out among 120 healthcare staff and carers. The first part assessed their opinions on the availability of current written materials for carers, including the availability of information in different languages and the ease of accessing current information. The second half of the survey provided a link to the Carer Training Kit and asked respondents regarding its usefulness. **Results:** 68% of respondents felt that current information for carers was inadequate, and 77% felt that there was a lack of information in multiple languages. 58% of respondents said that current information was not easily accessible. 98% of respondents felt that the Carer Training Kit was useful. **Conclusion:** The 'Carer Training Kit' developed fulfilled an existing need to provide written information for carers after discharge. A further review is needed to assess the impact of the kit on carer attitudes and patient outcomes.

Keywords: Carer training

FP-02

Physical Activity, Dietary Intake and Muscle Strength Among Adolescents in Malaysia

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Introduction: The role of muscular strength (MS) across lifespan especially on children and adolescents is getting more attention recently. The relationship between dietary intake, physical activity and muscle strength in adolescents is not well understood. This study attempts to investigate the association between dietary intake, physical activity and MS among adolescents. This finding will assist in the provision of better nutrition and physical activity strategies for better adolescent muscular health. **Methods:** This cross-sectional study was based on 1012 adolescents, aged 15-year-old secondary schoolchildren (male = 395; female = 617). The details of the protocol of the adolescent study was published previously. The inclusion criteria for the analysis included complete data on gender, BMI, dietary intake (energy, carbohydrate, protein, fat), hand grip strength (HGS) and physical activity score (PAS). MS was measured by the HGS. Dietary intake was collected using seven-day diet history and was analysed using the database from Nutrient Composition of Malaysian Food (4th edition) and Nutritionist Pro™ software. The level of physical activity was measured by Physical Activity Questionnaire for Children (PAQ-C). Partial correlation was used to examine the association between dietary intake, PAS and MS. **Results:** The major finding were as follows; a positive relationship between MS and energy ($r=0.143$; $p=0.005$), carbohydrate intake ($r=0.158$; $p=0.002$), fat ($r=0.124$; $p=0.014$) and PAS ($r=0.155$; $p=0.002$) in the male group after it was controlled for ethnicity, place of residency, waist circumference, percentage of body fat, length of hand span and BMI. Such relationship was not observed among the females. **Conclusion:** Muscle strength correlates positively with energy, carbohydrate, fat intake and PAS for male adolescents. Thus, this emphasis that program should be tailored according to specific sex. **Keywords:** Diet, physical activity, muscle strength, adolescents

Keywords: Diet, physical activity, muscle strength, adolescents

FP-03

Perceived Barriers to Cardiac Rehabilitation Participation Amongst Cardiac Patients in A Malaysian Tertiary Care Hospital

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Introduction: Despite proven to reduce mortality rates and the risk of recurrent myocardial infarction, cardiac rehabilitation (CR) participation rates are still low (ranging from 20- 30% in developed countries). The aim of this study is to identify perceived barriers to cardiac rehabilitation in cardiac patients in a tertiary Malaysian hospital. **Methods:** A prospective cohort study was conducted on 61 patients who were eligible for outpatient phase 2 of cardiac rehabilitation programme (CRP2). They were divided into the non- participant group or those who did not adhere or refused to participate in CRP2 (n= 31) and the participant group or those who completed CRP2 (n= 30). Sociodemographic, medical, behavioural and functional data were collected and a self- administered Cardiac Rehabilitation Barriers Scale (CRBS) questionnaire was completed by the participants. **Results:** More CR participants had higher body mass index (BMI) and returned to drive ($p < 0.05$). Non-CR participants scored higher perceived barriers in logistical (2.89 ± 0.73), work/ time conflicts (2.67 ± 0.91) and healthcare (2.44 ± 0.695) subscales ($p < 0.05$) and the mean total CRBS score of non-CR participant group was higher (2.56 ± 0.48) ($p < 0.05$). Lower education level and the inability to drive was associated with higher perceived barriers to CR ($p < 0.05$). **Conclusion:** Logistical, work/ time conflicts and healthcare barriers are significant factors for cardiac rehabilitation participation. Cardiac patients with these identified barriers should be given special attention to facilitate them in benefitting from cardiac rehabilitation such as flexible working schedule, financial assistance and offering home- based CR programmes.

Keywords: Cardiac rehabilitation, barriers, cardiac rehabilitation barriers scale, Malaysia

FP-04

Evaluation of Contralateral Leg Status of patients with Primary Major Lower Limb Amputations and its association with AMPnoPRO (Amputee Mobility Predictor Without Prosthesis) Score in a North Peninsular Malaysia Tertiary Hospital: A 5 Year- Retrospective Review

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Introduction: Lower limb amputation causes major disabilities with amputees being at higher risk for contralateral limb amputation. There is a need to evaluate the relationship between contralateral leg status and amputee mobility function. Objective of this study is to investigate the association between status of contralateral leg of major lower limb amputee patients with amputee mobility predictor using AMnoPRO score. **Methods:** We performed a retrospective cross-sectional review of patients seen in Amputee Rehab Clinic who underwent major lower extremity amputation for 3 months' duration. The association between the status of contralateral leg (presence of high risk foot, ulcer or amputation) and AMnoPRO score was analysed. **Results:** We evaluated 74 patients who underwent major lower limb amputation from 2012 -2017. The mean AMnoPRO score was 22.5 (\pm 8.56). 1.4% of the amputees were of K0 level, 24.3% K1 level, 48.6 % K2 level, 21.6 % K3 level, and 4.1 % were of K4 level. The mean (SD) AMPnoPRO score in those with ulcerated contralateral leg was 19.9 (\pm 8.5), which was lower than in those without ulcers, 23.7 (\pm 8.4). Higher AMnoPRO score was associated with reduced risk of developing ulcer on the contralateral leg by 0.948 times (Crude OR: 0.948). However, it was not statistically significant due to a small sample ($p = 0.124$). **Conclusion:** Amputees with higher AMPnoPRO scores were less likely to develop ulcers in the contralateral leg. Further studies with bigger sample size are needed to explore this association.

Keywords: Amputation, AMNoPRO, rehabilitation, contralateral leg

FP-07

Evaluation of Call-Recall Nutritional Intervention in Post-Acute Rehabilitation Stroke Patients: A Randomized Controlled Trial

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Introduction: Good nutritional status is more likely to contribute to the successful rehabilitation of stroke patients. However, undernutrition is highly prevalent among these patients and may worsen throughout hospitalization. To date, there are no studies investigating the effect of nutrition intervention on stroke patients undergoing rehabilitation in Malaysia. Therefore, we conducted a single-blinded, randomized controlled trial in a teaching hospital to evaluate the effect of call-recall nutritional intervention on nutritional status of post-acute stroke patients. **Methods:** From 167 patients who have been screened for eligibility, 45 patients were recruited and randomized into two groups, in which the control group (n=22) received standard rehabilitation care and the intervention group (n=23) received standard care with the addition of 12-weeks call-recall nutritional intervention. Nutritional assessment was performed using Mini Nutrition Assessment and 24-hour diet recall. All recruited patients were followed up twice within week 6-8 and week 11-12. Data analysis was performed using Generalized Estimating Equations. **Results:** Our results demonstrate that the intervention group had a significant improvement for nutritional status ($p < 0.001$), though no treatment effect as compared to control group ($p = 0.258$, OR 1.85, 95% CI 0.64-5.4). The intervention group had higher dietary and protein intake than control group ($p < 0.01$). Within the intervention group, the percentage of patients with good nutritional status was significantly increased from 17.4% to 68.2% and the mean dietary intake was significantly increased from 1469 ± 66 kcal/day to 1600 ± 44 kcal/day ($p < 0.05$). **Conclusion:** In conclusion, our study suggests that call-recall nutritional intervention strategy can improve nutritional status of post-acute stroke patients. Stroke patients may benefit even more from a longer period of nutritional intervention.

Keywords: Undernutrition, call-recall nutritional intervention, stroke

FP-08

Respiratory Function and Physical Activity Level Among Undergraduates

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Introduction: There is an association between respiratory function and physical activity level. However, information regarding correlation between respiratory function and physical activity level among undergraduates is limited. We aimed to determine correlation between respiratory function and physical activity level among undergraduates. **Methods:** In this cross-sectional study, we recruited 62 undergraduates with mean age 22.09 ± 1.13 years from the Universiti Kebangsaan Malaysia Kuala Lumpur campus (UKMKL). Participants' respiratory function which included FEV₁, FVC and FEV₁/FVC were measured using a spirometer. Physical activity level was evaluated using the International Physical Activity Questionnaire (IPAQ). **Results:** Approximately, 45% and 40% undergraduates had high and moderate levels of physical activity respectively. Male undergraduates had significantly ($p < 0.01$) higher physical activity level (4262.71 ± 328.72 minutes/week) compared to females (2131.47 ± 1852.55). Significantly higher FEV₁ (3.57 ± 0.34 litres) and FVC (2.97 ± 0.45 litres) were found in male undergraduates in comparison to their counterparts ($p < 0.001$). However, females had significantly higher FEV₁/FVC (86.06 ± 4.10 litres) compared to male undergraduates ($p < 0.01$). There was a significantly moderate correlation between physical activity level with FEV₁ ($r = 0.423$, $p < 0.05$) and FVC ($r = 0.452$, $p < 0.05$). **Conclusion:** Our study findings suggest that increase in physical activity level may lead to increase in respiratory function. Higher level of physical activity should be promoted among healthy young adults for improved respiratory function.

Keywords: Physical activity, respiratory function, undergraduate students, spirometry

FP-09

An Exploration of Dysphagia Awareness, Screening Practices and Its Challenges Among Nurses in A Teaching-Based Hospital in Malaysia

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Introduction: Being integral in the care and management of patients with swallowing disorders (dysphagia), nurses should possess adequate knowledge and awareness about dysphagia, and be able to effectively carry out dysphagia screening. Current dysphagia screening practices of nurses in Malaysia and the challenges faced by the nurses in this area are under-explored. The objectives of this research were to explore the awareness of dysphagia, the practices in dysphagia screening, and the challenges faced when providing the service, among nurses in a Malaysian teaching-based hospital. **Methods:** This exploratory cross-sectional study involved 161 nurses who each responded to a self-administered questionnaire consisting 16 questions regarding participant's demographic information, awareness of dysphagia, role of nurses and speech-language pathologists (SLPs), involvement in dysphagia management, procedures used in performing dysphagia screening, and challenges faced by them. **Results:** A majority of nurses had limited awareness regarding the clinical indicators of dysphagia, and the roles of the nurse and SLPs in dysphagia management. A total of 73.6% of the nurses indicated that they conducted dysphagia screening and performed within standards suggested in guidelines. However, there was low consistency in dysphagia screening practices among the nurses. Lack of training and/or education related to dysphagia was reported as a major challenge. **Conclusion:** The present study raised several issues and barriers which need to be addressed to improve dysphagia service delivery particularly among nurses, training providers, SLPs and policy makers.

Keywords: Swallowing, dysphagia, screening, nurses

FP-10

Stroke Step Down Care (SSDC): Post Stroke Transition from Tertiary to Primary Care

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Introduction: Stroke is the third commonest cause of disability worldwide. A survey by Aznida et al in 2014 urged for a coordinated transition of post stroke care from tertiary to primary centre. SSDC program aimed to improve compliance in medical and rehabilitation follow up, as well as achieving treatment goals and optimizing functional ability post stroke. **Methods:** Stroke patients admitted to Hospital Sultanah Bahiyah, Alor Setar were discharged and followed up at their local primary care centres within Kedah. The centres involved three health clinics and a district hospital with existing multidisciplinary staffs and facilities where patients had their therapy sessions. Rehabilitation physicians and neurologist visited SSDC centres monthly. The following parameters were collected at the first appointment and six months later: appointment default rate, Modified Barthel Index (MBI), blood pressure control, lipid control, glycaemic index (HbA1C), statin and antiplatelet usage. **Results:** We compared data in 2015 (year established) and 2017 (latest data). There is a reduction in default rate from 23.5% to 17.3%. We also observed improvement in the following parameters - Modified Barthel Index (MBI) >75/100 (60.8% to 93.1%), blood pressure control (from 53.6% to 78%), lipid control (31.6% to 40%), usage of statin (74.6% to 96.4%) and usage of antiplatelet (85% to 93.5%) (Target control level is based on National Stroke CPG guidelines). **Conclusion:** SSDC is capable of delivering optimal medical and rehabilitation care post stroke. This programme can be practiced nationwide.

Keywords: Stroke, rehabilitation, community, transition

FP-11

A Study Protocol for A Randomized Controlled Trial on The Effectiveness of Brain Injury Family Intervention (BIFI) In Improving Psychological Well-Being of Traumatic Brain Injury (TBI) Caregivers at Two Government Hospitals

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Introduction: The effectiveness of brain injury intervention program tailored for TBI caregivers has been widely known in western countries but less clear in TBI caregivers in Malaysia. This study protocol describes the design measuring the effectiveness of BIFI in reducing emotional distress, reducing burden of care, fulfilling caregiver's needs, and increasing life satisfaction among TBI caregivers at two government hospitals. **Methods:** This is a single blinded randomized controlled trial study. It will be conducted at Sungai Buloh Hospital and Cheras Rehabilitation Centre. A total of 100 TBI caregivers attending neuro-rehabilitation unit or centre will be randomized into 50 in intervention group and 50 in control group. The intervention group will be included in the Brain Injury Intervention (BIFI) program. The control group will receive treatment as usual. TBI caregivers must be 18 and above to be eligible to participate. TBI caregivers with any type of races/ethnicity and gender will be included. They must have been caring for TBI patients for > 3-month post injury. Self-reported questionnaires will be collected at baseline, immediately after intervention program, 3 months and 6 months follow-up. The primary endpoint is the in TBI caregiver's emotional distress. **Results:** It is expected that psychological well-being of the intervention group is better compared to the control group at post, 3 month and 6-month follow-up. **Conclusion:** This is the first controlled trial evaluating the effectiveness of the brain injury intervention program for TBI caregivers in Malaysia. This study will provide more knowledge and scientific evidence in improving rehabilitation services.

