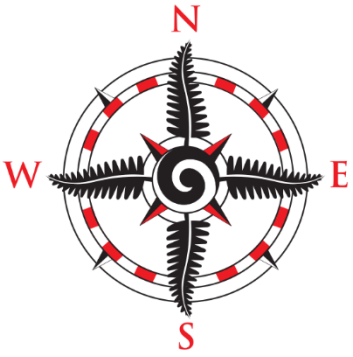

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Poster abstracts

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01

Effectiveness of Prehabilitation in Asymptomatic Breast Cancer Patients Before and After Radiation Therapy - A Medical Center Experience in Taiwan

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Background and aim(s):
Breast cancer is the most prevalent cancer being diagnosed in Taiwan for women. Prehabilitation means that via education and early management to prevent possible symptoms accompanying by breast cancer and radiotherapy such as functional limitation of the shoulder, lymphedema, peripheral neuropathy, and sexual dysfunction. The aim of the study was to evaluate the effectiveness of prehabilitation in asymptomatic breast cancer patients.

Method:
Patients with breast cancer referred by radiation oncologists from March 2017 through April 2018 before starting radiotherapy were included. EORTC QLQ-BR23 (European Organization for Research and Treatment of Cancer) was used to evaluate the quality of life of breast cancer patients. The questionnaires were performed on breast cancer patients before radiotherapy and three months after radiotherapy.

Result(s):
129 breast cancer patients were enrolled in this study. Preliminary data showed 69 valid questionnaires were collected. Most of the invalid questionnaires were caused by patients refusing to answer questions related to sexual life. The mean age of valid respondents of the quantitative survey was 54±11.06. The mean quality of life score before radiotherapy was 39.13±9.12. Elderly asymptomatic women had better quality of life than younger patients before radiotherapy (37.71±8.52 versus 40.59±9.61). After prehabilitation, the mean quality of life score became 33.33±3.22.

Conclusion(s):
In our study, the quality of life in asymptomatic elderly patient was better than younger women. We also found the improvement in quality of life by prehabilitation management. Accordingly, prehabilitation for asymptomatic breast cancer patients was recommended. Further data will continue to be collected to evaluate the outcome of prehabilitation.

02

Treatment progress and biomechanical properties of adhesive capsulitis after breast cancer surgery

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Background and aim:
Adhesive capsulitis occurs frequently in patients after breast cancer surgery. The mechanisms are reported as surgery itself, postoperative shoulder motion limitation, radiotherapy, and soft tissue adhesion.

The purpose of this study was to identify the effect of hydraulic expansion on patients who underwent breast cancer surgery and to characterize the biomechanical properties of their glenohumeral joint capsules.

Method:
This case-control study of 23 prospective patients with breast cancer surgery (BCS) and 44 retrospective patients without BCS. Both group patients were diagnosed as adhesive capsulitis and were underwent hydraulic distension therapy.

Prospective participants were evaluated with passive range of motion on affected shoulder and questionnaire (VAS; visual analogue scale, SPADI; shoulder pain and disability index)

Result:
The mean age of the case group was 51.30 ± 6.58 yrs and mean symptom duration was 7.63 ± 5.51 months (Table 1).

There was a significant improvement of all range of motion (abduction, flexion, external rotation) at the 2 weeks and 4 weeks after hydraulic distension. Significant results were also observed in the changes of SPADI (Table 2).

There were significant differences in mechanical characteristics (maximum volume and capsular stiffness) between case and control groups. The mean value of capsular stiffness was 19.69 ± 10.58 mmHg/mL in case group and 11.55 ± 7.77 mmHg/mL in control group. (p-value = 0.001) (Table 3)

Conclusion:
Intraarticular hydraulic distension with steroid was effective in patients with adhesive capsulitis after breast cancer surgery. The mechanical characteristics of adhesive capsulitis after breast cancer surgery differ from those of general adhesive capsulitis.

03

The Use of Wearable Exercise Tracker in Cancer Rehabilitation Patients

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Background and aim(s):
Cancer patients benefit from physical exercise program in terms of improvement in fitness level and functional status. Wearable trackers are known for its popular use in healthy, active patients but limited studies have been conducted in cancer patients. The objective of this study is to obtain feasibility data on the use of wearable activity trackers for cancer patients and its ability to monitor physical activity of patients undergoing rehabilitation at a tertiary cancer center.

Method:
One hundred patients undergoing Cancer Rehabilitation were enrolled in the study. Each participant received a wearable exercise tracker watch (Fitbit Charge HR2) and an iPod touch. Participants were asked to wear the watch for 24 hours for duration of the 14 days of the study. Compliance variables such as daily time wearing the watch were summarized as well as demographic variables. Patients completed surveys at the end of the study evaluating the use of the watch.

Result(s):
The majority of the participants were female (54%), married (69%) and white ethnicity (70%). The data showed 69 patients (69%) wore watch all day (24 hrs) for at least one day. Smaller percentages wore the watch for the full duration of the study, 3 patients (3%) wore the watch every day for 24 hours for 2 weeks and 7 (7%) patients wore the watch daily for at least 8 hours for the 2 weeks of the study. 95 patients (95%) reported partially or completely agreeing that they wore the watch daily and 92 (92%) patients partially or completely agreed the watch was comfortable to wear on a daily basis.

Conclusion(s):
Cancer patients were able to adhere to wearing the wearable exercise tracker for the majority of the day. Further study will examine the terms of improvement in fitness level and functional status.

04

Muscle fibrosis after Radiotherapy in Head and Neck Cancer Patients Evaluated by Elastography

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Head and neck cancer patients survive longer and longer with the evolution of radiotherapy, chemotherapy, and general care. However, the life quality of these patients were among the worst in all cancer patients. Late onset radiation toxicity, among the most important treatment complications, are extremely under-investigated regarding the scarcity of research on how, when, and to whom the late toxicity takes place. Consequently, patients need to survey late toxicity on their own. In this longitudinal study, we followed up 30 head and neck patients for 2 years and regularly applied high frequency ultrasound probe to investigate muscles stiffness after radiation therapy, using acoustic radiation force impulse (ARFI)

technique, including the longitudinal and transverse view of sternocleidomastoid muscle (SCM), the trapezius muscle, levator scapula muscle, and the transverse view of scalene anterior muscle. Under transverse view examination, all muscles showed softening change at the 1-year follow up visit, and partial recovery at 2-year follow up visit. Under longitudinal view examination, SCM muscle showed hardening change at the 1-year follow up visit, and even harder at 2-year follow up visit. There were already plenty research showing that the longitudinal and transverse stiffness measured by ARFI elastography might have distinct clinical implications, yet this is by far the first study to apply ARFI elastography to evaluate muscles undergoing radiation therapy. The tentative conclusion was that early radiation muscle fibrosis signs could be detected by ARFI elastography using longitudinal view after 2 years completing radiation therapy. More survey is needed to verify this observation.

05

Experiences of people with physical disabilities before, during, and after tropical cyclones in Queensland

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Background and aim:
People with disabilities are highly vulnerable in natural disasters due to the impact of individual, societal, and environmental factors on their ability to prepare, evacuate, and recover from disaster events. Whilst international disaster policy is disability inclusive, Australia's National Strategy for Disaster Resilience does not mention the needs of people with disabilities. This study investigated the experiences of people with physical disabilities in recent severe cyclones affecting Queensland, and explored factors that influence their capacity to manage their wellbeing through cyclone events, to inform disability inclusive disaster risk reduction activities.

Method:
A qualitative study consisting of semi-structured interviews was conducted with twenty people with physical disabilities who had experienced a recent severe cyclone in northern Queensland, Australia. Thematic analysis using an inductive approach was used to interpret interview findings.

Results:
The interaction between the disabling health condition and key environmental factors (cyclone impact, logistical support, and psychosocial support) and personal factors (readiness, managing one's own health, financial autonomy, and personal resilience) influenced the capacity of people with disabilities to manage their wellbeing through cyclone events.

Conclusions:
To optimise disaster resilience of this vulnerable population, Australia's national disaster policy must endorse disability inclusive disaster risk reduction, and people with disabilities and their organisations must be actively involved in disaster planning at an individual, community, and policy level. Disability inclusive disaster risk reduction strategies need to focus on strengthening key environmental and personal factors that influence each individual's ability to manage their wellbeing at different time points over the course of a cyclone event.

06

Bangladesh landslide natural disaster rehabilitation perspectives

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Background and aims:
This report characterizes traumatic rehabilitation injuries due to the 2017 Bangladesh landslides. Studies on landslide victim's injury reporting and rehabilitation issues are lacking. Emergency care for rehabilitation conditions provided by field responders, at community health center and at tertiary hospitals is described. Recommendations to improve rehabilitative care in future landslides are provided.
Introduction:
Landslides are triggered by external processes including earthquakes, rainstorms, and slope disturbance by humans. Humans are highly vulnerable to the high energy forces of sliding earth and debris which can result in severe traumatic

physical injury and death. Landslides triggered by torrential seasonal monsoon rain began early June 2017 and severely affected 42,000 persons in several hilly and coastal districts of Bangladesh.