Keywords: Traumatic brain injury, caregiver, randomized controlled trial, Malaysia

FP-12

The Effect of Music towards Emotional Response in Children with Low Functioning Autism

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Introduction: Children with Autism Spectrum Disorder (ASD) are gradually increasing in numbers, evidenced by statistics. Children with ASD are diagnosed typically by the age of three and exhibit unique differentiated characteristics in areas of social, communication, emotion and behaviour. Disrupted emotional interaction such as difficulty to establish and maintain conversation and share or express emotion in maintaining relationship with others are often seen. This research was conducted to identify the effectiveness of music towards emotional response in low functioning ASD.

Methods: This is a two-groups design, comprising of an intervention group and a control group. Each group consists of 14 subjects. In the intervention group, the subjects were exposed to sensory integration and music, while in the control group, the subjects were exposed to sensory integration without music. The music was specially created by a composer-researcher to accompany each segment of sensory integration activities. Emotional Regulation and Social Skill Questionnaire (ERSSQ) version for parent and teacher, and the Short Sensory Profile (SSP) Questionnaire were used as outcome measures. Both questionnaires were used at pre and post intervention. **Results:** After 10 weeks of weekly 30 minutes sessions, there were significant differences between pre-test and post-test by teacher ERSSQ report. In the intervention group, music showed increase in emotional response at the post-test assessment reflecting improvement of social-emotional function. However, sensory profile did not show any significant changes in both the intervention and control group.

Conclusion: Music may improve emotional response in children with low functioning autism.

Keywords: Autism spectrum disorder, low functioning, sensory integration, music

FP-13

The Effect of a Virtual Reality-Based Therapy on Functions in Older Adult with Knee Osteoarthritis

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Introduction: Knee Osteoarthritis (OA) is a leading cause of disability among older adults worldwide. Virtual Reality-Based Therapy (VRBT) has been an increasingly popular method for enhancing physical functions in rehabilitation. However, there are limited evidence of the effectiveness of VRBT in improving lower limb strength and aerobic capacity among older adults with knee OA. The aim of this study was to evaluate changes in physical functions following VRBT intervention among older adults with knee OA. **Methods:** In this controlled trial, the experimental group (n=22) received VRBT games, while the control group (n=22) underwent conventional physiotherapy. Both groups received 24 therapy sessions, i.e., 45 minutes per session, twice per week, for 12 continuous weeks. Changes in physical function were assessed using the 30-second Chair Rise test and 6-minute Walk test (6MWT). Baseline status at 0-week and therapy outcomes at 13th-week were measured by an independent assessor. A mixed model ANOVA was used to analyse the time, group and interaction effects of the interventions. **Results:** All 44 participants were analysed using intention-to-treat analysis post-intervention. Results show a significant time effect ($p < 0.05$) with large effect size between 0.54 to 0.61 for both outcomes. Participants in the experimental and the control group demonstrated 33.9% and 30.2% improvement in lower limb strength and 17% and 18.9% increase in aerobic capacity, respectively. However, no significant group and interaction effects were found ($p > 0.05$) for both outcomes. **Conclusion:** VRBT is shown to be just as effective as conventional physiotherapy in improving physical function of older adults with knee OA. VRBT can be used as a therapy option in the rehabilitation of this patient population.

Keywords: Virtual reality, knee osteoarthritis, physical function

FP-14

Employment Status and Employment Pattern after Traumatic Brain Injury: A Preliminary Descriptive Analysis

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Introduction: The rate of return to work (RTW) for TBI survivors ranges from 10% to 70% which is influenced by multiple factors; namely patient, workplace and injury factors. Understanding the employment status and pattern after TBI is important in directing clinicians toward an individualized vocational rehabilitation. This study aimed to describe the employment status and pattern among TBI survivors after motor vehicle accident (MVA). **Methods:** A retrospective analysis was conducted on 370 medical reports written from 2010-2012 for patients who sustained TBI from MVA. Premorbid employment history was compared to latest employment status at the point where medical reports were written. The employment pattern was then established. Demographic data including age, gender, education level, and severity of TBI were also extracted. **Results:** More than two-thirds of the patients were below 40 years old (75%), male (82.2%) and received at least secondary education (84.8%). Almost half of these patients successfully returned to work (49.2%). Patients with mild TBI have the highest rate of RTW (65%) compared to moderate (52%) and severe (33%) TBI. Among those who returned to work, 34% returned to former employment with similar job demand, while 22% underwent job modification under the same employer. Another 33% had a new employer with a new job scope. **Conclusion:** The rate of RTW in TBI patients after MVA is still low. As TBI affects mainly young adults in their productive years, successful RTW will benefit the patients in terms of financial independence and community participation. Efforts should be made to improve the overall rate of RTW.

Keywords: Traumatic brain injury, employment status, employment pattern

FP-15

Characteristics of Post Traumatic Amnesia among Traumatic Brain Injury Patients Admitted in a Rehabilitation Ward

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Introduction: Post traumatic amnesia (PTA) is a recovery process from traumatic brain injury (TBI); characterized by amnesia and confusion with likely behavioural disturbances. A proper assessment of PTA is crucial for rehabilitation planning and prognostication. The purpose of this study was to describe the characteristics of PTA among TBI patients admitted to the rehabilitation ward. **Methods:** This is a retrospective study on TBI patients who were admitted to the rehabilitation ward, UMMC from December 2016 to May 2018; with a documented Westmead Post Traumatic Amnesia Scale (WPTAS) score on admission. Patients' characteristics, duration of inpatient rehabilitation stay, duration of PTA and details of WPTAS were analysed. **Results:** 19 patients were recruited. All of them were male, have severe TBI, with mean age of 27.1 years \pm 8.3. Motor vehicle accident was the cause of TBI in 18 patients. The mean PTA duration was 49 days \pm 30. Only 3 patients were out of PTA before discharged. The mean WPTAS score for those discharged while still in PTA was 5.5. During first assessment, the question on examiner's face in recall component was answered correctly by most patients. Initially, 53% patients showed better performance in recall component. By the end of inpatient stay, most patients (75%) showed better performance in orientation than recall component. 6 patients (32%) had post traumatic agitation that interrupted the WPTAS assessment. 13 patients (68%) showed a temporary drop in WPTAS total score during change of therapist and after long holidays. **Conclusion:** Orientation component seems to improve first, perhaps due to the nature of resolution of confusion and enforcement of orientation board in the ward. Post traumatic agitation, change of therapist and long gap in between WPTAS assessment have shown to negatively affect the patient's PTA recovery.

Keywords: Post traumatic amnesia, traumatic brain injury, Westmead Post Traumatic Amnesia Scale, recovery pattern

FP-16

Stroke Rehabilitation in Malaysia: A Systematic Literature Review

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Introduction: Stroke rehabilitation is accepted as one important component for stroke care and management. A search in Cochrane Library on January 2018 yielded a total of 474 systematic reviews pertaining stroke are available. However, the reviews come from an international context; where specific evidence on the local context is a better approach to drive the practice. Distinct differences in terms of culture, lifestyle, language, socio-geographic composition and economic development of a region from other regions may affect the delivery of health services. Objective of this review is to develop a comprehensive overview on stroke rehabilitation practice in Malaysia.

Methods: Systematic searching on MedLine, CINAHL, Scopus, Web of Science and MyCite databases were conducted on January 2018. **Results:** After screening for eligibility, only 15 were included out of 281 articles. These are controlled trials (n=3), one-group cohort (n=2), case-control (n=1), case study (n=7), and feasibility study on product development (n=2). The interventions were classified as manual conventional therapy and technology-based therapy. Majority (n=12; 80%) of the articles were authored by non-rehabilitation specialist; medicine (n=3), traditional and complementary medicine (n=1), computer and information sciences (n=1), engineering (n=6) and nursing (n=1). Only (n=3; 20%) articles were authored or co-authored by rehabilitation expert; medical rehabilitation (n=1) and physiotherapy (n=2).

Conclusion: Current evidence on stroke rehabilitation in Malaysia is inadequate to support evidence-based practice. Majority of the studies are in low quality, premature and in infancy. More rigorous research is required on this topic in Malaysia. Involvement from rehabilitation practitioners is warranted.

Keywords: Allied health, cerebrovascular accident, evidence-based practice, technology

FP-17

Disability Profile and the Factors Affecting Functional Outcome in Malaysian Motor Neurone Disease Population

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Introduction: Motor neurone disease (MND) is a progressive neurodegenerative condition affecting motor neurons in the brain and spinal cord. The accurate knowledge on the individual spectrum of disabilities is important for timely medical and rehabilitation management of patients with MND. The objectives of this study are to identify the disability profile, the associated factors of the functional outcome, fatigability status and the correlation between fatigue and domains of functional decline in Malaysian MND population. **Methods:** MND patients undergoing rehabilitation programme in University Malaya Medical Centre (UMMC) were consecutively enrolled between January 2017 till April 2018. Each patient completed a checklist to report the symptoms and problems affecting daily life, ALSFRS-R depicting their function level and Fatigue Severity Scale (FSS) to determine their fatigability status. The ALSFRS-R was repeated again after 6 months to measure the functional decline. **Results:** 30 patients participated in this study with 3 deaths during the course of the study. The mean age was 60 years with men more affected than women (3:1). The main symptoms reported were weakness (93%), weight loss (83%) and fatigue (73%). Most of them had difficulties in performing domestic chores (77%) and engaging in social life (73%). No statistically significant factors were found to be associated with functional decline among the Malaysian MND patients. Decline in respiratory function was shown to be statistically significant among the fatigued MND patients ($p=0.032$). **Conclusion:** Framework of International Classification of Functioning, Disability and Health should be explored further in MND population to provide the best multidisciplinary care through the 'neuropalliative rehabilitation' model. Routine nutritional assessment and care if needed should be rendered to all MND patients. In terms of rehabilitation, a paradigm shift is needed to provide pulmonary rehabilitation to MND patients especially the ones with fatigue to dampen the progressive deterioration of respiratory function. Enforcing these measures will augment the quality of life among this population.

Keywords: Motor neurone disease, disability profile, functional outcome

FP-18

Outcome of School-Based Neuromotor Task Training on Motor Performance of Children with Developmental Coordination Disorder

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Introduction: Many children with learning difficulty are found to experience motor coordination problems or developmental coordination disorder (DCD). Numerous studies shown that school-based interventions are effective in improving motor coordination difficulties. However, studies which assess neuro-motor task training (NTT) are limited. This quasi-experimental study was conducted to compare the effect of NTT against usual physical education (PE) on children with DCD at schools with special education program. **Methods:** A total of 53 children aged seven to 10 years were recruited from seven primary schools in Klang Valley and participated in the study; NTT group (n=32 participants; 22 boys, 10 girls) and PE group (n=21 participants; 12 boys, 9 girls) were comparable in age and motor coordination ability at baseline. Each group received twice a week intervention respectively, for the course of eight weeks. Changes in motor coordination performances following the interventions were measured using the Movement Assessment Battery for Children-2 (MABC-2) test, which contains three sub-tests, namely manual dexterity, aiming and catching, and balance. **Results:** Data analyses were conducted using Mixed Model Anova test. Results shown significant effects in group*interaction [F (1,51)=6.34, *partial n*²=.11, p=.015]; time*interaction [F (1,51)=30.83, *partial n*²=.38, p=.000] and group*time interaction [F (1,51)=8.28, *partial n*²=.14, p=.006] for the total MABC-2. For manual dexterity, there are significant effects in group*interaction [F (1,51)=4.61, *partial n*²=.08, p=.037] and time*interaction [F (1,51)=6.58, *partial n*²=.11, p=.013] but not in group*time interaction [F (1,51)=0.36, *partial n*²=.01, p=.552]. Results for the aiming and catching sub-test shown significant effects in group*interaction [F (1,51)=5.40, *partial n*²=.10, p=.024], time*interaction [F (1,51)=71.01, *partial n*²=.58, p=.000] and group*time interaction [F (1,51)=13.38, *partial n*²=.21, p=.001]. While for balance, no significant effect was found in group*interaction [F (1,51)=2.89, *partial n*²=.05, p=.095] although time*interaction [F (1,51)=8.04, *partial n*²=.14, p=.007] and group*time interaction [F (1,51)=13.65, *partial n*²=.21, p=.001] effects were significant. Analysis of effect size shown that overall, the NTT group achieved greater motor coordination improvement than the PE group. **Conclusion:** As a conclusion, both interventions are useful in improving motor coordination problems among the children. NTT can be added into PE to improve balance performance among school children with DCD. **Keywords:** Motor coordination, neuromotor task training

FP-20

Compliance Towards Diet Modification and Liquid Consistency Amongst Inpatients with Dysphagia: Revisited

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Introduction: Previous local studies had shown that compliance rate towards diet modification and liquid consistency was 60% to 82.5% amongst inpatients with dysphagia during pre and post-remedial measures. Modification of diet texture and liquid consistency is vital to avoid complications such as pneumonia, malnutrition, dehydration, and deaths. However, many patients and caregivers are reluctant to make modifications to the diet and liquid. This study aims to examine whether the compliance rate of diet modification amongst inpatients with dysphagia at Hospital Rehabilitasi Cheras (HRC) is sustained or reduced and to identify the factors associated with non-compliance. **Methods:** A descriptive, non-experimental cross-sectional study was conducted. 25 patients with dysphagia on diet modification and liquid consistency were identified. Data was collected and analysed through observation for every meal (breakfast, lunch, afternoon tea and dinner) within five consecutive days. **Results:** Of 434 meals recorded, 79% (n=345) complied with prescribed diet modification and liquid consistency whilst 21% (n=89) were not. Reasons for non-compliance include dissatisfaction with taste (24%), dissatisfaction with texture (23%), served wrong diet consistencies (19%), other reasons (18%), patients took outside food (9%), and required compensatory strategies during swallowing (7%). There was a significant association between i) ethnicity; ii) age group with compliance rate ($p < 0.05$). Chinese was more complied than Malay and Indian whilst younger group (aged 18-40 years old) showed reduced compliance rate compared to middle and older age group. However, no significant association was found between gender and compliance ($p = 0.670$). **Conclusion:** Continuous monitoring of compliance rate is needed to ensure sustainability of compliance for quality health care.