Method:
An electronic literature search was performed to identify relevant articles on landslides in Bangladesh, Southeast Asia, and other developing countries. Reports from government and non-governmental sources including relevant hospital admissions data were obtained and analyzed. Information was also obtained through personal communications with local health and emergency management officials and from local and international media sources.

Results:
The 2017 Bangladesh landslides resulted in 172 deaths and 11 missing persons. Thousands of persons received first aid from responding medical teams. Of the 194 persons admitted to district hospitals for severe injuries, 33.50 % of injuries treated were musculoskeletal conditions. Twelve (12) persons with critical injuries including long bone fracture, spinal injury, and head injury were referred to a regional tertiary hospital for management by neurology, orthopedic surgery, physical Rehabilitation medicine and psychiatry specialists.

Conclusions:
Landslides can result in severe traumatic injuries. Rehabilitative treatment with involvement of physiatrists should be provided at all levels of emergency care of this disaster. Specialized rehabilitation response teams should be employed in landslides and other severe natural disasters in Bangladesh.

Key words: Landslides, Bangladesh, Disaster, Rehabilitation

07

Promotion and application of ICF activity and participation scale(ICF-APS) in community rehabilitation

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Background and aim(s):
In 2001, the fifty-fourth World Health Assembly formally promulgated the international function, disability and health classification (ICF). On this basis, the WHO Disability Assessment Scale 2.0(WHO DAS2.0). However, in the community rehabilitation assessment tools, the lack of global and universal assessment tools based on ICF function is an urgent problem.

Method:
We count the coverage of WHO DAS II items, define the missing parts, establish the ICF-APS, use Internal Consistency, retest reliability and Pearson correlation coefficient to verify its reliability and validity.

Results:
The Cronbach's Alpha coefficient was usually 0.912, and the retest reliability was 0.58-0.93 ($P<0.01$) within 3 days. The correlation coefficient of ICF "activity and participation" and FIM, MBI and SF-36 were 0.854,0.879,0.832 ($P<0.01$) in 1061 patients with chronic diseases.

Conclusion:
The ICF-APS has good reliability and validity, and is suitable for popularization and application in community rehabilitation.

08

The effect of complex upper extremity rehabilitation robotics with spinal cord injury patients

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Background and aim(s):

Repetitive and intensive training can lead to spinal plasticity, exercise intensity can have a significant impact on the sensory-motor recovery.

Rehabilitation robots provide repetitive and intensive training consistently. The purpose of this study is to confirm the effect of upper limb rehabilitation in patients with spinal cord injury(SCI) when two upper limb rehabilitation robots are combined.

Method:
A randomized controlled trial of 30 patients with SCI. Participants were divided into 17 experimental group(EG) and 13 control group(CG). EG was subjected to upper extremity and finger training using Armeo power and Amadeo, and CG was given the same training with conventional therapy(CT). The training was conducted three times a week for 5 weeks.

Primary outcome was assessed by manual muscle test(MMT) and hand dynamometer. Secondary outcome was graded and redefined assessment of strength, sensibility and prehension(GRASSP), Korean version of spinal cord independence measure-3(KSCIM-3).

Result(s):
The EG showed significant improvement in elbow flexion/extension as a result of muscle strength evaluation($p<0.05$). The muscle strength of the CG showed significant improvement in wrist extension, 5th finger abduction, tip and three-jaw chuck pinch($p<0.05$). GRASSP evaluation showed significant improvement in shoulder abduction in both groups and MP 2-5 extension in EG($p<0.05$). The results of KSCIM-3 evaluation showed significant difference in bathing(upper body), dressing(upper body) and grooming, and the CG showed significant difference in dressing(lower body)($p<0.05$).

Conclusion(s):
This study showed significant improvement in muscle strength in both EG and CG. However, there was a difference in the area showing the change. Complex robot therapy was found to be more effective for proximal part training and CT for distal part training. Nevertheless, the difference between the groups was not confirmed. In other words, although complex robot therapy was not more effective than CT, both treatment proved to be an effective treatment for patients with SCI.

09

"Let's be honest whose goal is it?" Patients know their priorities better than we do. The introduction of a "Rehab Journey Folder" can improve clinician engagement of person centered goals

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Background:
The National Stroke Foundation (NSF) clinical guidelines state goals for recovery should be patient-centered, clearly communicated and documented so stroke survivor/family and rehab team are aware of goals set. Two rehab wards in Illawarra-Shoalhaven-Local Health-Service-District weren't documenting or communicating patient-centered goals. One of teams worked together to improve this by creating the Rehab Journey Folder.

Aims:
Each patient on 12bed inpatient rehabilitation unit provided with "Rehab Journey Folder" to improve communication and documentation of patient-centered goals, improve team collaboration working towards patient-centered goals, improve patient/families knowledge of rehab team and provide a centralized location for patient specific information.

Methods:
The team involved in creation and implementation of folder met quarterly over 12 months to review layout, use, and provide feedback from patients/families.

Comparison of 2016 NSF goal setting audit results from 2 rehab units to determine change in documentation and communication of patient-centered goal setting compared to unit who didn't implement Journey Folder.

Goal documentation audits to review results were maintained.

Results:
2016 Audit results showed the rehab unit that had implemented Rehab Journey Folder had improved documentation of patient-centered goals by 50%. 2017-2018 audit results demonstrated improvement from 80-100%.
2016-2018 the other Rehabilitation unit achieved only 6% of documented patient-centered goals in audits.

Anecdotally, members of rehab team report feeling more informed of patients goals. Patients, families/carers report is meaningful to have goals visible. Folder useful tool ensuring information not lost and have documented key contacts once discharged from hospital. Community teams report continued use of rehab journey folder once discharged from hospital.

Key barriers to implementing across multiple sites included changes of management, clinicians with nil rehabilitation experience and poor communication between staff in shared roles.

Conclusion:
"Rehab Journey folders" are simple successful way to improve communication and documentation of “patient-centered” goal setting in inpatient rehab unit.

10

Feasibility of gastrostomy in advanced amyotrophic lateral sclerosis patients with low vital capacity

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Background and aims(s)
In patients with amyotrophic lateral sclerosis(ALS), bulbar-innervated muscle impairment occurs therefore all patients requires enteral nutrition, eventually. But there is no definite consensus regarding the optimal timing of gastrostomy tube insertion and it is still controversial. The aim of this study is to investigate the safety of gastrostomy in a large number of advanced ALS patients with vital capacity(VC) less than 30% of predicted value(VCpred) and, finally, to suggest a new standard of VC in gastrostomy procedure.

Method
We evaluated a total 479 of patients who were diagnosed with ALS according to Revised El Escorial Criteria in our hospital between January 1, 2005 and December 31, 2017. 126 patients who underwent gastrostomy for the first time among those patients who had not undergone tracheostomy and under 30% of VCpred. The medical charts were retrospectively analyzed for ventilation status, complications from gastrostomy tube insertion to the first tube change.

Result(s)
The gastrostomy procedure was safe regardless of VC status or respiratory support. There were complications related to the gastrostomy procedure in 7 of 126 patients and all were managed through conservative care. Comparing non-invasive intermittent positive pressure ventilation(NIPPV) to invasive positive pressure ventilation(IPPV), complications were seen in 5 of 106 patients (4.7%) and 9 of 104 patients (8.7%). There was no statistically significant difference between two groups(p=0.386). No respiratory complications were found in any patient.

Conclusions
Percutaneous placement of gastrostomy is safe, effective procedure and can be performed in the ALS patients who have low vital capacity (VC<30%). This study shows that only with non-invasive respiratory support such as NIPPV or ambu-bagging, gastrostomy was performed without severe complications such as respiratory decompression in patients who did not undergo tracheostomy surgery. We suggest that there should be a new standard of VC to allow performing gastrostomy for ALS patients.

11

Clinical and Kinematic Evaluation of the H-Man arm robot for poststroke upper limb rehabilitation: Preliminary Findings of a randomised controlled trial

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Background and Aims
The H-Man robot, a table-top, portable, 2D planar, end-effector is designed to deliver intensive, self-paced, repetitive reaching arm movements together with engaging virtual reality feedback. Interim results of a non-inferiority randomized clinical trial of 26/44 intended strokes with hemiparetic arm weakness are presented.

Methods
Inclusion criteria included first-ever stroke, >4 months duration with Fugl Meyer Assessment Scale (FMA) 20-50/66) and ability to understand instructions. Intervention (HCT) group received 18 sessions over 6 weeks of 60 minutes of supervised H-man training and 30 minutes of conventional therapy (CT), while control group (CCT) received a similar intensity of 90 minutes of CT. Blinded outcome assessments were measured at weeks 0 (baseline), 3,6 (end-training), 12 and 24 (follow-up). The primary outcome measure was the change in FMA at week 6. Secondary outcomes measures included Action Research Arm Test (ARAT), grip strength (KgF), pain (VAS), spasticity (Modified Ashworth Scale) and H-Man kinematic data. Parametric analysis was used and level of significance was $P < 0.05$.