Keywords: Dysphagia, compliance rate, diet modification, liquid consistency

POSTER PRESENTATIONS

PP-01

Mild Hyponatremia Causing Altered Sensorium with Low Dose Sertraline: Is It Possible to Miss It? A Case Report

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Introduction: Hyponatremia is defined as serum sodium less than 135 mEq/l while mild hyponatremia is when serum sodium is not less than 130 mEq/l. Hyponatremia may cause nausea, dizziness, dry mouth, malaise and when severe, leads to somnolence, seizures, and coma. Sertraline causing hyponatremia is commonly found in elderly and at higher dose (i.e. 100mg or 50mg OD). This case report is to study on the possibilities of psychotropic medication- induced hyponatremia which is common but important clinical problem with potential serious consequences if not recognised and treated early. **Case:** A 50-year-old lady with underlying hypertension, dyslipidemia and gastritis was admitted for left thalamic bleed with initial NIHSS of 10. During the in-patient stay, patient had low mood, reduce appetite and easily crying. The diagnosis of post stroke depression was supported with phq-9 of 11, hence T. Sertraline 25mg ON was commenced. Baseline sodium was 140. 1-week later patient had sudden onset of incoherent speech associated with confusion and nausea. Vital signs and random blood sugar were normal. However, repeated sodium showed 130. Other electrolytes were within normal range. Repeated CT Brain showed no significant changes. Serum and urine osmolar were within normal range. Sertraline was withheld, and patient was then started on mist sodium chloride 15mls. Patient should clinical improvement and repeated sodium after 4 days showed increment to 134 mEq/L. **Conclusion:** Mild hyponatremia can cause altered sensorium even with low dose sertraline in middle adulthood lady. Thus, prompt detection and treatment may reduce mortality and improve quality of life.

Keywords: hyponatremia, stroke, sertraline, SSRI

PP-02

Can I Find A Job After Finish My School?

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Introduction: The ultimate purpose of rehabilitation of adolescent with childhood-onset disabilities is to maximize their independency and participate in social, cultural and economic activities. Unfortunately, most of them grow up and facing many challenges and difficulty as they have multiple disabilities. They may not be able to do well in education due to cognitive deficit and concomitant disabilities, thus may negatively affect the possibility to get a sustainable job. In order to help facilitate them, good collaboration of medical rehabilitation team, parents and the adolescents with physical disabilities is essential in preparing them for vocational assessment and training. This pre-vocational program should start as early as possible because the adolescents may require extended training period before they are able to master the necessary skills. The aim is to highlight the importance of providing good guidance and opportunity during the period of 'emerging adulthood' which is a distinct developmental period which extends from 12-20 years old so that they can acquire or enhance pre-requisite skills for employment. **Case:** Here, we illustrate three patients who have been in the transition programme from school to work. From the cases, we had learnt that by improving level of independency in self-care, mobility and spending more time to explore on the vocational skills as well as getting the parental support is a worthy effort and critical to promote the young adult with disabilities in making living. **Conclusion:** Our intervention, co-created by multidisciplinary team effort can serve as steppingstone in helping the young adolescent emerge into the adult life with greater dignity and self-worthiness.

Keywords: Young adult, vocational rehabilitation, transition programme, physical disabilities

PP-03

Mucopolysaccharidosis Type IVA: A Rehabilitation Challenge

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Introduction: The mucopolysaccharidoses (MPSs) are a group of metabolic disorders caused by a specific lysosomal enzyme needed to degrade glycosaminoglycan (GAG). GAG is an important constituent of the extracellular matrix, joint fluid and connective tissue throughout the body. MPS type IVA also known as Morquio Syndrome is characterized by skeletal dysplasia. Spinal cord compression at the craniovertebral junction caused either by bony instability or localized tissue thickening is very common observe in these group of patients however there are limited descriptions regarding their specific rehabilitation management. **Methods:** We report a case of 24 years old Malay male who was diagnosed with MPS type IVA following a spinal cord injury and was referred to rehabilitation team for functional management of his condition and improvement of his quality of life. **Results:** After 2 months of inpatient Spinal Cord Injury rehabilitation, his Spinal Cord Independence Measure (SCIM) III improved from 36/100 to 84/100. His Modified Barthel Index (MBI) improved from 46/100 to 80/100. From initially bed ridden, he was able to walk using elbow crutches and performed personal activity of daily living (pADL) independently. **Conclusion:** Morquio syndrome is a progressive condition that mainly affects the skeleton at varies rate among affected individuals. Early diagnosis, treatment and careful long term follow up by the multidisciplinary team are important to prevent long term complications of the disease. **Keywords:** Mucopolysaccharidosis, spinal cord injury, rehabilitation

PP-04

Transdisciplinary Team Management in Diagnosis of Pancoast Tumour in a Patient with Paraparesis

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Introduction: Patients with Pancoast tumour often present with variable presentations which results in delay in diagnosis. This is a case report which showed that transdisciplinary team management is effective in improving the diagnosis of Pancoast tumour in a patient with paraparesis presented with left upper limb neuropathic pain and numbness, left Horner's syndrome and intrinsic muscle wasting of left hand.

Methods: This is a case report of a 55-year-old gentleman, who was a smoker of 30-pack year, with history of traumatic spinal cord injury with paraparesis, presented with 2-month history of left upper limb neuropathic pain with left hand weakness. Further examinations showed that the patient had left Horner's syndrome, clubbing of fingers and toes, left lower trunk brachial plexus injury with intrinsic muscle wasting of left hand. No pulmonary symptoms or constitutional symptoms reported. Transdisciplinary discussion was performed and concluded that the patient was suspected to have Pancoast tumour. A series of investigations and Computed Tomography of Thorax were performed, and Pancoast tumour was confirmed. **Results:** Transdisciplinary team management will aid in diagnosis of patient with Pancoast tumour. **Conclusion:** Transdisciplinary team management should be encouraged if there is a case with diagnostic challenge in order to improve the effectiveness of diagnostic workout and facilitate long term plan.

Keywords: Pancoast tumour, transdisciplinary team

PP-05

Footwear Preference Among Diabetic in Outpatient Clinic of UiTM Medical Specialist Centre, Sungai Buloh

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Introduction: Many complications can arise from diabetes, among other is peripheral neuropathy. Good footwear is necessary to prevent the complication of neuropathy such as recurrent foot ulcer and amputation. This study is hoped to give in depth knowledge on footwear preferences among person with diabetic to improve foot care education and footwear prescription among the healthcare provider. **Methods:** All patients attended Outpatient Clinic, UiTM Medical Specialist Centre, Sungai Buloh, in July 2018 were enrolled in this study. Foot examination was done to determine patients' King's College Classification. Subsequently, the patient was given foot questionnaire regarding foot history, knowledge and preferences. **Results:** 28 patients were enrolled for this study (11 males, 17 females). Based on foot examination, there were 67.9% of patient with normal foot (Stage 1) and 32.1% of patient with high risk foot (Stage 2). Based on the results, the most common shoes of choice of patients is sandals which was 50.0% and the least were leather and flip flops with 3.6% each. There were 46.4% of participants that wore shoes inside the house and 71.4% of patients wore socks during outing. **Conclusion:** Majority of patients were wearing improper footwear. Sandal and flip-flop were the most preferred footwear. Therefore, it is important to improve quality of footcare education especially on footwear in UiTM Specialist Medical Centre.

Keywords: Footwear, diabetes mellitus

PP-06

Depression Diagnosis with Adaptation Method in Stroke Survivor with Aphasia

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Introduction: Depression is one of the common complications among stroke patient, reported as high as 5% to 54% in one-month post stroke. The frequency of depressive disorder was 28% in first year. However, post stroke depression is often under diagnosed in stroke patients with aphasia. **Case:** A 50-year-old lady with no known psychiatric history presented with depressive symptoms following left Middle Cerebral Artery (MCA) infarct complicated with right hemiparesis and expressive aphasia. She was total carer dependent upon admission to rehabilitation ward. During in-patient rehabilitation, patient was found not engaging actively in rehabilitation program and was having low mood with crying spells most of the days, insomnia, worthlessness and thought of death. By clinical observation of nonverbal behaviour and the help of informants such as husband, staff nurses and managing physician; major depressive disorder was diagnosed based on DSM-V criteria. Subsequently she was started on Selective Serotonin Reuptake Inhibitor (SSRI). 2 weeks after treatment, patient noted to have significant improved in her mood, more forth coming and able to engage better in rehabilitation program. Upon discharge, she was able to perform basic activities of daily living with minimal help from her family members which significantly reduce the carer burden. **Conclusion:** Depression following stroke especially in patient with aphasia, is often overlooked and under treatment. Physician should always maintain awareness of this treatable condition as under-recognized of the condition will lead to suboptimal recovery, recurrent stroke and poor quality of life.

Keywords: Aphasia, depression, stroke, depression diagnostic method

PP-07

Alien Hand Syndrome: A Peculiar Challenge in Stroke Rehabilitation

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Introduction: Alien Hand Syndrome (AHS) is defined as a feeling when the affected hand feels foreign or “has a will of its own” *together* with observable involuntary motor activity. The alien limb sign includes failure to recognize ownership of one’s affected limb when visual cues are removed, a feeling that the affected limb is foreign, personification of the affected limb, and autonomous motor activity which is perceived as outside voluntary control. **Case:** We report three cases of stroke patients presented with AHS resulted by anterior circulation infarcts. Signs and symptoms of these patients are typical features of AHS variants that attributed to the different stroke locations. Literature searches showed limited information on rehabilitation guidelines for AHS, though neurodevelopmental approaches and task-oriented strategies are effective. **Conclusion:** Overall, it is a challenge for multidisciplinary health care teamwork from early detection of AHS to comprehensive rehabilitation for such patient to achieve optimal functional outcome.

Keywords: Alien hand syndrome, stroke, neurorehabilitation

PP-08

In the Eyes of The Fallers

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Introduction: Falls among hospital inpatients are common, ranging from 2.3 to 7 falls per 1,000 patient-days, and the risk of falls has been known to be higher in rehabilitation hospital setting. Individuals with cerebral palsy (CP) tend to have varying degrees of pre-existing motor, movement and balance impairments, thus causing them to have higher risks of falls. This case report was to highlight the importance of holistic patient assessment in identifying possible contributing factors for CP child with frequent falls. **Case:** 17 years old boy with Spastic Diplegic CP, GMFCS III, admitted for inpatient gait training one (1) year post-bilateral hamstrings released. He has retinopathy of prematurity on corrective glasses. He had three (3) episodes of falls in different initial positions (sitting, standing and lying in bed) within the three (3) months inpatient stays. After comprehensive review of the three (3) falls episodes, the common element identified from all the falls was that he was reaching out for objects just before the incidents. He was subsequently recognized to have depth perception issue and inaccuracy of reach issue which may be the key contributing factor for all the falls. **Conclusion:** Individuals with CP have higher risks of falls and visual impairment may be a crucial contributing factor that requires further evaluations. Thus, clinicians need to be more alert when managing CP child with frequent falls.

Keywords: Cerebral palsy, visual impairment, falls

PP-09

Complex Regional Pain Syndrome after Severe Right Hemispheric Stroke: A Case Report

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Introduction: Complex regional pain syndrome (CRPS) is a painful and disabling condition that affects one or more limbs. It typically occurs after localized nerve injury or distant aetiology including stroke. CRPS after stroke often involves the upper limb of affected side which may become a barrier to rehabilitation. **Case:** A 61 years old housewife was admitted for severe right middle cerebral artery infarct which was complicated with cerebral oedema that required an emergent right craniectomy at day 2 post stroke. Physical assessment revealed that she had impaired cognitive function, dysphagia, dysarthria, severe left hemi-neglect, left hemiparesis, reduced left sided sensations and left shoulder subluxation with left shoulder pain. During inpatient rehabilitation at 2 weeks post stroke, she developed pain and swelling in her left hand, associated with clinical signs consistent with CRPS. The pain affected her mood and she refused rehabilitation therapies. The pain was eventually under control with both non-pharmacological and pharmacological approaches. At discharge, she could ambulate without aid and perform most of her personal daily activities under supervision. At 3 months post stroke, despite poor motor strength of left hand, the swelling and pain had fully resolved. **Conclusion:** Prompt recognition of CRPS in stroke patient is important. Multidisciplinary team with multimodal approaches to achieve optimal treatment for CRPS helps to improve patient participation in stroke rehabilitation and ultimately improve functional outcome.

Keywords: Complex regional pain syndrome, stroke rehabilitation, shoulder hand syndrome

PP-10

High Amplitude Penile Vibrostimulation - A Diagnostic Cum Potential Therapeutic Modality for Neurogenic Anejaculation in Men with Spinal Cord Injury?

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Introduction: Neurogenic anejaculation has been reported to affect up to 95% of men with spinal cord injury (SCI), following which highly intense stimuli are required to trigger the remaining of sexual reflexes. Penile vibrostimulation (PVS) induces a strong afferent nerve stimulation and intense activation of the autonomic nervous system, and has been regarded as the first-line diagnostic modality to induce ejaculation in men with SCI. This report aims to describe PVS as an effective and safe diagnostic modality to successfully induce antegrade ejaculation in a series of SCI men with neurogenic anejaculation in the local setting. Additionally, we aim to explore its potential as a therapeutic modality. **Methods:** Stimulation was performed using a high amplitude PVS device (Vibrect X³) pre-set at 4 mm amplitude, 110 Hz frequency with simultaneous ventral-dorsal pads vibration. **Results:** Successful antegrade ejaculation was achieved within the duration of between 80 – 104 seconds in paraplegic men with total abstinence of more than 5 years following SCI. Additionally, PVS has been shown to be a potential therapeutic modality considering few patients regained spontaneous ejaculation following an initial session of successful diagnostic PVS. **Conclusion:** In our experience, PVS may serve as a diagnostic cum potential therapeutic modality for neurogenic anejaculation in men with SCI. To the best of our knowledge, there are no previous publication that ever described this observed phenomenon, thus further systematic research is indicated.

Keywords: Vibrostimulation, anejaculation, spinal cord injury

PP-11

Prosthetic Restoration in Lower Limb Amputation in HRPZ II: A Cost Analysis Study

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Introduction: The prevalence of lower limb amputation is increasing in Malaysia, lead to increase demand in prosthetic restoration. Prosthetic restoration gives rise and financial burden to our health care systems. Even though the annual cost for prosthetic restoration is a large economic burden, yet there is no proper data on direct costs of it in our country. The objectives of this study were to review the healthcare cost for prosthetic restoration in lower limb amputation in HRPZII and to compare between the cost of transtibial and transfemoral amputation. **Methods:** The medical records of lower limb amputation patients attending the rehabilitation clinic were retrospectively reviewed. Only those with transfemoral and transtibial amputation were included in this study. The amputee patient was seen by the rehabilitation medicine team from 2015 to 2107 and decided for prosthetic restoration. **Results:** 324 lower limb amputees attended the rehabilitation clinic from 2015 to 2017 with 211 (65.1%) were transtibial amputees and 113 (34.9%) were transfemoral amputees. Total cost of prosthetic restoration for this period was RM599330 with mean cost was RM186443 yearly. For transtibial amputation, it cost RM 387, 028 for three years while transfemoral amputation took up RM 212,302. **Conclusion:** The results suggest that prosthetic restoration place a substantial financial burden to our health care system and justify the need to carry out national level survey on the issue. Clinical practice guideline and health care policy need to establish as a frame of reference for prosthetic restoration including appropriate and effective screening tools.

Keywords: lower limb amputation, prosthetic restoration, cost

PP-12

I Love to Swim

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Introduction: Nowadays, childhood obesity is a medical crisis, this include children with physical disability. Unfortunately, due to the multiple disabilities add up with obesity, there must be intensive and continuous approach which should follow the procedures and schedule of rehabilitation medicine. In order to help ensure this rehabilitation process, good collaboration of medical rehabilitation team, paediatric team and parents is essential for rehabilitation therapy. In this case report, we share our experience in managing one patient with multiple disabilities and severe obesity.

Case: AD, 1 year 2 months old boy with central hypothyroidism, G6PD deficiency and neurodevelopmental regression with global developmental delay, bilateral profound sensory neural hearing loss and bilateral nystagmus with optic atrophy secondary to brain insult (meningitis with complication). He is feeding orally using bottles with formula milk 9 ounces every 2 hours. His BMI is 25.4, placing the BMI-for-age at greater than the 99th percentile for boys with weight of 16.8kg. Latest thyroid result shows that he is still in hypothyroidism state due to poor compliance of taking the levothyroxine. Severe obesity hindering the development of his physical function, such as turning from side to side, crawling. His carer able to do very minimal physical therapy due to his physical size and most of the time he just lies down on the bed. After going through multiple disciplinary approach by controlling thyroid function, educating carer regarding diet intake by reducing milk intake, start giving soft diet and intensive rehabilitation therapy mainly with hydrotherapy, AD able to turn and roll with minimal assist. **Conclusion:** Managing patients with multiple disabilities and obesity is challenging for both healthcare providers and the care givers. There are no single causes for obesity management and required multidisciplinary approach to optimize function.

Keywords: childhood obesity, BMI, hydrotherapy

PP-13

Bariatric Rehabilitation: Just Do It

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Introduction: Bariatric rehabilitation with comorbidity necessitates a multidisciplinary approach that requires a technologically equipped and structurally optimal environment. Objective of this case series is to discuss two individuals not only with morbid obesity but with underlying comorbidity in two different environments. One, in a tertiary hospital and one, in a district hospital. The challenges to achieve cardio-pulmonary fitness and weight reduction in different environments including modifications required to create an optimal and safe program is discussed. **Methods:** A 30-day inpatient rehabilitation program was conducted in Ipoh General Hospital and Batu Gajah Hospital. Both patients had morbid obesity (300kg and 190kg) with comorbidity. Pre and post rehabilitation outcomes were documented for both patients. This included weight (kg), Modified Rivermed Mobility Index (MRMI), Modified Barthel Index (MBI) and subjective cardiorespiratory fitness assessment. **Results:** Patient A achieved a weight reduction of 12 kg, increment in MRMI score from 24 to 33 and MBI score from 44 to 72. He was able to walk 3 meters unaided within a month. Patient B reduced weight by 14 kg and showed an increase in MRMI score from 15 to 30 and MBI score from 48 to 74. She was able to walk 4 meters with aid. **Conclusion:** Bariatric rehabilitation is not impossible. It can be done in either a tertiary or district hospital safely with a dedicated team. Being creative, modifying equipment and utilising available resources is paramount in achieving a holistic program in any environment.

Keywords: Bariatric, rehabilitation

PP-14

A Multimodal Neuromodulative Intervention in the Rehabilitation of Speech and Language Disorder in Post Stroke Dysphasia: A Case Series

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Introduction: Various restorative interventions have been described and shown to be effective in the rehabilitation of speech and language disorder, which includes behavioural therapy, pharmacological treatment and physical modulation. Non-invasive electrical stimulation or pharmacotherapy is frequently paired with behavioural therapy to enhance the outcome. However, there is limited evidence in combining all three interventions concurrently in a speech and language rehabilitation. We describe a multimodal neuromodulative intervention, which involves concurrent behavioural therapy, pharmacological treatment and physical modulation for speech and language disorder in two different chronicity of post stroke dysphasia. **Case:** Case #1 is a 77-year-old lady with expressive dysphasia secondary to left cortical stroke diagnosed 3 years ago (2015). She was prescribed with piracetam and underwent speech and language behavioural therapy for 2 years. She showed remarkable improvement, however recovery progress plateaued in year 3. She was prescribed transcranial direct current stimulation (tDCS) to augment the therapy. She showed further improvement in spontaneity and speed of speech after 2 weeks of tDCS. Case #2 is a 70-year-old lady, with a 4-month history of left cortical stroke and global dysphasia. She was also started on Piracetam 800mg BD, and subsequently underwent a multimodal speech and language intervention. She showed improvement in the receptive component after 2 weeks of intervention. **Results:** Both patients showed improvements in all domains tested during the sessions, except writing. The improvements lasted up to 6 weeks since they started tDCS. Improvement noted in terms of shorter time taken to complete the tasks and more accurate answers given as shown in the tables below. **Conclusion:** A multimodal restorative neuromodulation intervention may improve several domains of speech and language outcome. However, the improvement in both cases described above was not sustained. Further studies to determine the role of stimulation with tDCS to enhance speech and language improvement are warranted. **Keywords:** Multimodal, restorative, rehabilitation, post stroke dysphasia

P-15

Sinking Skin Flap Post Cranioplasty: Why Do We Need to Bother?

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Introduction: Patient post cranioplasty (CP) are frequently referred for rehabilitation thus awareness of possible complication of CP is important to be appreciated by the rehabilitation team. We present 2 cases of post cranioplasty complication encountered during the process of acquired brain injury rehabilitation. **Case:** Case 1 is Mr L, age 40 years, Chinese gentleman with underlying hypertension, had required decompressive craniectomy following an MCA aneurysm rupture. He subsequently underwent an autologous CP at 2 months post stroke. He was referred for rehabilitation to HTJS after 9 months post stroke. A mildly sunken CP site was noted which became more sunken following insertion of ventriculoperitoneal (VP) shunt for his hydrocephalus. Recranioplasty was done with premoulded titanium mesh and bone flap reconstruction. Intraoperative finding noted bone resorption of the flap; possibly led to sunken of the cranioplasty flap. Case 2 is Mr R, 52 years old Malay gentleman with risk factor of chronic smoker reviewed in clinic at 4-month post cranioplasty secondary malignant MCA infarct which needed decompressive craniectomy 5 months ago. We noticed he had a sunken skin flap with minimal pus discharge at the CP wound. However, patient had no symptoms of fever, headache, blurred vision, or worsening weakness. A Contrast enhanced CT scan was done which showed large right frontoparietal extradural collection. He required removal of the whole infected cranioplasty flap and drainage of the extradural collections. Intraoperatively it was noted areas of bone loss and pus oozing from bone defect and bone flap with 11x6 cm extradural collection. **Conclusion:** Bone Flap Resorption is one of the complications post cranioplasty especially with autologous graft that may manifest as sunken skin flap at CP site. Careful evaluation from rehabilitation doctors are important in order for early detection and prompt referral to neurosurgeons for the subsequent treatment prior to further rehabilitation.

Keywords: Sinking flap, resorbed bone

P-16

Functional Outcome for Patients with Spinal Cord Injury after Inpatient Rehabilitation

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Introduction: Spinal cord injury (SCI) is a devastating injury which could lead to significant impairment in physical, psychology and social wellbeing. Rehabilitation is important to assist patients to achieve highest level of independency. There is lack of data on the functional recovery after inpatient rehabilitation in Malaysia. The main objective of this study is to compare functional outcome for patients with SCI before and after inpatient rehabilitation. The secondary objectives are to examine the demographic and clinical characteristics of patients admitted for inpatient SCI rehabilitation. **Methods:** This is a retrospective cohort study. All patients with SCIs and admitted to the rehabilitation ward, Hospital Kuala Lumpur, from 2016 to 2017 were reviewed. The data were extracted from case records of the patients. The variables of interest analysed included demographic characteristics, co-morbidities, ethology, the severity of SCI, clinical presentation and length of inpatient stay. **Results:** 64 patients met the inclusion criteria. A significant difference ($p < 0.001$) in functional outcome was detected after inpatient rehabilitation for 63 patients after excluding missing data. The mean age of this cohort was 45 years, with a range between 14 and 77 years. Malays formed the majority (59.4%) of patients and most (75%) of patients are males. Half of the injuries (50%) were traumatic in origin. 59.4% of patients were paraplegic and 40.6% were tetraplegic. **Conclusion:** Significant improvement in functional abilities of patients with SCI following in-patient rehabilitation was observed. Future research could explore on barriers for higher functional outcome after rehabilitations. **Keywords:** Spinal cord injury, functional outcome

PP-17

Lower Limb Amputation: How About the Other Leg?

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Introduction: Lower extremity amputations are increasing problem among individuals with diabetes. Prior studies focused on the primary limb undergoing amputation. The objective of this study is to explore the status of the contralateral foot in amputees which has been followed up in Rehabilitation Specialist Clinic Hospital Sultanah Bahiyah. **Methods:** We performed a retrospective cross-sectional review of patients who underwent major lower extremity amputation which visited the clinic from June to August 2016. The status of contralateral foot is divided into foot with current, healed, no ulcer and amputated foot. **Results:** In 120 amputees, the mean age was 54.2 years, 64.2% were male. 71.1% had below knee amputation. 76.7% were amputated due to diabetes. The contralateral foot showed that 73.3% has no ulcer, 5.8% current ulcer, 4.2% healed ulcer and 16.7% had contralateral amputation. Out of patient's with contralateral amputation, 40% (n=8) had ray's amputation, 25% (n=5) trans-metatarsal, 25% (n=5) below knee, 5% (n=1) through knee and 5% (n=1) above knee amputation. Our study demonstrated 5.8% (n=7) had contralateral major amputation. This is consistent with a study made in England by Glaser et al. (2013) which showed 5.7% had a contralateral major amputation. However, our rate is lower than a study made in Texas by Izumi et al. (2006) which showed 11.6% had major amputation in a year. Meanwhile, there is still a gap of knowledge in literature on the incidence of contralateral foot ulcer. **Conclusion:** It is important for early recognition and close surveillance of the contralateral foot to prevent bilateral amputations which cause further disability.

Keywords: Amputation, contralateral leg, rehabilitation

PP-18

Adrenal Crisis-The Importance of Early Clinical Detection

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Introduction: Adrenal crisis is a potential life-threatening event for an individual with adrenal insufficiency. In an inpatient rehabilitation hospital setting, early detection and prompt management of adrenal crisis makes a difference in clinical outcome.