Results
Altogether, 26 out of 44 consented subjects were randomized into 2 groups. (13 HCT, 13 CCT). There were no significant baseline differences between the 2 groups. (mean age 54.0 years (SD 10.9), 14/26 were male, 15/26 had hemorrhagic strokes, mean stroke duration 227.2 days (SD 207.2), mean baseline FMA 38.6 (SD 11.1,). The HCT group achieved significantly better FMA gains compared with the CCT group (4.15 HCT vs 1.69 CCT, $P = 0.03$) at week 6 (post-training), and at week 24 (follow-up) (5.77 HCT vs 2.61 CCT, $P=0.03$). There were no drop outs or adverse events. H-man line/circle tracing correlated with baseline FMA.

Conclusion
Combinatory arm rehabilitation with H-Man robot was superior to CT and safe, with short-term gains up to 6 months of follow up, comparable to 2D planar commercial robotic devices.

12

Training with a sliding board rehabilitation machine after spinal cord injury: a study on safety and feasibility

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Background and aim:
Spinal cord injury (SCI) is a major cause of neurological disability. The primary need of patients with SCI is walking function recovery. Sliding rehabilitation machine (SRM) provides weight-bearing exercises needed for gait function. We explored the safety and feasibility of using these machines in intensive rehabilitation programs for patients with SCI.

Method:
This retrospective study included patients admitted for rehabilitation after incomplete SCI. Patients with severe cognitive impairment, visual impairment, or other neurologic and musculoskeletal problems were excluded. Training with SRM was performed twice daily, Mondays to Fridays, during the admission period. The number of training sessions and the occurrence of side effects were documented daily. SRM angle of inclination, Berg balance scale (BBS), Korean-modified

Barthel index (K-MBI), walking index for spinal cord injury (WISCI), and manual muscle test (MMT) result were documented before treatment and at discharge.

Results:
For 30 patients, 1263 of 1340 scheduled SRM training sessions were performed; the performance rate was 94.3%. There were no serious side effects; only minor and transient side effects such as local muscle pain or knee pain occurred. The causes of absence from training were fever due to infection; buttock, hip, and calf pain; knee pain; sleep disturbance or depression; schedule error; and dizziness. At discharge, the patients showed improvement in SRM inclination angle, BBS, K-MBI, WISCI, and MMT.

Conclusions:
Using SRM for intensive muscle strengthening and gait training early in SCI is readily applicable and seems safe as part of an inpatient rehabilitation program.

13

Feasibility of Robot-assisted Gait Training with End-effector Type in Various Neurologic Disorders

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Background and aim
Robotic-assisted gait training (RAGT) is becoming popular because it provides repetitive task-oriented movements similar to normal ambulatory patterns. Morning Walk® is the only end-effector commercially available in Korea. It has two foot plates that simulate locomotor activity with saddle support for body weight. The purpose of this study is to investigate the feasibility of Morning Walk® in many patients with various etiologies.

Method
From April 2014 to May 2017, RAGT was tried in patients who were able to sit independently or American Spinal Injury Association Impairment Scale C or D among spinal cord injuries. RAGT was done for 30 minutes per each session and 5 times per week. Completed therapy consisted of 24 consecutive sessions. If weight support greater than 70% and ground reaction force less than 20% of the body weight remained unchanged, the patient was excluded from RAGT because in that case, continuous intervention of therapist was needed during the therapy. In addition to that, if experienced therapist judged there would be a possibility of musculoskeletal injury, or if there was patient's request or when the person was not cooperative the therapy was stopped and these cases were analyzed in this study.

Result
Total 191 patients consisted of 115 brain injuries, 41 spinal cord injuries, 18 pediatric patients, 8 Parkinson's diseases, and 9 patients with peripheral neuropathies. Among these population 22 patients (11.5%) could not complete RAGT therapy becaused of several problems, such as cognitive dysfunction, musculoskeletal conditions, and neurologic deficits.

Conclusion
The present study demonstrated that automated gait machine with end-effector is feasible and safe for diverse spectrum of neurologic diseases. Before training via end-effector, several possible limitations should be considered.

14

The Effect of End-Effector Type Robotic Assisted Gait Training in Patients with Guillain-Barre Syndrome: a Preliminary Report

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Background and aim
The clinical manifestations of Guillain-Barre syndrome (GBS), rapid-onset immune-mediated seneorimotor polyneuropathy, can range from mild muscle weakness to complete muscle paralysis, which may lead to severe

impairment in walking ability. To regain walking ability, various treatments are undertaken to assist gait training including robotic-assisted gait training (RAGT). RAGT is has been shown to be effective in improving gait function in patients with stroke and spinal cord injury. However, no studies have reported the effect of gait training using end-effector type robotic device in GBS patients. In this study, we report the effect of gait training using end-effector type robotic device in GBS patients.

Method
Among GBS patients who had been hospitalized from April 2016 to April 2017, eight GBS patients were enrolled. Among them, one participant was dropped out of the trial. The reason for dropping out was pain and discomfort around saddle area. The final sample consisted of 7 participants. Subjects received RAGT for 24 times . All participants were assessed with manual muscle test, Functional Ambulation Categories (FAC), Modified Barthel Index Score (MBI) and Rivermead Mobility Index (RMI) before and after RAGT.

Results
Compared to baseline, all outcome measures were improved after RAGT. Strength in proximal muscles of the lower extremities significantly improved after RAGT. Also FAC, MBI and RMI which are associated with gait function were significantly improved.

Conclusion
This study showed RAGT using end-effector type device has benefit to improve walking ability in GBS patients. RAGT can be considered as one of gait training tools to recover gait function in patients with GBS. However, this study has limitation of small sample size and lack of control group, so further study is required to confirm the effectiveness of RAGT in GBS patients.

15

The therapeutic effect of electroacupuncture combined with Bobath technology in the treatment of cerebral apoplexy during convalescence

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Background and aims
To observe the effect of electroacupuncture combined with Bobath technology in the treatment of cerebral apoplexy.

Methods
A total of 120 patients were randomly divided into an experimental group (electroacupuncture plus Bobath technique), recovery group and electroacupuncture group, with 40 cases in each group. The experimental group is Bobath method (with parapodium passive stretching back stretch training) to add electric acupuncture to stimulate destroyed, gb 34 treatment, rehabilitation treatment to be pure gimmick acusector group to be pure cupping treatment. All 3 groups were treated 15 times consecutively, 5 times a week. The simplified fugl-meyer lower extremity motor function assessment (FMA) and the lower limb function FAC staging evaluation were used to evaluate the degree of pronation and lower extremity motor function in patients before and after treatment. (results) Three groups of patients after treatment, FMA score and lower limb function of FAC assessment phases were improved significantly ($P < 0.01$), and the experimental group after treatment FMA score significantly higher than the rehabilitation group and the curative group ($P < 0.01$), the experimental group FAC lower limb function in installment compared with electric acupuncture group and rehabilitation group improved significantly ($P < 0.05$).

Conclusion
Electroacupuncture cooperate with parapodium ankle passive backstretch, and induce the initiative back stretch ankle and other technical treatment of stroke recovery strephenopodia can obviously improve the strephenopodia state, improve the walking motion of foot function, and the curative effect is superior to the pure ankle treatment such as stretching, also is better than that of pure electric acupuncture treatment. Experiments show that combination therapy is superior to single therapy.

16

A novel approach to neuromodulation platform connected with personalized medical system for neuro-muscular disorders

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Background

Numerous discoveries made throughout history contributed to the development of electrotherapy based on neuro-modulation platform. A simple phenomenon known as amber friction was found by Thales in 600 B.C.E. However, Thales was unable to prove this simple phenomenon at that time. In 1511 C.E., Gerolamo Cardano established electro-friction based on his book Wonders of Nature. Within a century, William Gilbert first termed the word “electric” based on his book in 1600 C.E. Lastly, Alessandro Volta discovered electric current between copper and zinc in sulfuric acid solution. Current electrotherapy is the fruit of these historical discoveries. We will further contribute to this development by creating a neuro-modulation platform, both surface and implant, based on big data stored on cloud for the well-being of human life.

Aim

Neuro-modulation platform provides neuro-modulation feedback for neuro-muscular disorders based on big data stored on cloud.

Method

Neuro-muscular stimulation consists of TENS, FES and HVPCS. TENS (Transcutaneous Electrical Nerve Stimulation) releases pain. FES (Functional Electrical Stimulation) increases muscular power. HVPCS (High Voltage Pulsed Current Stimulation) heals soft tissues around the spine. Electrotherapeutic current is divided electro frequency, but Neuro-muscular stimulation can synthesis device and control.

Result

When a patient wants to meet a doctor, physiotherapist or rehabilitation team, the neuro-modulation platform will get individualized data from the cloud and utilize big data related to hospital information system to provide delivery of health care. They use encrypted information each other base on big data in neuro-modulation platform.