Methods: A 53 years old lady with underlying of hypertension, hyperlipidaemia, and adrenal insufficiency on corticosteroid replacement therapy, presented with ascending weakness of all extremities for 10 days. Neurologist confirmed the diagnosis of Guillain-Barre syndrome. She received intravenous immunoglobulin treatment and her neurological function improved. She was transferred to an inpatient rehabilitation ward for further neurological rehabilitation interventions. Two weeks after admission, she developed vomiting, fever and hypotensive events. She was clinically treated as urosepsis. Despite fluid resuscitation, antibiotics and supportive medications, she progressed to shock and hypoglycaemia. Adrenal crisis was suspected. She dramatically responded to intravenous hydrocortisone and was transferred to acute primary hospital for further management. **Results:** The patient improved gradually despite other complications such as nosocomial infections. She was discharged 4 weeks after acute management and was planned for review in the outpatient rehabilitation clinic for further rehabilitation plan. **Conclusion:** Symptoms of adrenal insufficiency are non-specific, and a high level of clinical suspicion is required to make the correct diagnosis. Adrenal crisis may occur even when an individual is receiving standard replacement therapy. Earlier detection of Adrenal crisis is critical, and delay of steroid replacement may result in mortality.

Keywords: Adrenal crisis

PP-19

Rehabilitation in Moyamoya Disease: A Case Report

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Introduction: Moyamoya disease (MMD) is a chronic cerebrovascular condition characterized by progressive stenosis of the arteries of the circle of Willis leading to a large number of collateral vessels to compensate for the ischemia. This local network of tiny blood vessels appear cloud like on angiogram giving Moyamoya its characteristic “puff of smoke” appearance on angiogram. We present here a case of verified MMD and the neurorehabilitation outcome. Objective of this case report is to report the outcome of rehabilitation in an MMD patient. **Case:** A 19-year-old Malay gentleman, chronic smoker 6 pack years presented with a fall secondary to sudden onset left sided body weakness associated with slurring of speech preceded by a headache. Initial CT Brain done showed no obvious abnormality. However, his left sided body weakness worsened, and a repeat CT brain showed minimal subarachnoid bleed at right frontal region and multifocal new infarct. By this time, his weakness had progressed to left hemiplegia. His blood investigation for young stroke work up was normal. MRI of the brain revealed right basal ganglia infarct and carotid doppler shows no evidence of stenosis. MRA was consistent with MMD. Right Superficial Temporal Artery-Middle Cerebral Artery bypass surgery done. He had undergone neurorehabilitation program both inpatient and outpatient. He achieved good functional recovery at 2 months post stroke despite only having partial neurological recovery. **Conclusion:** Rehabilitation is important in improving neurological outcome and maximizing functional recovery in MMD.

Keywords: Moyamoya disease, stroke, functional recovery

PP-20

Hyperthermia After Stroke – How Do We Manage?

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Introduction: Prolonged hyperthermia as a manifestation of autonomic dysregulation after stroke is uncommon. Definitive management guideline is not widely available. **Case:** We report a case of a 32-year-old gentleman who was admitted for rehabilitation following a massive ischemic stroke. CT scan revealed hypodense lesions over territories of left middle and bilateral anterior cerebral arteries. He presented with prolonged hyperthermia (body temperature ranged 37.6oC to 38.5oC) with associated persistent tachycardia (110 to 140 beats per minute) which interrupted the stroke rehabilitation programme. Infective and endocrine causes were ruled out. The temperature control was not optimized with non-pharmacological approaches. Paracetamol was contraindicated due to concurrent transaminitis. Sympathetic blockade with low dose propranolol dramatically normalized the body temperature. Subsequent dosage escalation of propranolol was necessary to achieve chronotropic control of heart rate. The patient remained afebrile throughout the inpatient rehabilitation phase. The heart rate was maintained within acceptable range with propranolol. The optimization of autonomic function resulted in improved participation in stroke rehabilitation programme, with subsequent recovery. **Conclusion:** Autonomic dysregulation can occur as a clinical sequela of stroke. Central hyperthermia with tachycardia potentially limits participation during stroke rehabilitation. Sympathetic blocking agent may be beneficial to achieve thermal and heart rate regulation. **Keywords:** Hyperthermia, stroke

PP-22

Defeating the Odds Of ODS: A Case Series on Rehabilitation Outcome of Individuals with Osmotic Demyelination Syndrome Presenting with Features of Incomplete Locked-In Syndrome

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Introduction: Osmotic demyelination syndrome (ODS) is a non-inflammatory demyelination neurologic manifestation seen with rapid osmotic change. The clinical manifestations vary depending on degree of central-pontine and extra-pontine involvement, including features of incomplete locked-in-syndrome (ILIS). The objective of this study is to highlight the functional recovery in highly dependent individuals with ODS and ILIS who underwent structured interdisciplinary inpatient neurorehabilitation.

Methods: Single- institution descriptive case-series of three individuals with ODS who presented to rehabilitation facility with features of ILIS. Clinical improvement and functional level via Modified Barthel Index (MBI) were recorded. **Results:** Three individuals with ODS admitted for neurorehabilitation were identified (admission range 5-6 weeks). All demonstrated ILIS features of quadriparesis, anarthria, oropharyngeal dysphagia, preserved vertical gaze but with some additional voluntary limb movements. *Case 1:* A 49-year-old-gentleman with ODS secondary to varicella infection with SIADH and rapid sodium correction. He additionally demonstrated tremors with neuro-psychological issues during the inpatient rehabilitation period. Functional level improved (MBI: 7 to 51) upon discharge. Successful reintegration into community was later attained at 6 months. *Case 2:* A 46-year-old lady with ODS due to rapid correction of hyponatraemia induced by thiazide. Functional level improved (MBI: 4 to 62) during inpatient rehabilitation and was ambulant upon discharge. *Case 3:* 57-year-old lady with ODS due to rapid sodium correction after chemotherapy-induced-hyperemesis. Dependency level improved (MBI: 0 to 16) upon discharge.

Conclusion: Individuals with ODS and ILIS are highly dependent and require extensive and prolonged neurorehabilitation. Despite high dependent level, patients with ODS can demonstrate immense functional recovery with structured interdisciplinary rehabilitation.

Keywords: Osmotic demyelination syndrome, central-pontine myelinosis, extra-pontine myelinosis, incomplete locked-in-syndrome

PP-23

Getting Better Slowly, Yet Steadily: An Illustrative Report on Functional Recovery Trend of Guillain-Barré Syndrome and Miller-Fisher Syndrome Subtypes following Neurorehabilitation

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Introduction: Guillain-Barré syndrome (GBS) and its principal variant, Miller-Fisher Syndrome (MFS) have several subtypes based on topographic clinical features outlined by GBS Classification Group. Despite demonstrating variable clinical course, rehabilitation of GBS/MFS patients result in prodigious improvement in functional recovery and overall outcome. Our aim is to highlight the subtypes of GBS/MFS as outlined by GBS Classification Group and illustrate subtype-specific recovery trend with neurorehabilitation. **Methods:** Single-institution, non-consecutive case series illustrating the functional recovery trend of six individuals; each representing various subtypes of GBS/MFS variants. Modified Barthel Index (MBI), Motor Assessment Scale (MAS) and Hughes GBS Disability Scale (HGDS) were compiled to illustrate recovery trend. **Results:** Six cases were identified to each represent Classical GBS, Paraparetic GBS, Pharyngo-Cervical-Brachial (PCB), Bifacial-Weakness with Paraesthesia (BFP), Classical MFS and Bickerstaff's Brainstem Encephalitis (BBE). Classical GBS, Paraparetic GBS, PCB collectively demonstrate large functional improvement. Initial admission functional score [MBI:20-29, MAS:16-20 and HGDS:4] improved within 2 months [MBI:74-100, MAS:36-47 and HGDS:2]. BFP and Classical MFS presented with higher functional score [MBI:45-71, MAS: 27-33, HGDS: 3-4] which improved within 2 months [MBI:87-100, MAS:39-44, HGDS:1]. BBE attained lowest admission functional score [MBI:2, MAS:15, HGDS:4]. Scores for BBE immensely increased within 2 years of rehabilitation [MBI:84, MAS:37, HGDS:3]. **Conclusion:** Functional recovery is demonstrated in all GBS/MFS subtypes, though with variable time interval and clinical course. Classical GBS showed greatest functional gain with the slowest functional recovery seen in BBE. A full clinical profile of consecutive GBS/MFC cases is useful to discern comprehensive functional recovery trend following neurorehabilitation within specific subtypes. **Keywords:** Guillain-Barré syndrome, Miller-Fisher syndrome, functional recovery, neurorehabilitation

PP-24

Hip Surveillance in Children with Cerebral Palsy

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Introduction: Abnormal movement or posture in children with cerebral palsy (CP) increases the risk and incidence of hip subluxation or dislocation. Hip surveillance plays an important prevention role in this matter. This is to explore the practice of hip surveillance for CP children in rehabilitation service. **Methods:** We reviewed clinical records of followed-up CP cases at the rehabilitation clinic. Data analysed included patient's demographics, Gross Motor Function Classification System (GMFCS), the date of the patient's first referral to the rehabilitation service and hip surveillance records. **Results:** We noted majority of CP children had records of hip surveillance as per clinically indicated. In some cases, patients do not have a record of early hip surveillance because they were referred to the rehabilitation clinic at a later stage. Hip subluxation and dislocation occur more in those with higher level of GMFCS IV-V. **Conclusion:** Multi-disciplinary healthcare providers should be aware of the importance of hip surveillance in CP children and facilitate their early referral to rehabilitation service.

Keywords: Hip surveillance, cerebral palsy

PP-25

The Use of a Humanoid with 25-Degrees of Freedom in Augmenting Physical Therapy for Children with Disability: Case Series through a Pilot Study

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Introduction: The use of humanoids for either therapy, social companion or as a service robot in recent years have seen positive developments. Our aim is to study the potential use of a humanoid with 25-degrees of freedom (DOF) for augmenting physical therapy for children with disability and to measure the clinical benefit.

Methods: Two children with Cerebral Palsy were chosen. Child #1, a 9-year-old male, with spastic diplegia and Gross Motor Function Classification System (GMFCS) II. Child #2, a 13-year-old with spastic quadriplegia and GMFCS IV. Both children underwent three interactive physical scenarios with the humanoid as a coach. The scenarios included sit-to-stand, single leg stand and ball kicking into a goal session. We also analysed the movement characteristics of the humanoid NAO. **Results:** The humanoid NAO has 11 DOF for the lower body (legs and pelvis) and 14 DOF for the upper body (trunk, arms, shoulder and head). To maintain balance for ambulation, the humanoid adopted a “crouching” posture, with hips and knees flexed and ankles dorsiflexed. Both chosen children completed the 8-week programme. Outcome measures used were the Gross Motor Function Measure (GMFM) and Timed Up and Go (TUG). Both children improved TUG scores. Child #2 improved in GMFM score. Child #1 was physically better and had reached a ceiling affect for GMFM improvement. **Conclusion:** The pilot study showed promising benefits of using humanoids to augment conventional rehabilitation. It is however not advisable for the humanoid NAO to teach gait as the humanoid exhibited a pathological gait pattern.

Keywords: Humanoid, children with disability, rehabilitation

PP-26

3-Dimensional Virtual Reality Environment as A Proposed Tool in Dual Cognitive Task Rehabilitation for Patients with Stroke

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Introduction: Dual cognitive task is defined as performing motor and cognitive task simultaneously. Patients with stroke may have difficulty to perform dual cognitive task. 3-dimensional virtual reality (3-D VR) is a proposed tool for stroke rehabilitation. Therapy can be conducted in a safe virtual environment within most setting. **Methods:** We developed a virtual reality environment incorporating game elements, game theories and game mechanics which fulfil clinical application to address stroke rehabilitation. The clinical application of the VR environment focuses on dual cognitive task training. **Results:** A framework design of 3-D VR environment have been applied to construct the game which includes the use of inexpensive equipment identified as low health risk, game elements which incorporates challenge, reward by score, motivation, adventure game genre, and the use of Prisoner's Dilemma game theory in decision making. The virtual environment created included element of conventional therapy with attention, balance and gait skills component. 3 levels of environment complexity matched with cognitive challenges such as counting backwards, multiplying numbers by 2 and subtraction of 7's from 100 were also incorporated into the gaming environment. **Conclusion:** A prototype 3D VR environment has been constructed based on the game elements described with potential clinical application for dual cognitive task rehabilitation. Challenges faced during the construct were to understand the clinical goals of dual cognitive task rehabilitation and matching the assessment with 3D VR elements.

Keywords: 3-dimensional virtual reality, serious game, stroke rehabilitation, dual cognitive task

PP-27

The Relationship between Major Lower Extremity Amputation and Its Risk Factors in A North Peninsular Malaysia Tertiary Hospital: A Survey of the Contralateral Leg.

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Introduction: Diabetes Mellitus and hypertension are known risk factors of major lower extremity amputation. Recognizing the effect of these risk factors on the contralateral leg is essential to prevent further disabilities. Objective: To evaluate the relationship between DM/hypertension and the health of contralateral leg in primary major lower extremity amputation patients. **Methods:** We performed a retrospective cross-sectional review of major lower extremity amputees who visited our Amputee clinic over a three-month period. The association between DM/ hypertension and health of the contralateral leg (amputated/ with ulcer vs. high risk foot/ without ulcer) was analysed using simple logistic regression. **Results:** We evaluated 120 patients who underwent major lower limb amputation from 2012 -2017: 67 have DM and hypertension, 31 have DM only, 5 have hypertension only, and the remaining 17 have neither DM nor hypertension. We observed a higher risk of developing an ulcer on the contralateral leg in diabetics (29.59%) in comparison with non-diabetics (13.63%). Similarly, hypertensive patients were more likely to develop an ulcer on the contralateral leg (31.08%) compared to the non-hypertensive group (19.57%). In general, patients with DM have 2.66 times higher risk of developing an ulcer on the contralateral leg compared to those without DM (Crude Odd Ratio: 2.66, p-value = 0.138). Patients with hypertension have 1.85 times higher risk than those without hypertension (Crude Odd Ratio: 1.85 p-value = 0.169). **Conclusion:** Patients with DM and hypertension have a higher risk of amputation or developing an ulcer on the contralateral leg; however, the result is not statistically significant. A bigger sample size is required to confirm the association.