Conclusion

Neuro-modulation platform will be used to treat neuro-musculoskeletal disorders in hospitals and rehabilitation centers. It will provide welfare to organizations and homes.

17

Music Therapy and Speech Pathology: A collaborative approach to the rehabilitation of acquired apraxia of speech and expressive aphasia

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Background and aim(s)

Providing ongoing therapy to stroke survivors with both severe apraxia of speech and expressive aphasia and thus minimal verbal output, can be a challenging, arduous task for both survivor and clinician. It is therefore important to find more creative and motivating ways of addressing goals of verbal output training. Music therapy interventions draw upon the survivor’s unimpaired ability to sing, thereby creating opportunities for the development of speech (voluntary and spontaneous) through sung melodies. The aim of this project was to examine whether a collaborative approach to verbal output training could enhance the rehabilitation of a stroke survivor (over one year post stroke).

Method

A stroke survivor was referred to have combined music/speech therapy with the goals of verbal output training and self-expression. During these collaborative sessions, the survivor engaged in singing of familiar songs, vocal improvisation and creating new melodies for word finding and sentence construction.

Results
The stroke survivor responded positively to the collaborative approach, as indicated by some success in functional word and phrase production, and an increase in positive facial expressions throughout sessions. When reflecting upon the experience of the collaborative sessions, the speech pathologists drew upon themes of professional skill development and increased motivation for patients.

Discussion
Collaborating in this way shows promise for improved outcomes for stroke survivors compared to standard therapy. The additional improvements were noted with the commencement of music therapy even though the survivor had been having intensive rehabilitation (including speech therapy) since stroke onset.

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"Here comes the sun": the multi-faceted benefits of music therapy for a patient with Parkinson's Disease

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Background and aim(s)
Parkinson's Disease (PD) can be debilitating as it impacts the individuals movement, vocal production and quality of life. As treatment for PD is based on the management of symptoms, it is important to give the individual access to a broader range of motivating interventions. Past literature has identified that music therapy can simultaneously address movement, vocal production and wellbeing in PD. The aim of this paper is to examine the multi-faceted benefits of music therapy for a patient with PD.

Method
A patient with PD was referred for individual music therapy for the goals of vocal projection, self-expression and fluidity of movement. As the patient was a professional singer, the music therapist encouraged him to lead vocal warm-ups and reflect upon repertoire from his performing days. The sessions commenced with vocal warm-ups, followed by improvised singing (using words and sounds) and finished with movement to music. The patient's response was heightened when singing the instructions of the intervention whilst doing the intervention itself. For example, when singing "let's get louder and louder", the patient sung louder as he repeated the word. The music therapist further encouraged this approach when working with the physical goal of fluidity of movement. Video excerpts will be shown.

Results
By giving this patient a personable and thus motivating medium to engage in his therapy, there was an improvement in his vocal production, fluidity of movement and quality of life. After each session, the patient reflected positively about the impact of using music to help with his rehabilitation and, more specifically, the value of finding joy in singing once again.

Conclusion(s)
Though this approach may have been of benefit to this patient due to his relationship with music, it has since been used with PD patients who are from non-musical backgrounds with success.

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Using Healthcare Virtual Reality Applications to Engage caregivers in an outpatient clinic waiting area: an exploratory study

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Aims:
Substantial time is spent by patients and caregivers waiting to see healthcare professionals. Many caregivers are elderly. We thought to value-add to this time by educating/encouraging healthy living, with basic health assessment.

Objective:
Explore feasiblity of Taggle Healthbox Population Health Module to engage caregivers of outpatients in registration/waiting room areas of outpatient clinics in customized health promotion, active living and health assessment virtual reality games/applications.

20 caregivers accompanying patients to TTSH CART for outpatient consultation recruited to play all 3 sub-modules of Population Health Module (health promotion, simple exercises and health assessment) within 30 minutes. Primary outcome measure, a feasibility questionnaire, was self-administered by participating caregivers.

Findings:
20 caregivers recruited. 19 completed whole session, 1 partial completion (50%) of module. 13(65%) of caregivers are female, 7(35%) male. Medial age 60 years old. Most had no previous gaming experience (85%).

Most (95%) found Taggle Healthbox system enjoyable. They felt it benefited their healthcare knowledge (85%), engagement in simple physical exercises (90%) and useful as healthcare assessment tool for memory/coordination (95%). They hoped to see more games produced for this purpose (85%) and be a routine part of waiting time (80%). Most would recommend it to other caregivers (75%). 90% felt it was informative compared to waiting without any activities. However, only 50% of them wanted to purchase the system for home use. None 0% thought it caused more harm than good, 65% felt it too complex to set-up at home.

Adverse effects: 1(5%) caregiver had joint pain after the session, 1(5%) had mild giddiness that resolved after rest.

Conclusion:
Taggle Healthbox system is feasible to engage caregivers of outpatients in waiting room areas of outpatient clinics. It can be explored in other outpatient clinics of similar settings and may also benefit healthy elderly undergoing community based activities in care centres.

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An influence on psychological function/motivation of hospital inpatients by intervention with Walk evaluation system AYUMIEYE ～Examination by quasi-randomized controlled trial～

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Background and aim
For favorable rehabilitation results, it needs to focus on not only physical functions but also psychological factors. However, there has been no sufficient verification for effective intervention methods so far. The purpose of this study is to examine whether an intervention with Walk evaluation system AYUMIEYE as a walk scoring system based on acceleration data would actually influence psychological function/motivation of hospital inpatients.

Method
The study targeted 60 elderly patients in the recovery rehabilitation ward and 30 patients were randomly assigned to the intervention group and the control group respectively. The intervention period was set as 4 weeks and the walk evaluation by AYUMIEYE and feedback to the patients on the basis of the evaluation results were conducted total 4 times or once every week.

The end-point was Hospital Anxiety and Depression Scale(HADS), General Health Questionnaire 12(GHQ), Pittsburgh Rehabilitation Participation Scale(PRPS), Falls Efficacy Scale(FES). The study statistically used Mann-Whitney U test for compared the change before and after the intervention between two groups using.

Results
We recognized a significant improvement in HADS(Depression), PRPS.

Conclusion
It is suggested that the gait evaluation system AYUMIEYE had a positive influence for a psychological function/motivation of hospital inpatients.

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Conventional Physiotherapy Vs Virtual Reality Exergames in Subacute Patients Undergoing Rehabilitation in a Community Hospital

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Background:
Functional mobility significantly affects patients' quality of life and is improved by rehabilitation strategies conducted by physiotherapists. Gaming technologies are used to complement conventional rehabilitation therapies, with many published journal articles. However, there is lack of randomized controlled trials, especially on improvement of functional mobility and its use for subacute patients in community hospitals.

Methods:
20 patients (age M=72.7, SD=7.48) admitted for inpatient rehabilitation were randomized into 2 treatment groups. Each group underwent 9 sessions (3 sessions/week for 3 weeks) of additional mobility training, physiotherapy session for conventional group and exergame for intervention group. Both groups still continued their daily therapy sessions. Pre and post measurement for 10 Meter Walk Test (10MWT), Time Up and Go Test (TUGT) and Berge Balance Scale (BBS) were captured.

Results:
There were no statistical differences in improvement scores between the two groups. However, higher improvement scores were observed in the interventional group on 10MWT (M=0.29, SD=0.30) and BBS (M=9.80, SD=4.66) than in the conventional group (M=0.13, SD=0.35) and (M=8.3, SD=4.97) respectively. There was a statistical improvement of the interventional group for all variables, $p<.05$. Statistical improvement of scores for the conventional group were observed for TUGT and BBS, $p<.05$ but not 10MWT, $p=.254$.

Discussion & Conclusion:
Preliminary results showed effects of additional mobility training using virtual reality exergame were comparable to conventional physiotherapy treatment. In addition, virtual reality exergame appeared to gain additional benefits in terms of static balance.

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Effect of Robot-assisted rehabilitation on upper limb motor function in hemiplegic patients

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Aim:
To investigate the effect of robot-assisted rehabilitation on upper limb motor function in hemiplegic patients.

Methods:
A total of 38 patients with hemiplegia were randomly divided into the strengthened group (19 cases) and control group (19 cases). All the subjects had been managed with routine therapy for 8 weeks, including drug therapy, hemiplegia rehabilitation and daily living activity training. The strengthened group was performed with robot-assisted rehabilitation for upper limb additionally.

Results:
There were significantly statistic differences in the path efficiency, activity ratios, active/passive range of motion, fluency and FMA scale after 8 weeks in the two groups respectively compared with before therapeutic interventions ($P<0.01$). Outcome of intergroup comparison after therapy for 8 weeks manifested there were statistic differences in path

efficiency (P<0.01), activity ratios (P<0.01), FMA scores (P <0.01)and fluency (P<0.05) respectively, while there was no statistic differences in active/passive range of motion (P>0.05).

Conclusion:
The upper limb robot-assisted rehabilitation could further improve the funaional control of upper limb in hemiplegic patients.
Key words: Robot-assisted rehabilitation; Upper limb; Hemiplegia

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Study of the effect of Speech Training Combined with Psychological Support on Dysarthria after Stroke

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Aim:
To observe the effect of speech training combined with psychological support on rehabilitation of articulation function psychological function of the patients with dysarthria after stroke.

Methods:
28 patients with dysarthria after stroke were randomly divided into 2 groups: observation group and control group, 14 in each ; routine speech training was performed on patients in both groups while psychological support was added to patients in observation group ; articulation function and psychological improvement of the patients in the 2 groups were compared and an analysis was made.

Results:
The scores of the medified Frenchay articulation disorder rating scale of the patients in both groups after treatment were obviously lower than those before treatment (P<0.01), the decrease in observation group was even greater (P<0.01) ; the number of “a” items in the Frenchay Dysarthria Assessment of the patients in observation group after treatment was much higher than that before treatment and than that in control group after treatment (P<0.01, P<0.05) ; the scores of Hamilton depression rating scale of the patients in observation group after treatment dropped down more than those before treatment and than those in control group (P<0.01, P<0.05).

Conclusions:
Speech training combined with psychological support can help improve the articulation function and mental status of the patients with dysarthria after stroke.

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An influence on kinematic characteristics for a lifting motion of heavy object by emotional aspect of pain

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Background and aim
Various factors are involved in a protracted course of low back pain and an excessive fear for exercise (generally called kinesophobia) would be one of these factors. Although questionnaire is often used in the evaluation for emotional aspect of pain clinically, it is pointed out that such method may easily be biased by individual research participant or environment. In the study, we decided to examine a relation with emotional aspect of pain through kinematic analysis by using a lifting motion of heavy object which is deeply related to low back pain.

Methods
The study targeted 10 workers with non-specific low back pain. The motor task is “a lifting motion of heavy object” or lifting a 10kg box from the floor with use of a three-dimensional motion analysis device Kinema Tracer (Kissei Comtec Co.,Ltd.) as a measuring instrument. For the evaluation items, the study calculated the maximum angle and the maximum/minimum angular velocity for thoracic vertebra, lumbar vertebra, pelvis, thigh, knee, and foot joint in sagittal plane as a kinematic factor. In addition, Fear-Avoidance Beliefs Questionnaire (FABQ) was conducted as an evaluation for

emotional aspect of pain. The study statistically used Spearman's rank correlation coefficient for correlation analysis between a kinematic factor and FABQ with a significance level 5%.

Results
We recognized a significant correlation between FABQ and pelvic angle (r=-0.657), knee joint angle (r=0.687), the minimum angular velocity of knee joint (r=-0.669), and the minimum angular velocity of foot joint (r=-0.809) respectively.

Conclusions
It is suggested that kinesophobia would reflect a decrease in pelvic mobility and an increase in knee/foot joint mobility for a lifting motion of heavy object as possibly extracting emotional aspect of pain from the observation of physical exertion.

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Current Situation and Unmet needs for Rehabilitation in Complex Regional Pain Syndrome in Korea : A pilot survey

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Background and aims :
Complex regional pain syndrome (CRPS) is characterized by debilitating and refractory pain in affected limbs, associated with sensory, motor, autonomic, skin and bone abnormalities. For CRPS patients, rehabilitation aimed at improving limb function and desensitizing pain is important, however, patients cannot receive appropriate rehabilitation consistently although patients want systematic, sufficient rehabilitation treatment. The purpose of this study was to evaluate the current status of severity of pain, degree of depression, and quality of life in patients with CRPS in Korea, and assess both subjective need and unmet need for rehabilitation of patients in clinical care.

Methods:
Thirty-two patients with CRPS who were diagnosed based on Budapest's criteria were recruited from a single medical center in Korea. As well as demographic and clinical data, structured questionnaires including brief pain inventory (BPI), world health organization disability assessment schedule-Korean II (WHODAS-K II), EuroQol-5D (EQ-5D) for measuring quality of life were analyzed.

Results:
The average value of BPI and WHODAS-K II were 8.00 ± 1.74 and 68.62 ± 16.58% in overall. Patients' need to get more rehabilitation treatment is high in all domains: Pain 96.9%, Gait disturbance 81.3%, Fatigue 78.1%, Ache 75.0%, Anxiety 68.8%, Body weight 62.5%, Memory 65.5%, and ADL 43.8% in a decreasing order. Only Pain, Ache, Anxiety, and Gait disturbance were given concerns by physicians but still satisfaction of patients was poor (<50%). Meanwhile, for Fatigue, Body weight, and Memory domains, patients stated that they did not receive proper rehabilitation treatment and satisfaction of care was also low (<30%).

Conclusions:
In Korea, patients with CRPS are not given adequate rehabilitation treatment for them to feel satisfied by medical care. More structured and individualized rehabilitation treatment to manage each domain related to chronic pain as well as provision of care guidelines are needed in the future for CRPS.

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Effects of Assisted Sit-up Exercise compared to Core Stabilization Exercise on Patients with Non-specific Low Back Pain

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Background and aim

Sit-up exercise (SUE) is a simple method that has been commonly used to improve abdominal muscle strength and endurance. However, it can potentially increase lumbar spine loading and injury risk, especially shear and compressive forces on intervertebral discs. The purpose of this report is to evaluate the effect of assisted SUE using new training device, HubEX-LEX®, on strengthening core muscles and improving non-specific low back pain (NSLBP), compared to conventional core stabilization exercise (CSE).

Method
Subjects with chronic non-specific low back pain were randomly divided into the two groups: assisted SUE (n=18) or conventional CSE (n=18) group. They participated in 3 sessions of exercise program per week for a total of 4 weeks. Before and after the training, thickness and activity of core muscles were measured using ultrasonogram and surface electromyography respectively, and pain and disability were assessed using two questionnaires.

Results
Thickness ratios (contracted/rest) of bilateral rectus abdominis muscle (RA) and external oblique muscle (EO) in the SUE group and those of bilateral transversus abdominis in the CSE group were significantly different between before and after exercise. ($p<0.05$) The SUE group showed a tendency of activation in right internal oblique muscle (IO) and significant activation in left IO after exercise compared to initial data. However, the CSE group presented signifiantly higher level of activation in both right and left IO after exercise. When the ratio of IO/RA activation was calculated, there was significant increase after intervention in both groups All measurements for pain and disability were significantly improved after intervention in both groups. ($p<0.05$)

Conclusions
Assisted SUE using new training device can be an effective therapeutic exercise to strengthen dynamic abdominal muscles and improve core muscle activation pattern in NSLBP patients. Its effects are not significantly different from those of CSE.

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The effects of injection distance of Rho Kinase inhibitor on the irritability of a myofascial trigger point

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Background and aim
The characteristic of electromyographic recording from a myofascial trigger point (MTrP) is endplate noise (EPN). In our previous studies, the prevalence of EPN in an MTrP has been shown to be correlated with the irritability of an MTrP. The activity of Rho kinase has also been revealed to be correlated with the irritability of an MTrP. In addition, Rho kinase inhibitor (Rho inh) has also been shown to significantly decrease the irritability of an MTrP. The aim of this study is to further delineate the effects of injection distance of Rho inh on the irritability of an MTrP.

Method
The myofascial trigger spots (MTrS; equivalent to the MTrP in human) over the biceps femoris muscle of adult New Zealand rabbits were located. The prevalence of EPN in the MTrS was the primary outcome of therapy. Different injection distances from an MTrS (0 mm, 10 mm, 20 mm) were tested. Our study collected 12 rabbits for normal saline injection on the MTrS, 12 rabbits for Rho inh injection on the MTrS, 12 rabbits for Rho inh inection 10 mm from the MTrS, and 6 rabbits for Rho inh injection 20 mm from the MTrS.

Results
There were significant decrease in the prevalences of EPN in the MTrS with the injection of Rho inh. The differences of EPN prevalence between before and after the injection of rho inh on the MTrS ($p<0.0001$) were most significantly different than that in 10 mm from the MTrS ($p<0.05$), and more than that in 20 mm from the MTrS ($p<0.05$).

Conclusion

Our experiment revealed the effect of injection distance (0 mm, 10 mm, 20 mm) of Rho kinase inhibitor for the EPN prevalence in the MTrS. The results would improve our understanding of the pathophysiology of myofascial pain syndrome.

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Prediction of functional outcome in patients after total knee arthroplasty for osteoarthritis: a clinical pathway analysis

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Background and aim:
Knee osteoarthritis (OA) is a common but complex disease that causes pain, ROM limitation and impaired physical function. Total knee arthroplasty (TKA) is popular and widely performed to treat patients with unfavorably conservative results. However, some patients seemed not to be satisfied after TKA due to unmet expectations. Therefore, identifying the predictors of functional outcome after TKA is crucial.