Keywords: Amputation, risk factor, rehabilitation

PP-28

Dependent and 'Difficult': Rehabilitation Nursing Challenges in Managing Individuals with Osmotic Demyelination Syndrome

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Introduction: Osmotic Demyelination Syndrome (ODS) is an uncommon neurologic clinical condition which may arise following rapid correction of hyponatraemia. Individuals with ODS are often dependent with significant impairments, Rehabilitation nursing plays a pivotal role to ensure the complex needs are met. The objective of these studies is to highlight the rehabilitation nursing challenges in managing individuals with ODS who demonstrate high dependency level with concurrent difficult behaviour. **Methods:** Single-institution descriptive case series of two individuals with ODS. **Results:** *Case 1:* A 46-year-old lady with ODS due to rapid correction of hyponatraemia induced by thiazide presented with quadriparesis, anarthria, and oropharyngeal dysphagia. She demonstrated emotional lability, behavioural regression and tantrums outbursts with no identified triggers. Use of low tech alternative & augmentative communication (AAC) was useful to reduce unwarranted frustrations and clarify her needs. *Case 2:* A 49-year-old-gentleman with ODS due to rapid sodium correction following SIADH presented with quadriparesis with minimal movements of lower limbs, anarthria, oropharyngeal dysphagia and preserved vertical gaze. He experienced frequent nocturnal nightmares and produced disturbing howling-like sounds to indicate needs. With gradual improvement of lower limbs strength, he demonstrated aggression motions, impulsivity, and wandering tendency with increased fall risk. Frequent nursing rounds, AAC and accessible call-bell were reinforced. These environmental modifications alongside psychiatric review resulted in gradual improvement in behaviour. **Conclusion:** Difficult behaviour in ODS may arise from communication impairment or actual neuropsychological sequelae of ODS. Assessing client's needs and understanding of patho-clinical presentations, good psychological rapport, effective communication skill and appropriate environmental modifications are necessary to provide rehabilitation nursing care of utmost quality. **Keywords:** Osmotic demyelination syndrome, difficult, rehabilitation nursing, neurorehabilitation

PP-29

Challenge of Rehabilitation in Young Stroke Patient with Moyamoya Disease

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Introduction: Moyamoya disease is a rare cause of stroke among children and young adults. Stroke rehabilitation in the affected young patient with Moya moya disease is challenging but may have dramatic impact on the quality of life in survivors. **Case:** We reported a case of a 25-year-old lady who was referred for rehabilitation following previous history of Moyamoya related stroke in late 2010. She presented with residual right hemiparesis with right hemisensory loss, severe cognitive impairment, mixed transcortical aphasia and right homonymous hemianopia. Multidisciplinary approached rehabilitation programme was continuously set up to improve her functional outcome including intensive inpatient rehabilitation in early post stroke then followed by outpatient care. She again underwent inpatient rehabilitation late after stroke in 2017 with goals directed to improve gait pattern, domestic activities of daily living (ADL) training and evaluation of work employment. She exhibited improved physical functioning since 2011 as she was able to walk independently with right ankle foot orthosis. Intensive inpatient physiotherapy late after stroke in 2017 did slightly improve her gait pattern but the effects do not seem to be maintained, perhaps contributed by impaired cognitive and behaviour. She was able to perform personal ADL independently with Modified Barthel Index of 98%. Her domestic training was a challenging task due to multiple restrictive factors especially severe cognitive deficit with problem of logic concept, sequencing and memorizing during cooking. Gradually, she was able to do simple cooking task after repetitive training. Patient showed slow cognitive recovery as she obtained very low score in serial Mini Mental State Examination (MMSE). Further cognitive assessment revealed broad range of cognitive impairment in this patient causing difficulty with social independence particularly in work employment as she only able to perform simple task with constant supervision. Poor social support and behavioural issue also contribute to challenging rehabilitation progress in this patient. **Conclusion:** Even rehabilitation can be quite challenging in patients with Moyamoya disease related stroke, but it appears that these patients may still benefit from rehabilitation oriented toward neurological deficits under multidisciplinary holistic approach.

Keywords: Moyamoya, rehabilitation

PP-30

Chronic Intestinal Pseudo-obstruction in Chronic Traumatic Brain Injury - A Case Report

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Introduction: Chronic intestinal pseudo-obstruction (CIPO) is a rare but debilitating disease characterised by symptoms of mechanical bowel obstruction in the absence of any obstructive lesion. Clinical features of CIPO are usually under-recognized, resulting in malnutrition and delay in diagnosis. **Case:** We report a case of chronic intestinal pseudo-obstruction in a patient with chronic traumatic brain injury who has been on long term usage of baclofen and quetiapine. Following identification of possible causes and withdrawal of both medications, the obstruction resolved after 2 months. **Conclusion:** Combined usage of baclofen and drugs with anticholinergic effects should be prescribed with caution and extra vigilance. Potential secondary causes of chronic intestinal pseudo-obstruction need to be identified as it is potentially reversible.

Keywords: Pseudo-obstruction, baclofen, quetiapine, traumatic brain injury

PP-31

Multidisciplinary Management of Bilateral Heterotopic Ossification of the Hip

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Introduction: This is a case illustration of the multidisciplinary management of a case with bilateral heterotopic ossification. We describe in detail the events of this case management and outcome. **Case:** We report a case of a gentleman who had to undergo bilateral heterotopic ossification removal. We discuss the importance of management of this patient as a team in providing the optimum healthcare. Emphasis is made in managing this gentleman throughout his life. **Conclusion:** This article illustrates the importance of a multidisciplinary approach and knowledge of various methods in managing multiple disabilities that can help to achieve a realistic goal for the patient.

Keywords: Multidisciplinary, heterotopic ossification, rehabilitation.

PP-32

Improving the Quality of Life Among Stroke Survivors by Autogenic Relaxation Training

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Introduction: Stroke survivor's quality of life is a symbol of effectiveness of post stroke rehabilitation. Physical inactivity behaviours largely influenced by functional recovery and unconditional attention is required to the determinants of quality of life such as physical and mental health issues. Autogenic Relaxation Training (ART) is proved to be effective in improving health related quality of life in some conditions. However, there is lack of studies, which evaluated the effect of its positive influence on quality of life among stroke survivors. The aim of this experimental pilot study is to evaluate the effectiveness of ART in addition to usual physiotherapy in quality of life among stroke survivors. **Methods:** A total of 14 sub-acute stroke survivors are received 20 minutes ART followed by 40 minutes usual physiotherapy once a week and they were requested to carry out unsupervised ART at least twice per week, for six weeks. Post-intervention outcomes were assessed using Barthel Index (BI) and EuroQol 5-Dimension 5 Levels (EQ5D5L and EuroQol Visual Analogue Scale (EQVAS)). **Results:** The study shows statistically significant reduction of the EQ5D5L ($p=0.03$) scores of the participants. However, the mean score \pm SD of BI reduced from 95 ± 12.5 to 100 ± 6.25 is not statistically significant. The intervention is effective for stroke survivors with no adverse events reported. **Conclusion:** ART in addition to usual physiotherapy is promising in stroke rehabilitation by beneficial in improving quality of life among stroke survivors.

Keywords: autogenic relaxation training, stroke, functional ability, quality of life

PP-33

Hidden Patient Safety Threat: Dietary Errors in Hospital

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Introduction: Delivering the right diet to the right patient in hospital is important for patient safety. Hospital diet with wrong diet consistency will increase risk of aspiration pneumonia for patients with dysphagia. 28.5% of non-compliance to modified consistencies diet served to in-patients at Hospital Rehabilitasi Cheras (HRC) was reported due to wrong diet consistency. This study aims to identify all types of dietary errors and its contributing factors and therefore to reduce the dietary errors by implementation of remedial actions. **Methods:** A sequential clinical audit was conducted at HRC from May 2018 to July 2018, consisted of two phases (pre- and post-remedial measures). Data collection was done through observation during each meal, from the process of diet order until the diet being delivered to the patients. The event and cause of dietary errors were recorded. Re-audit was performed one month after implementation of remedial actions. Data was analyzed to determine difference between pre- and post-remedial actions. **Results:** During pre-remedial audit, 30 dietary errors (30.6%) were identified from 98 servings of modified consistencies diet, with wrong diet consistency served to the patients as the main contributing factor (76.7%). Department meeting and staff education were given as remedial measures to reduce the dietary errors. There was a significant reduction in percentage of dietary errors post remedial actions (from 30.6% to 12.4%, $p < 0.005$). **Conclusion:** This study shows that staff education is the first line of defense to reduce human errors. Regular monitoring and audit are required for the sustainability of improvement.

Keywords: Dietary errors, modified consistencies diet, clinical audit, dysphagia

PP-35

Prosthesis Usage after Restoration for People with Major Lower Limb Amputations

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Introduction: Major lower limb amputations can be divided into transtibial (TT), through knee, transfemoral (TF) and hip amputations. People who had major amputations would require prosthesis and/or walking aids for ambulation. In Amputee Rehabilitation Clinic, Hospital Kuala Lumpur, rehabilitation physicians would decide whether amputees are suitable for prosthesis restoration and the types of prosthesis suitable for them. There is lack of data on how many of them really use the prosthesis and how frequent do they use it after prosthesis restoration. The main objective is to determine the proportion of subjects, who use their prosthesis after restoration. Other objectives are to explore the demographics of people with major lower limb amputations, funding for prosthesis restoration and common barriers of prosthesis usage. **Methods:** It is a retrospective cohort study. All patients who were prescribed lower limb prosthesis in Amputee Rehabilitation Clinic from 2014 to 2016 were reviewed. The data were extracted from case records of the patients. The variables of interest analyzed. **Results:** 104 patients were prosthetically restored from 2014 to 2016 but 2 defaulted follow up. Out of 102 patients, 100 (98.04%) of them used the prosthesis while 2 (1.96%) of them did not use. 57 (55.88%) of patients used prosthesis less than 10 hours per day and 43(42.16%) used 10 hours or more per day. The most common reason for reduced prosthesis usage was problem with the prosthesis (33.33%). **Conclusion:** Issues with prosthesis have to be explored prior to prosthesis prescription.

Keywords: Lower limb amputation, prosthesis usage

PP-36

Pre-Post Cardiac Rehabilitation Program (CRP) towards the Physical Activity Performance and Psychological Health Status

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Introduction: Cardiovascular disease (CVD) are the leading cause of mortality worldwide and are a significant contributor to morbidity and health-related costs. Coronary heart disease (CHD) is the most common type of CVD. Cardiac Rehabilitation Program (CRP) is an effective and safe management of heart disease. Hence our study was aims to investigate the pre-post efficacy of six-week phase II CRP towards physical activity performance and psychological health of the participant of CVD. **Methods:** A total number of twelve participants with the mean age \pm SD (52.50 ± 12.97) participated in this study, consist of nine (75%) male and three females (25%) from Occupational Therapy Unit by using purposive sampling. Outcomes measured in this study include grip strength, lifting, Duke Activity Status Index (DASI), six-minute walk test (6MWT) and The Lawton Instrumental Activities of Daily Living. While only one questionnaire named Depression Anxiety Stress Scales - 21 (DASS-21) was used to measure psychological health status. All data were analysed by using non-parametric test with significance level set at $p < 0.05$ and Cohen's effect size (d). **Results:** The baselined showed a significant difference between the male and female in term of left and right grip strength, lifting and DASI score ($p < 0.05$). Almost all variables showed an improvement however only the lifting ($d = 0.618$), and DASI scores ($d = 0.891$) were achieve statistically significant difference ($p < 0.05$) before and after the CRP. **Conclusion:** This study portrays a clinically important outcome as it addresses the potential evidence of the benefit during phase II CRP as a therapeutic intervention in increasing physical activity performance and psychological health of patient with CVD.

Keywords: cardiovascular disease, cardiac rehabilitation, exercise, quality of life, Malaysia

PP-37

Botulinum Toxin Injection for Trismus associated with Brain Injury: I Want To Eat! – A Case Report

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Introduction: Trismus is spasm of the masticatory muscle with difficulty in opening the mouth which is essential for oral feeding, oral hygiene, and speech. It is an upper motor neuron syndrome caused by cerebral damage. Various modalities have been tried to treat trismus, but no intervention is reported to be solely effective. **Case:** A 25-year-old male sustained traumatic brain injury with polytrauma following motor vehicle accident. During review at clinic, he was alert and able to obey simple commands. He complained of inability to open his mouth which began 3 months post injury. Patient was fed through NG tube as oral feeding was impossible. Initial clinical examination revealed a mouth opening of 0mm. Botulinum toxin was injected into the masseter muscles (40u each) and temporalis muscles (10u each) bilaterally. A second cycle of Botulinum toxin injection was given post 6 months first cycle into the masseter muscles (50u each) bilaterally to further assist in mouth opening. **Results:** Following first cycle of injection, improvement in mouth opening was noted within 2 weeks from clenching to 6mm. Further improvement noted from 10.5mm to 13.5mm noted 2 weeks post second cycle of injection. **Conclusion:** Botulinum toxin injection into masseter and temporalis muscle can be used as an effective and safe treatment for trismus associated with brain injury.