Methods:
Patients who underwent TKA received a standardized rehabilitation program via clinical pathway. Evaluations were performed at 4 time points: pre-surgery, before discharge, 3 months and 6 months follow-up and included the following factors: (1) VAS, (2) knee ROM, (3) WOMAC score.

Result:
A total of 81 patients (58 women, 71.6%) aged 70.4±7.6 years, completed the study with BMI 27.2±3.7 kg/m2 and length of stay (LOS) 6.9±1.2 days. Patients' WOMAC total score improved after TKA at every time point (by GEE analysis with p-values for trends< 0.05). The factors associated with significantly better WOMAC improvement at 3 months follow-up were: (1) age, (2) pre-surgery pain, (3) LOS, (4) knee ROM before discharge, (5) female patients. The improvements in WOMAC total score, pain subscale, stiffness subscale and physical function subscale were 73%, 91%, 52% and 74% respectively. At 6 months follow-up, age (aOR = 1.11, p = 0.035), pre-surgery pain (aOR = 1.47, p = 0.043) and LOS (aOR = 0.55, p = 0.037) remained statistically significant, with negative association in LOS. The improvements in WOMAC total score, pain subscale, stiffness subscale and physical function subscale were 87%, 99%, 81% and 86% respectively

Conclusion:
TKA is an effective intervention to achieve WOMAC improvement. There were 3 independent predictors identifying better WOMAC improvement at 6 months follow-up, when the improvement appeared to reach a plateau.

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Usefulness of Partial Body Weight Support Treadmill Training after Total Knee Arthroplasty

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Background and aim:
Early mobilization reduces pain and risk of thromboembolic disease after surgery. The purpose of this study is to compare the effects of partial body weight supporting treadmill training (PBWSTT) and conventional rehabilitation for post-TKA patients.

Method:
Among patients who underwent TKA in orthopedic department, who had unilateral primary TKA and was able to follow commands were included. Patients were randomly divided into intervention group and control group. All patients underwent modality including ultrasound, electrical stimulation and continuous passive motion from 4 days after TKA to discharge. After modality therapy, intervention group received PBWSTT for 7 days, 20 minutes per day, while control group received passive ROM exercise, passive stretching and joint mobilization for 7 days, 20 minutes per day. All patients were evaluated before, 2 weeks after, and 6 weeks after TKA. Berg Balance Scale (BBS) and Biodex Balance System SD® (Biodex, Shirley, NY, USA) were used to evaluate functional balance. Angular velocity of knee flexor and extensor at 60°/s

measured by Biodex System 4 Pro® (Biodex, Shirley, NY, USA) were used to evaluate isokinetic strength. Numeric Rating Scale (NRS) and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) scales were used to evaluate pain.

Results:
There were 20 patients in the intervention group and 17 patients in the control group. Changes of measurements at 2 weeks after TKA, intervention group showed significant improvement compared to control group in BBS. At 6 weeks after TKA, intervention group showed significant improvement compared to control group in peek torque of knee extension and flexion and WOMAC scales. There were no complications such as severe pain or fall down during PBWSTT.

Conclusion:
This study suggests that PBWSTT may have advantages on improving patients' strength, balance, and pain compared to conventional rehabilitation on osteoarthritis patients after TKA.

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Comparison of radiographic curve patterns and eletromyographic activity of paraspinal muscles in patient with idiopathic scoliosis

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Background and aim(s)
Many studies have been done to reveal the etiology of idiopathic scoliosis(IS), but its pathogenesis is still poorly understood. As it possible to measure activity of paraspinal muscles using surface electromyography(S-EMG), several studies found out that the S-EMG activity increased on the convex side of the scoliotic curve and suggested paraspinal muscle asymmetry as a cause of IS. Therefore, we assumed that curve patterns of scoliosis is relate with concave side muscle weakness. The purpose of this study is to find out the association between paraspinal muscle imbalance and scoliosis curve type and improve the exercise method of IS according to muscle weakness and curve pattern.

Method
The study design was prospective clinical trials and twenty nine participants with IS were enrolled. S-EMG was used to evaluate the muscular activation at bilateral erector spinae (ES) on three vertebral levels(7th, 12th thoracic, 3rd lumbar). The curve type was measured in simple radiograph. Curve type was defined on the basis of the Scoliosis Research Society Classification Definitions

Result(s)
The Wilcoxon's singed ranks test was conducted to compare the muscle activity between the convex and concave sides in each paraspinal levels. The most significant findings from the S-EMG data was increased activities of convex EST12 in thoracolumbar curve group(convex/concave side: 111.79 ± 33.85/146.63 ± 45.58, p value = 0.018). At the levels of EST7 and ESL3, there were no significant differences between the convex and concave sides.
The S-EMG data on thoracic curve and lumbar curve, EST7 and ESL3 showed most significant differences.

Conclusion(s)
The paraspinal muscle asymmetry well reflected the curve type on this study. Based on these findings, we propose a new exercise protocol to carry out the asymmetrical stabilization exercise of the scoliosis according to the asymmetrical paraspinal muscle weakness.

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Ultrasound-guided selective nerve root block versus fluoroscopy-guided interlaminar Epidural block for the treatment of radicular pain in the lower cervical spine

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Background and aim:
This study is to compare advantages and mid-term effects of ultrasonography (US)-guided selective nerve root block (SNRB) to fluoroscopy (FL)-guided cervical interlaminar epidural steroid injection (CIESI) for lower cervical radicular pain by assessing pain relief and improvement of functionality.

Method:
Patients with radicular pain in lower cervical spine who received US-guided SNRB (n=51) or FL-guided CIESI (n=61) were included in this retrospective study. All procedures were performed with either FL or US. The complication frequencies during the procedures, adverse events, treatment effects, functional improvements were compared at one, three, and six months following the last injection.

Results:
Both neck disability index and verbal numeric pain scale scores demonstrated enhancements in both groups at all one, three, and six months following the last injection, without meaningful differences between the groups ($p<0.05$). Moreover, no meaningful differences were present between the groups in terms of treatment success rate at every time point. Logistic regression analysis demonstrated method of injection (US- or FL-guided), sex, use of analgesics, pain duration, number of injections, and age were not independent variables for successful treatment results. There was blood aspiration before injection in 0% patients of the US-guided group, and 8% (n = 5) of the FL-guided group. In 7 patients of FL-guided group, contrast spread intravascularly during injection.

Conclusion:
Compared to FL-guided CIESI, US-guided SNRB requires briefer administration duration while relieving pain and improving function similarly. Consequently, US-guided SNRB is a promising choice for conservative management of chronic lower cervical radicular pain.

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The clinical effects of echo-guided peritendon and subdeltoid bursa steroid injection in patients with unilateral frozen shoulder

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"Frozen shoulder" was first described as pain near the deltoid insertion, inability to sleep on the affected side, painful and restricted elevation and external rotation with normal radiological appearance. The purpose of this study was to investigate the clinical outcomes and range of motion improvement after treating frozen shoulder with echo-guided peri-tendon and subdeltoid bursa steroid injection. In this study, 29 patients with unilateral shoulder pain and range of motion limitation in sagittal, coronal and transverse plans were recruited. The mean active range of motion of affected side in flexion, extension, abduction, external rotation and internal rotation were 140±38.40, 35.75±4.92, 122.22±41.84, 51.22±29.70, and 59.67±15.48 degrees, respectively. The mean active range of motion of control side in flexion, extension, abduction, external rotation and internal rotation were 171.67±9.66, 41.75±5.68, 162.44±19.72, 82.44±10.53, and 71.67±9.01 degrees, respectively. The evaluation included active(AROM) and passive range of motion(PROM) of shoulder joint, numerical rating scale of pain(NRS) and shoulder pain and disability index(SPADI) and was performed at initial visit, 4th week, 8th week, and 12th week follow up. The first injection was given to all patient's affected side at initial visit. The patients who failed to reach 80% improvement in PROM at the 4th week evaluation received the second injection, and those who still failed to reach 80% improvement in PROM at the 8th week received the third injection. Comparing the evaluation results from 12th week to initial visit showed that (1) PROM and AROM both significantly improved (2) NRS significantly improved from 7.3 points to 3.7 points. (3) SPADI significantly improved from 46.7 points to 22.6 points. Conclusion: Echo-guide injection was effective in decreasing pain and increasing both PROM and AROM in long term follow up.

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Treatment effect of sono-guided suprapatellar bursa effusion aspiration on knee osteoarthritis

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Knee osteoarthritis (OA) affects a large portion of the elderly population. It is caused by degeneration of knee joint and leads to variety of symptoms including pain, stiffness, and swelling or even increases joint effusion. These may result in decreasing of muscle strength, hamstring-quadriceps co-contraction, abnormal gait patterns, and leads to poor quality of life. However, no cure exists to date. Various interventions have been used to relieve symptoms and reduce fluid accumulation, but the evidence of these interventions is still considered few.

The purpose of this study is to investigate the short term and long term effect of echo-guided aspiration of suprapatellar effusion. In this study, patients with OA knee and suprapatellar effusion are diagnosed via X-rays with Kellgren-Lawrence grading scale and sonography respectively. Scale 1~2 is suggested mild to moderate knee degenerative osteoarthritis. Sixteen patient were recruited in this study and randomized into two groups. The first group received oral form NSAID only and the second group received oral form NSAID with sono-guided suprapatellar bursa effusion aspiration. The patient was put on Cybex Humac Norm with surface EMG attached to quadriceps and hamstring to calculate muscle activation ratios in different angles before receiving treatment and 1, 4 weeks after treatment.

No significant improvement was noted at the first week after treatment. But at 4 weeks after treatment, the second group who received oral form NSAID with sono-guided suprapatellar bursa effusion aspiration showed a significant different comparing to the first group in EMG ration at flexion 60 degrees, 120 degrees and 180 degrees. The result shows us that combining oral form NSAID with sono-guided suprapatellar bursa effusion aspiration could correct the co-contraction between quadriceps and hamstring.

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Rehabilitation Program in a Left Index Finger Open Fracture of a Factory Worker: A Case Report

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Background:
Penetrating injury to the tendons of the hand are frequently found in the Emergency department by as much as 20%.1,2 Injury to the second digit was the most common, especially at the extensor tendon.3 Between the genders, males were significantly affected (84.1%) and are found at productive ages ranging from 20 – 29 years.1 Each component of the hand, such as the index finger, plays an important role in performing activities of daily living. Thus, this case report aims to analyze the importance of rehabilitation program in extensor tendon injuries of the hand.

Case:
A 27-year old man was brought the emergency department with a laceration on distal phalanx of the left index finger as a result of accident to a grinding machine. On physical examination, laceration is found at dorsal aspect of the index finger with continuous bleeding, and capillary refill time is < 2 seconds. Extension motion of the second digit were greatly restricted. Radiograph examination revealed an open fracture in distal phalanx of the index finger, which resulted in distal bone displacement. Treatment was done by surgical tissue repair and immobilization of the finger. In the second week, a static finger extension orthosis was given.

Conclusion:
Previous studies have shown that the use of static finger orthosis could achieve successful tendon healing in zone I extensor tendon injury.4 A static finger orthosis of DIP joint at 0-degree extension were used, and no functional limitation was observed during the rehabilitation program. It is then expected that no extensor lag would occur after 3-months immobilization to accomplish both tendon and bone healing, eventually restoring the hand function.

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Healing of interstitial tear of rotator cuff tendon after one shot of platelet-rich plasma injection

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Rotator cuff tendinopathy is a major cause of shoulder pain and disability, leading to muscular weakness and impaired mobility. Without proper management, it may progress to partial tendon tear and ultimately affects the activities of daily living. Effect of traditional treatments vary, and the emerging researches have considered platelet-rich plasma (PRP) as a potentially useful treatment. Recent meta-analysis of randomized controlled clinical trials had supported the use of a single injection of leukocyte-rich PRP (LR-PRP) under ultrasound guidance in tendinopathy, the studies excluded the tendon tears though.

Herein, we report a case of a 66-year-old woman suffered from severe left shoulder pain for three months. All therapies were less effective until she received one shot of PRP injection. The visual analog scale and the clinical assessment tools both disclosed significant improvement. High-resolution musculoskeletal ultrasonography was performed before and 3 months after the treatment, which revealed healing of the torn region and decrease in inflammation.
Application of PRP injection remains a promising treatment in partial-thickness rotator cuff tears. Future large-scale randomized control trials are required to strengthen the result demonstrating in this case study.

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Prolotherapy versus corticosteroid injections for the treatment of plantar fasciitis: a randomized controlled trial

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Aim of Investigations
Chronic plantar fasciitis is a degenerative condition and one of the most common causes of foot pain among adults. In this study we have compared improvement in pain and foot function in patients with chronic plantar fasciitis following P2G (prolotherapy) versus Triamcinolone acetonide injections.

Methods
A double-blind randomized controlled trial included 100 participating adults with at least 3 months of refractory plantar fasciitis. The participants were randomized to either group using random number tables. Prolotherapy group received injection of 1ml P2G solution (phenol 1. 2%, glycerine 12. 5%, and dextrose 12. 5% in sterile water). Steroid group received 1ml Triamcinolone acetonide injectable suspension 10mg/ml.

The primary outcome measures used were resting heel pain (0–10 Likert scale) and foot function index. Secondary outcome measure used was tablet count chart. Each was recorded at baseline, 4 and 12 weeks.

Results
The subjects who received prolotherapy reported to have improvement both in pain scores (7. 32±1. 1 and 4. 08±1. 0 versus 7. 32±1. 2 and 5. 75±1. 0 at baseline and 4 weeks, respectively) and foot function scores (48. 21±14. 9 and16. 65±5. 6 versus 40. 98±12. 1 and 26. 85±3. 4 at baseline and 4 weeks, respectively)as compared to steroid group. Wilcoxon rank-sum (Mann-Whitney) test revealed astatistically significant improvement ($p<0.05$) with prolotherapy injections alone as well as in comparison to steroid group among both outcome measures at 1 month. The prolotherapy subjects also reported to have reduced analgesic tablet intake ($p<0.05$) as compared to steroid group. Results at 12 weeks are still awaited. However, in both the treatment group there were no adverse events seen.

Conclusions
Prolotherapy with P2G solution was more effective in decreasing heel pain and improving foot function in subjects with refractory plantar fasciitis as compared to Steroid injections.

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NEUROPATHIC CHARACTERISTICS AND PSYCHOLOGICAL DISTRESS IN CHRONIC NECK PAIN - PILOT STUDY IN A MUSCULOSKELETAL REHABILITATION CLINIC

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Background and Aim:
Neck pain is the fourth leading cause of disability. Global point prevalence is 4.9% and annual prevalence rate is over 30%. After an acute episode, almost 50% of patients continue to suffer frequent recurrences or chronic pain. Unlike nociceptive pain, neuropathic neck pain remains under treated and under recognized. It is also known to cause greater emotional distress and worse quality of life. Therefore it is important to be cognizant and to prescribe appropriate treatments. There are very few papers in the literature on prevalence of neuropathic neck pain. This study aims to find out the prevalence of neuropathic characteristics and psychological distress in chronic neck pain patients attending a musculoskeletal rehabilitation clinic in Singapore

Method:
Patients with chronic neck pain of over 3 month duration were screened for neuropathic pain with the interview and clinical examination version of Douleur Neuropathique 4 questionnaire (DN4), and psychological distress with the Kessler Psychological Distress Scale 6 (K6) questionnaire. The DN4 and K6 findings were analysed with patient demographic and clinical features.

Results:
24 patients, 12 males and 12 females, age 36 to 77 years (mean 56.9, median 56.5, SD9.1) were studied. 12 patients had neuropathic neck pain: They were more likely to have radicular symptoms ($p < 0.05$), higher pain intensity on the Numerical Rating Scale (NRS) and suffer psychological distress symptoms ($p < 0.05$).

Conclusions:
Prevalence of neuropathic neck pain in this study was 50%. It was associated with symptoms down the upper limb, higher pain intensity and psychological distress. Further studies will help enhance awareness and recognition, improve our understanding and management.

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Spinal accessory nerve: A sonographic localization

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Introduction
The spinal accessory nerve (SAN) has a superficial and long course in the posterior cervical triangle. The aim of this study was to demonstrate that course of SAN mapped in healthy volunteers and relation of surface landmark using ultrasound
Material and methods
The posterior triangle of the neck was scanned in 20 healthy volunteers by a qualified sonographer. Volunteers with prior surgery for neck disorder, major trauma and underlying other metabolic disorders related to peripheral neuropathy were also excluded. SAN was traced up to the level of the contact with posterior border of the SCM muscle. Nerve conduction study was additionally performed to confirm the position of the SAN using ultrasound (the enterance and exit of posterior neck triangle).

Results
The mean SCM muscle length (between mastoid process and sterno-calvicular notch) was 15.6±2.3 cm [13-18 cm]. The SAN mean measures were 1.8 mm × 0.7 mm (range 1.1–2.5 x 0.4.–1.3 mm) at the level of the posterior border of the SCM (enterance of posterior triangle of the neck) and 1.5 mm × 0.7 mm (range 1.1–2.4 × 0.5–1.0 mm) at the level of the anterior border of the trapezius muscle (exit of posterior triangle of the neck). At its proximal point, the depth of nerve was 4.9 ± 2.5mm from the surface of the skin and this was in the about one third of the whole distance of sternocleidomastoid muscle.

Conclusion
The SAN can be clearly visualized by means of ultrasonography. The knowledge of the nerve's precise location and relation of surface landmark around the neck may have useful clinical applications.

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Effect of anterior cruciate ligament reconstruction on proprioception of knee joint in elders

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Backgrounds:
Abnormal proprioception of the knee joint has been documented after rupture of the anterior cruciate ligament (ACL) and may result in the loss of muscular reflexes. Excessive loading from the lack of muscular control may predispose the joint to osteoarthrosis. This paper aims to evaluate the effect of anterior cruciate ligament reconstruction on proprioception of knee joint in elders.