Keywords: Botulinum toxin, trismus, masseter muscle, traumatic brain injury

PP-38

Burden and Coping Strategies among Caregivers of Heart Failure Patients

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Introduction: According to the Health Informatics Centre of Malaysia in 2011, cardiovascular disease is the leading cause of deaths worldwide and in Malaysia. Most often Heart Failure (HF) patients may experience disabilities which includes functional limitations due to their failing heart. Providing sustained care to HF patients is challenging and important because the presence of supportive care can affect the quality of life and mortality of HF patients. The objectives of the study include to investigate the coping strategies adopted by caregivers and to identify the relationship between burden and types of coping strategies used among heart failure patients' caregivers. **Methods:** This is a cross sectional study using a quantitative approach. The target population for this study was Heart Failure (HF) patients' caregivers. The instruments used to conduct this study were The Brief Cope and the Caregiver Reaction Assessment (CRA) questionnaire. **Results:** Results showed that the most used coping strategy was problem-focused (M=33.76, SD=3.62). In addition, there was a moderate positive relationship between maladaptive-focused and caregivers' burden ($r=0.56$, $p=0.001$). **Conclusion:** Designing support programs on adopting the correct coping strategies with caregivers can be helpful to reduce caregivers' burden. Therefore, education and practical support for caregivers during cardiac rehabilitation programs can be enhanced, thus further empower them to engage proactively in long-term care of patients.

Keywords: Caregiving, heart failure

PP-39

Unilateral Complete Claw Hand Presentation in Chiari Type 1 Malformation with Syringomyelia: A Case Report

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Introduction: Syringomyelia is a common complication of Type 1 Chiari Malformation. The clinical presentations of syringomyelia that were reported in the literature were variable which usually did not conform to the typical neurological signs and symptoms. The clinical presentation sometimes mimics the signs and symptoms of peripheral neuropathy. We would like to present a case of atypical unilateral complete claw hand presentation in a patient diagnosed with Type 1 Chiari Malformation with syringomyelia. **Case:** This is a 22 years old lady, presented with history of unilateral progressive weakness of the right hand over the period of 3 months. The weakness was accompanied with numbness which started distally and progressed to involve the whole arm. The weakness was confined to the distal area of the hand, slowly became more prominent associated with loss of muscle bulk over the thenar and hypothenar area, soon developed into a clawing deformity. There were absent of signs and symptoms of increase intracranial pressure, progressive neuropathic pain or neurogenic bladder and bowel. The dexterity of her right hand was affected, causing difficulty in performing daily activities **Conclusion:** Type 1 Chiari Malformation can be presented in a restricted segmental spinal lesion that may resembles peripheral neuropathy. The neurological clinical presentation of syringomyelia is variable with complete claw hand is one of the signs and symptoms. Higher suspicion is required in order to diagnosis the pathology with the help of nerve conduction study and magnetic resonance imaging of the spinal cord.

Keywords: Type 1 Chiari Malformation, syringomyelia, claw hand

PP-40

Impact of Personal and Environmental Factors towards Rehabilitation of Neglected Traumatic Spinal Cord Injury in A Rural Setting

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Introduction: Managing neglected spinal cord injury (SCI) patients in a rural setting can be very challenging due to the lack of resources and because of their unique personal and environmental contextual factors which may hinder rehabilitation. This article aims to identify the contextual factors and understand their impact towards successful rehabilitation. **Case:** A middle-aged man from a rural area had suffered a neglected traumatic SCI and was first seen by the rehabilitation team 17 years post injury. He was a T7 AIS A paraplegia, bedridden with multiple secondary complications. He was admitted with the goals to optimize his medical complications, initiate basic spinal rehabilitation and improve his functional status. By 1 month the patient made gradual improvement of his mobility and ADL but requested for discharge despite not yet achieving the rehab goals. We identified the factors that contributed to his poor motivation to be more functionally independent. His personal factors include poor educational level, his background personality and erroneous health seeking behaviour. Environmental factors include poor family and financial support, presence of physical barriers, lack of work opportunities and facilities for people with disability, poor community support and acceptance and poor healthcare facilities and expertise. **Conclusion:** The patient's personal and environmental factors have affected the delivery of prompt acute SCI management, spinal rehabilitation and management of secondary complications. Awareness of early spinal rehabilitation among the rural community and healthcare authorities is crucial to promote better implementation of policies, services or programs that may support people with SCI. **Keywords:** neglected spinal cord injury, rural, spinal rehabilitation, personal and environmental contextual factors

PP-41

A Descriptive Study of Hospital Acquired Infection in A Rehabilitation Hospital

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Introduction: Cheras Rehabilitation Hospital is a standalone rehabilitation hospital with no acute care facilities. Hospital acquired infection (HAI) rate of the hospitals in Malaysia was 1.30% in 2013, however there's a paucity of data on HAI in rehabilitation hospital. The objective of this study is to assess the prevalence of HAI in a rehabilitation hospital. **Methods:** A retrospective study of the medical records of adult patients who admitted between 1st January 2016 to 31st December 2016, who were started on antibiotics (except topical antibiotics) or transferred to acute care hospitals. Data of patients who fulfilled the criteria of HAI, according to 'Centers for Disease Control and Prevention', were collected. **Results:** The HAI rate was 7.8%, 38(57.6%) were male and 28(42.4%) were female. The mean age was 53.5±20.6 years old. The mean length of stay for HAI patients was 37.6 days, while the average hospital stay of all patients were 18.6 days [P-value <0.005]. HAI mostly occurred in stroke patients (42.4%) and spinal cord injury patients (28.8%). The common HAI were urinary tract infection (53%), skin and soft tissue infection (19.7%), and pneumonia (18.2%). 15.2% of HAI patients were transferred out to acute care hospital. **Conclusion:** HAI is common in rehabilitation hospital. HAI increases the length of hospital stay significantly and delays the rehabilitation progress. Further evaluation for the risk factors of HAI is needed in order to identify patients with high risk of developing HAI. Efforts in the practice of infection control program and effective prevention strategies are needed to prevent HAI.

Keywords: hospital acquired infection, rehabilitation hospital

PP-42

Modified Food and Fluids Classification: Towards A Common Language at the University of Malaya Medical Centre

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Introduction: Dysphagia cases cater 78% of case referred to Speech Language Therapist (SLT) at University Malaya Medical Center (UMMC). In view to the expansion of services, there's a need to have a detailed guideline on characteristics and textures of dysphagia diet. This project aims to identify a suitable framework to implement this new guideline at UMMC. **Methods:** A twofold investigation done; firstly, by critically appraised the topic (CAT) followed by informal industrial assessment to gain an idea of the current clinical practice on terminologies and classifications within Malaysia and around the world. **Results:** 21.43% of SLTs reported they did not follow any specific framework in their hospitals. Another 20% are following their hospital SOP but did not specify the evidence-based reference sources. 35.71% of the SLTs reported that they recommended certain dysphagia diet and fluid consistency for patients based on findings from subjective and objective swallowing assessments. 7.14% of the SLTs reported that the framework has been established by the pioneers in their hospitals and unsure of its evidence base. Among all, 7.14% of the SLTs referred the Australia guidelines, while another 7.14% based on UK/US researches with some modifications to cater food culture. To date, International Dysphagia Diet Standardisation Initiative (IDDSI) is working globally to develop international standardised terminology and definitions for texture modified foods and thickened liquids for dysphagia patients. **Conclusions:** It is recommended that a thorough consideration into the possibility of implementing IDDSI framework at the UMMC to meet up the current world standards.

Keywords: Dysphagia diet, modified food, modified fluids

PP-43

Reliability of Two-Minute Walk Test among Children and Adolescents with Cerebral Palsy

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Introduction: Two-minute walk test (2MWT) is one of the standardised outcome measures to measure walking performance. Previous studies had showed different methods of implementing the tests with conflicting results. In addition, very few studies had investigated the reliability of 2MWT among population with CP. The objective of this study is to investigate the reliability of 2MWT among children and adolescents with CP through test-retest reliability. **Methods:** Participants inclusion criteria were young people with CP aged 7-16 years who able to ambulate with or without walking aids and able to follow basic command. They were excluded if had botulinum toxin injection in the last 3 months, underwent for orthopaedic surgical in the lower extremity within last 6 months and had any congenital heart disease. During the assessment, participants required to walk for two minutes along 30 meters walkway. The same test was repeated after two weeks. **Results:** Twenty participants (12 females) were included in this study. The test-retest reliability showed that 2MWT had an excellent reliability with ICC=0.978 (95% CI: 0.95-0.99). The standard error measurement was found to be 1.44m and minimum detectable change was 3.33m. **Conclusion:** 2MWT is a reliable outcome measure to measure the walking performance of children and adolescents with CP.

Keywords: Cerebral palsy, reliability, 2-minute walk test, children

PP-45

Effectiveness of Inpatient Rehabilitation in A Cluster Hospital for Traumatic Spinal Cord Injury: A Case Study.

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Introduction: Malaysia is facing a rising demand for rehabilitation services. In 2014, the cluster hospital concept was introduced whereby each cluster consists of one lead hospital and two or more smaller specialist or non-specialist hospital sharing resources, facilities, manpower and equipment in a less urban area. Inpatient rehabilitation in a cluster hospital is beneficial for the recovery of spinal cord injury patients. This study is to demonstrate the progression of a young adult with complete traumatic SCI after intensive inpatient rehabilitation in a cluster setting. **Case:** A 22-year-old who sustained traumatic SCI at T5 level presented with paralysis of both lower limbs after a motor vehicle accident. He underwent laminectomy in June 2017 and started intensive inpatient rehabilitation on post-surgical day 7. Initial neurological evaluation was done, and progression was seen on subject as he improved from T5 ASIA A complete paraplegia to ASIA grade D, improved BBS score (from 1 to 44) and SCIM (from 6 to 71). His functional ambulation also improved from non-functional ambulation to independent ambulation using walking frame on level surface (0 to 4). **Conclusion:** The subject's function progressed from complete dependence to near total independence. The results demonstrated functional benefits of intensive inpatient rehabilitation in a cluster hospital and helps substantiate the need for inpatient rehabilitation following SCI.

Keywords: Rehabilitation, spinal cord injury, paraplegia, independence

PP-46

The Adjustable Ankle-Foot Orthosis following BoNT-A injection to Reduce Plantar Flexion Contracture in An Individual with Spastic Hemiplegic Cerebral Palsy: A Case Report

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Introduction: The purpose of this article is to describe spasticity management in a child with cerebral palsy and the option of adjustable solid Ankle Foot Orthosis (AFO) to improve the outcome as an alternative to serial casting to provide low load prolonged stretch effect. **Methods:** A 13-year-old girl with left spastic hemiplegic cerebral palsy (CP) under Rehabilitation Medicine clinic follow up complained of worsening of equinus gait with varus deformity and pain during walking. Complete clinical examination was carried out. Patient had a Botulinum toxin A (BoNT-A) injection for her left gastrocnemius and soleus followed by serial casting with the aim to improve gait and pain management. Serial casting was poorly tolerated after the first cycle; henceforth an option of adjustable solid ankle foot orthosis (AFO) was discussed. **Results:** Patient prescribed with adjustable solid AFO after discussion with a certified orthotist and prosthetist (CPO) and parents. The patient's dorsiflexion passive range of motion increased from -25 degrees to -15 degrees after 2 months of usage at night with gradual adjustment. **Conclusion:** The application of an adjustable ankle- foot orthosis following BoNT-A injection may reduce plantar flexion contractures in cerebral palsy patients. Thus, this may be an option for patients whom are unable to tolerate serial casting post BoNT-A injection.

Keywords: equinovarus foot, cerebral palsy, adjustable, ankle foot orthosis

PP-47

Rehabilitative Outcome on Patient with Multiple Amputations due to Gangrene from Inotropes Side Effect – A Case Report

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Introduction: We present a case of multiple limb amputation secondary to gangrene due to inotropes use and the pioneering, cost-effective rehabilitative steps that were taken as a result of lack of funding with the sole purpose of re-integrating the patient back into the community. **Case:** A 20-year-old lady with a history of anaemia and heart disease presented with fever and heart failure symptoms was diagnosed with septic shock secondary to infective endocarditis and was started on triple inotropes including noradrenaline in the medical intensive care unit. She developed DIVC as well as dry gangrene of the bilateral toes and hand due to inotrope use. Multiple limb amputations were performed on her. Multiple rehabilitative steps were taken, for instance, referral to psychiatric treatment as patient suffered from depression upon improved cognitive ability after therapy. Modified adaptive devices were prepared innovatively by the therapist to facilitate hand function as patient refused any surgical intervention. Independent bed mobility, sit-to-stand, and short distance walking training were given. Other mobility facilitating equipment including lightweight DAF wheelchair, commode chair, forearm walker, knee and Syme prosthesis, silicone gloves and elbow mechanical prosthesis was prescribed. A 3D bionic arm and integration into society are among the final rehabilitative steps. **Conclusion:** These rehabilitative steps engaged would improve behavioural health and present a learning opportunity to the therapist on assistive technology and adaptive equipment.

Keywords: Amputation, gangrene, inotrope, rehabilitation

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The Use of Amantadine: Does It Improve Cognition Following Hypoxic Ischaemic Encephalopathy (HIE)? A Case Report

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Introduction: Amantadine was initially used as an antiviral agent in the prevention of influenza A. Its potential property as a neurostimulant agent was quickly recognized and is now commonly used in the treatment of Parkinson's disease. Previous studies believe that Amantadine can improve arousal in comatose patients after traumatic brain injury. There is limited evidence of similar effect on patient with HIE. To report a case of the use of Amantadine in improving arousal in patient with HIE. **Case:** 51-year-old man suffered HIE after a failed resuscitation and intubation in 2015. He was in vegetative state and total dependent on carer for the last 3 years. His GCS was E4VtM3 and on PEG tube for feeding. He was admitted into HRC for trial of Amantadine to enhance cognition and arousal. The dose of Amantadine was started at 50mg twice daily at week 1, 100mg twice daily at week 2, 150mg twice daily at week 3 and 200mg twice daily at week 4 and then weaned over the following 3 weeks. The rate of cognitive recovery was assessed using JFK Coma Recovery Scale-Revised (JFK-CRS) and Disability Rating Scale (DRS). During the 4-week treatment period, there was improvement in auditory, motor and verbal function as detected on JFK-CRS. Changes remained over the weaning off period and after 2 months stopping the medication. There was no improvement detected on DRS. **Conclusions:** Amantadine appears to be a feasible option in enhancing cognition and arousal on patient post HIE. More clinical trials are needed to better define the drug efficacy and the possible drug adverse reaction.

Keywords: Phenytoin, thrombocytopenia, dexamethasone, rehabilitation

PP-49

Challenges in Managing A Patient with Central Post-Stroke Pain: A Case Report

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Introduction: Patient with central pain may suffer from severely impaired quality of life. In clinical practice, the treatment of patients with central post stroke pain is often based on trial and error until pain relief is found. This is a case illustration of the challenges faced in managing a patient with central post stroke pain secondary to right thalamic bleed. We describe in detail the events of this case management and the challenges that we had encountered. **Case:** A 68-year-old lady suffered right thalamic bleed secondary to hypertensive crisis and was further complicated with central post stroke pain over the hemiparetic side. The burning and pricking pain she experienced over her left upper limb severely disturbed her activities of daily living and caused sleep deprivation at night. We started her on pharmacological treatment, namely Amitriptyline, which was later changed to Gabapentin, but gave little help. We incorporated cognitive behavioral therapy, breathing and relaxation techniques but without patient's full commitment, which outcome was unfavorable. She also underwent several acupuncture sessions but was dissatisfied with the outcome. Due to multiple therapy resistance, we offered her electrical neurostimulation. However, the patient refused and insisted to continue with suboptimal dose of Gabapentin. **Conclusion:** There is indeed a great need to identify better treatment regimes in managing central post stroke pain. However, the holistic approach, both medical and psychological, together with the patient's own commitment towards the treatment offered are the only current best practice available.

Keywords: Post-stroke pain, thalamic pain, therapeutic modalities

PP-50

Pulmonary Rehabilitation in Pulmonary Alveolar Proteinosis. Useful Functioning Option for Patient: A Case Report

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Introduction: Idiopathic Pulmonary Alveolar Proteinosis (PAP) is a rare diffuse lung disease characterized by dense accumulation of phospholipoproteinaceous material in the alveoli. Whole Lung Lavage (WLL) is currently the mainstay of management for this disorder. **Case:** A 29-year-old lady presented with recurrent cough and episodes of shortness of breath which worsened during her third pregnancy. X-ray revealed patchy consolidation and CT Thorax showed “crazy-paving” appearance. After delivery, bronchoscopy was done to confirm the diagnosis. She underwent several WLL within 2 years and currently on Pulmonary Rehabilitation Programme that ameliorates her symptoms and she able to do acceptable daily activities. **Conclusion:** Rehabilitation serves as an important component of the management of chronic obstructive pulmonary disease (COPD) and is beneficial in improving health-related quality of life and exercise capacity, thus helps patient to have better coping mechanism towards their illness.

Keywords: pulmonary alveolar proteinosis, whole lung lavage, pulmonary rehabilitation

POST-CONFERENCE WORKSHOP TECHNICAL PAPER

BOTULINUM TOXIN – A: DEFINING AN UPPER LIMB SPASTICITY ASSESSMENT AND PLAN OF MANAGEMENT

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ABSTRACT

Spasticity is a common post-stroke complication which requires multimodal rehabilitation approaches in its' management. Botulinum toxin injection has shown to be effective to reduce post-stroke spasticity. A comprehensive assessment is mandatory to ensure the optimum outcome attained with the usage of botulinum toxin in order to achieve the treatment goals. We would like to illustrate the process of comprehensive rehabilitation assessment for two post-stroke patients, which include physical examination, goal setting, muscle selection, dosage calculation and technique of botulinum toxin injection.

Keywords: Post-stroke upper limb spasticity, Botulinum toxin-A, rehabilitation

INTRODUCTION

An expert led discussion comprising of 19 Rehabilitation Physicians discussed the spasticity management of two stroke patients during a post-conference workshop. Both case histories were presented, onsite clinical examinations were conducted, followed by discussion on goal setting, muscle selection and dosage calculation. The session also included muscle identification via ultrasound guidance.

Case 1

A 27-year-old female with underlying hypertension, diabetes mellitus Type I, and Stage IV chronic kidney disease suffered a right ischemic stroke in 2011, complicated with spasticity of the left upper and lower limb. She complained of shoulder pain upon stretching of the joint, difficulty in performing upper garment dressing and maintaining skin hygiene of the hemiparetic side especially around the area of axilla and palm. She had received botulinum toxin-A injection twice previously to the left biceps and brachioradialis muscles. Examination findings are summarized in Table 1.

Table 1: Examination of Left Upper Limb

Left Upper Limb	
ROM	Subluxation of shoulder Painful beyond 110° shoulder abduction
Tone	
Subscapularis	MAS 3
Pectoralis major	MAS 2
Triceps	MAS 2
Biceps	MAS 1
Brachioradialis	MAS 1+
Brachialis	MAS 2
Power	
Shoulder abduction	3
Elbow flexion	3
Elbow extension	4
Forearm supination	0
Forearm pronation	3
Wrist flexion	0
Wrist extension	0
Flexor pollicis longus	1+
Abductor pollicis brevis	1+
Flexor pollicis brevis	1+
Lumbrical*	Puckering of skin
Sensation	Reduced

*Puckering indicates spasticity rather than muscle atrophy

Through collective discussion of the expert panel with the patient, the following rehabilitation goals were agreed upon; 1) to reduce left shoulder pain, 2) to improve activities of daily function (ADL) with target of upper garment dressing, 3) to improve skin hygiene of the left hand and 4) to prevent joint contracture.

In order to achieve the above goals, a structured multimodal rehabilitation programme was planned which consist of pharmacotherapy with botulinum toxin injection followed by physical therapy and functional therapy to achieve maximal outcome. These were the muscles identified and the decided doses of botulinum toxin (Botox®) to be injected; pectoralis major (66 U); subcapularis (50 U); brachioradialis (33 U); biceps (33 U); triceps (33 U); pronator teres (33 U); pronator quadratus (17 U); flexor carpi radialis (33 U), flexor carpi ulnaris (33 U), lumbricals (17 U); flexor digitorum superficialis (33 U); flexor digitorum profundus (25 U); flexor pollicis longus (17 U); and adductor pollicis (4.5 U) and flexor pollicis brevis (4.5 U). A 3 ml dilution to one vial of botulinum toxin (Botox®) of 100U was used to ease the calculation of volume concentration. Physical therapy consisting of stretching exercise of the spastic muscles and strengthening of the antagonistic muscles was prescribed. Anti-spastic splint was also prescribed to provide prolong stretching and promote correct joint positioning. Physical modalities such as deep heat therapy with ultrasound may enhance soft tissue blood circulation and improve elasticity hence reduce pain and improve range of motion of the shoulder joint. Functional therapy which is task specific training was prescribed as part of the treatment plan to improve the quality of daily activities.

Case 2

A 43-year-old female with underlying hypertension and diabetes mellitus had suffered a haemorrhagic stroke at the age of 28-years. As a result, she has right hemiparesis with spasticity and dystonia, hemisensory loss, and dysarthria. The dystonia resulted in the difficulty of performing fine motor activities. She was treated with Baclofen 10mg bid and Benzhexol 1mg bid for dystonia but was unable to tolerate the medications as it caused drowsiness. Furthermore, she has difficulty in performing upper limbs activities such as combing hair, wearing bra and turning doorknobs. Reaching and gripping objects can be also distressing for her to perform due to abnormal posturing of the hand. These caused generalized fatigue as she required more effort to coordinate her movement.

During active movement of the shoulder joint, she demonstrated limited range of motion in shoulder abduction, forward flexion, internal, and external rotation. She also had difficulty with supination of the forearm and abnormal posture of the fingers; thumb in palm, flexion of distal interphalangeal joint of the thumb and index finger, and flexion of 3rd and 4th metacarpophalangeal joints. These resulted in difficulty of opening the hand (finger extension) to receive or release object as well as with reaching forward movement. The difficulty in movement and abnormal posturing was contributed by combination of spasticity and dystonia which were more apparent in the distal muscles.

Through collective discussion of the expert panel with the patient, the following rehabilitation goals were agreed upon; 1) to improve hand dexterity (turning doorknobs and upper body undergarment dressing), 2) to reduce fatigue by improving hand coordination and 3) to reduce shoulder pain.

Treatment plan consisted of multimodal rehabilitation approach which involves the use of botulinum toxin injection of the upper limb followed by physical and functional therapies. Specific muscle selections for botulinum toxin injection were as followed; subscapularis (66 U to 100 U); brachioradialis (33 U), brachialis (33 U), pronator teres (33 U), pronator quadratus (9 U), flexor pollicis brevis (3-4 U), adductor pollicis (3 U), flexor pollicis longus (9 U), 1st flexor digitorum superficialis (3 U), fourth lumbrical (3 U), and fifth lumbrical (3 U).

Following the injection, patient would require these physical therapies: stretching of the shoulder internal rotators, brachioradialis, brachialis, pronators teres and quadratus, strengthening of the shoulder abductors, both rotators, triceps, and supinator. Task specific training was also prescribed, consisting of drinking water using a cup, eat food, opening and closing doors using knobs, holding and manipulating smart phone and television remote, and operating electrical switches. Cursive writing and playing musical instruments such as keyboard or piano will also be helpful to facilitate functional improvement. Sensory re-education is also warranted to enhance the functional outcome by improving the hand coordination. Compensatory strategies such as adaptive devices, activity and environment modification should be integrated in the rehabilitation intervention to improve the functional performance and reduce fatigue.

DISCUSSION

Spasticity is a common debilitating complication in post stroke patients which may hinder functional recovery(1). Hence, it is important to address this condition systematically to enable appropriate treatment plan with the aim to reduce disability. In this workshop, two cases were discussed; Case 1 is a classical spasticity case while Case 2 is a mixed spasticity and dystonia.

Botulinum toxin-A has shown to be effective for the management of localized spasticity and dystonia. Several factors can influence the outcome of botulinum toxin-A injection which are; 1) muscle selection 2) dose calculation 3) mode of injection technique 4) physician experience 5) spasticity vs dystonia, and 6) post injection treatment plan (2-8).

Systematic approach including history taking, exploration of patient's concern, thorough physical examination, functional assessment, and analysis of patient's problem are crucial in setting the rehabilitation goals. Treatment plan should be goal orientated, specific, measurable, attainable, realistic and timely, which should be discussed and agreed between patient and treating rehabilitation team(9).

Observation of patient dynamic movement, knowledge of anatomy and muscle biomechanics, play an important role in muscle selection(8). Differentiating type of muscle tone abnormality and classification of its severity are crucial in deciding appropriate dosing(8). Spasticity require higher dosage compared to dystonia(8,10). Previous dose of botulinum toxin-A and previous response should also be taken into consideration on deciding optimum injection dose(11).

To enhance accuracy of injection, good knowledge on surface anatomy, use of ultrasound guidance and needle electromyography are important(7,10). To date, the evidences of superiority of injection methods are limited and dependent on the experience of the treating physician(7). However, through the experience and panel discussion of the 19 rehabilitation physicians, ultrasound is more preferred than needle electromyography and surface anatomy for muscle identification. The muscle anatomy may be distorted due to chronic spasticity to rely entirely on surface marking for muscle identification. The needle electromyography is also more invasive and requires additional equipment procurement.

Botulinum toxin-A injections alone does not provide optimum effect. Comprehensive post injection treatment should be planned and prescribed by an interdisciplinary team(11). Specific muscles to stretch and/or strengthen should be decided during the assessment. Task specific training is vital to translate treatment towards achievable functional goal. Orthotic prescription to maintain and provide correct joint positioning is also important. In summary decision of Botulinum toxins injection should improve functional outcome if these three phases were done diligently by the team; 1) Examination findings for goal settings, 2) identification of muscle, dosage and best method for injection, 3) Specific post injection rehabilitation strategy. Hence, rehabilitation intervention should be customised to individualised patient. These goals may also change and evolve through time, thus periodical review is mandatory.

The expert led discussion then concluded and listed the **recommendations as below:**

We recommend the following:

1. Decision to inject BoNT-A and dose is dependent on three factors:
 - i. Goal oriented: choose the muscle depending on objective e.g.: task specific activity, pain, positioning, ease of care and hygiene as examples
 - ii. Muscle tone pathophysiology: dystonia will require lower doses of BoNT-A as compared to spasticity, which will require higher doses
 - iii. Previous dose: if inadequate to optimize, if optimum to maintain
2. Identification of muscle using ultrasound
3. Post injection rehabilitation management must be followed by stretching, strengthening, orthosis and task specific therapy as indicated
4. Follow- up assessment to evaluate outcome of BoNT-A injection should be objectively done

Acknowledgments

All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this manuscript, take responsibility for the integrity of the work, and have given final approval for the version to be published.

We acknowledge the medical writing support in the preparation of this article by Dr Punit Srivastava of MediCeption Science (www.medicaption.com). Medical writing and publication support were funded with the help of publication grant by Allergan Singapore Pte Ltd.

Conflict of interest

The publication grant and the Expert Led discussion workshop conducted at the 10th Annual Malaysian Rehabilitation Medicine Conference was supported by Allergan.

Compliance with ethics guidelines

This article is based on previously conducted studies, clinical experience, and does not involve any new studies of human or animal subjects performed by any of the authors.

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