Methods:
30 ACL injure patients were studied at an average of 17.1 months after ACL reconstruction. Proprioception sense of knee joint were measurement by BIODEX at the position of 15°、45°and 75°on bilateral lower extremities. One way ANOVA was used to compare the difference of proprioception between bilateral lower extremities.

Results:
There are no significant difference between the unaffected side and the reconstructed side except at the position of 75°（$p<0.01$）。But in the unaffected side, the proprioception sense at the position of 75°was significantly lower than the position of 45°and 15°.There is no significant difference between the position of 15°、45° and 75° in the contralateral side.

Conclusions:
In fact, the extremity with the reconstructed ACL had a lower degree than the uninjured side in large angle. The cause of this phenomenon may be the learning effect because the test sequence of the uninjured side is in the front. However, the mistake of reconstructed side in the other two positions are larger than the unaffected side's, but have no significant difference. This result has instructional significance for making rehabilitation plans of ACL patients.
Keywords: ACL, Proprioception, knee joint

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TSCI at King Fahad Medical City (KFMC) in SAUDI ARABIA

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Introduction:
Our study aims to estimate the characteristics & causes of TSCI at King Fahad Medical City (KFMC) in Riyadh city in order to hypothesize strategy for primary prevention of traumatic spinal cord injury.

Method:
Cross-sectional, Retrospective study was conducted on all TSCI patients who aged 14 and above and who were admitted in rehabilitation center of King Fahad Medical City from January 2012 to December 2015. Furthermore, a descriptive analysis was conducted while considering factors including age, gender, marital status, educational level and causes of injury and characteristics of injury.

Results:
Total of 216 patients were admitted during this period, mean age was 28.94, majority of patients were male (86.5%), 71.7% of total patients were high school level of education or less, 68% were single, RTA was the main cause

with 90.7% and the main result of TSCI was complete paraplegia 37%. Furthermore, statistically we found that male are at a low risk of having incomplete paraplegia compared to female (p = 0.035, RRR=0.35).

Conclusion:
The rate of TSCI related to RTA has increased in Saudi Arabia in previous years. Despite the government's efforts to decrease RTA. It's clear that we need TSCI registry data developed on the basis of international data standards to have a
Keywords:
Tetraplegia; Traumatic spinal cord injury; Epidemiological Study.

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Effectiveness of Motor Function after Botulinum Toxin Type A Injection in Cerebrovascular Accident (CVA) Stroke Patients

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Background and aim(s):
The purpose of this study is to evaluate motor function before and after botulinum toxin injections for evaluating the effect of botulinum toxin injections on upper limb muscle strength and physical function performance in CVA stroke patient.

Methods and Materials:
We conducted a study that include patients with typical indications for Botulinum Toxin Type A injection in cerebrovascular accident (CVA) stroke patients. Of 12 patients included in the analysis, 6 were assigned to Botulinum Toxin Type A injection and rehabilitation, and 6 were chosen to only rehabilitation. Motor function, such as muscle strength, spasticity, and grip endurance, were evaluated.

Results:
Preliminary data revealed decreased strength in study group of tricep muscle and Extensor carpal radius(FCR). Twelve-week data revealed 11.67kg (tricep muscle) and 13.77kg(ECR), compared to 5.5kg and 4.9kg before Botulinum Toxin Type A injection. 6-meter-walking time also improved from 31.51sec to 26.17sec.

Conclusion:
We concluded increased strength in extensor muscle and gait improvement after Botox injection. Although the Botulinum Toxin Type A affects mainly flexor muscle in the hand. The strength of antagonist muscle (extensors) is also affected. We suggested intensive rehabilitation after Botulinum Toxin Type A injection to improve antagonist strength. Therefore, spasticity might be improved even though the effect of Botulinum Toxin Type A vanished. In addition, gait speed also revealed improvement. The reason might be spasticity in the hand was reduced.

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The Effects of Anodal Transcutaneous Spinal Direct Current Stimulation on Chronic Neuropathic Pain after Spinal Cord Injury: A Pilot Study

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Background and aim
Transcutaneous spinal direct current stimulation (tsDCS) is a neuromodulatory tool which could be in managing refractory chronic neuropathic pain (NP). As tsDCS-induced aftereffects depend on the electrodes montages, we evaluate the potential of tsDCS with unusual electrode montage to relieve chronic NP in individuals of chronic spinal cord injury (SCI)

Method
A single-blind crossover design was used to investigate the effects of single sessions of both anodal and sham tsDCS (2 mA, 20 min) on NP in a group of 10 chronic complete motor cervical SCI volunteers. In this study, the active electrode was over the spinal process of the tenth thoracic vertebra and the reference was placed over top of the head. Pre- to post-

tsDCS intervention changes in pain intensity (numeric rating scale, 0-10) were assessed before and after tsDCS session (immediately post-stimulation, and at 1 and 2 hours after stimulation).

Results
The Wilcoxon signed-rank test for each group showed no significant decreased in pain intensity (NRS) Compared the pre- to each post-treatment difference between sham and active tsDCS group. There was a tendency for the NRS, PGA, and PPI to slightly improve to 1, 0.5, and 0.5, respectively, before and after stimulation from mixed effect model analysis.

Conclusions
This study result suggests that anodal tsDCS with the montage used in this study did not have a significant analgesic effect in individuals with chronic cervical SCI.

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Clinical Applicability of Robot-assisted Gait Training System in Acute Stroke Patients

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Background and aim:
In Taiwan, stroke is not only the second-highest cause of mortality, more alarmingly, it is also the number one cause of long-term disability and institutionalization. The aim of this study is to investigate and document the clinical applicability of a new end-effector robotic gait training system in acute stroke rehabilitation.

Method:
Through block allocation, acute stroke patients were divided into the experimental and control group. All participants received daily hospital routine rehabilitation but the experimental group received an additional 30 minutes of supervised robotic assisted gait rehabilitation training daily for a total of 15 sessions over a 3-week period. Berg balance scale, Brunnstrom stage, European Quality of Life questionnaire, Pittsburgh Sleep Quality Index as well as the Taiwanese Depression Questionnaire were assessed prior- and after every five training sessions for all patients.

Results:
44 acute stroke patients were recruited, 30 patients (18 males and 12 females, 60.7±14.0 years) in the experimental group and 14 patients (3 male and 11 females, 57.9±12.8 years) in the control group. The patients undertook additional end-effector robotic gait training on top of the routine hospital rehabilitation demonstrated identifiable and significantly greater improvement in Berg balance scale, gait related lower limb capacity, as well as the Taiwanese Depression Questionnaire.

Conclusions:
Given the resource-demanding nature of post-stroke rehabilitation, the utilization of robotic assisted gait rehabilitation has been well advocated, like some commercially available suspension robotic systems. Our study provided preliminary empirical and concrete evidence supporting of the more cost-effective end-effector robotic system to be included as part of the routine clinical rehabilitation.

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The individuals with chronic stroke have deficits in velocity-dependent adaptation of thorax-pelvis coordination

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Introduction

Most of the individuals with stroke are able to walk independently through intensive rehabilitation, but their walking velocity is significantly slower than age-matched subjects without disability. In order to walk in the community, they should be able to increase the walking velocity relatively, such as crossing a crosswalk within a given time.

In unimpaired gait, the interaction or couplings between thorax and pelvis are relatively stable at comfortable gait speed, but as gait speed increase, the transverse thorax-pelvis coordination changes to adapt flexibly to the increased gait speed. For example, if gait speed increase, The transverse thorax-pelvis coordination changes from more or less in-phase (synchronous thorax and pelvis rotation in the same direction) towards more antiphase coordination (synchronous in opposite direction).

As the walking velocity increase, there is little research on the change of the thorax-pelvis coordination of the individuals with stroke. The aim of the present study was to determine the trunk-pelvis coordination when walking at a self-selected comfortable and fast velocity in individuals with stroke.

Methods
Fourteen subjects with chronic stroke living in the community participated in this study.
Thorax and pelvis rotations angle and angular velocity in transverse plane when walking at a self-selected comfortable and fast velocity were recorded using three-dimensional motion analysis system (VICON). Thereafter intersegmental coordination between thorax and pelvis were analyzed using the continuous relative phase (CRP) calculation.

Results
The individuals with stroke are able to walk faster (0.74m/s) than their self-selected comfortable (0.54m/s) walking velocity ($p<.001$) but encounter problems in adjusting thorax-pelvis coordination with increasing walking velocity remains more biased toward in-phase coordination.

Conclusion
The individuals with chronic stroke have deficits in velocity-dependent adaptation of thorax-pelvis coordination at self-selected gait speed.

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GNE Myopathy: A Prospective study on Patients Profile and Spatio-temporal Gait Characteristics

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Objective:
GNE Myopathy is an ultra-rare, distal, predominantly myopathy involving mainly the lower limbs with a prevalence of 1/1,000,000 population. We describe the topographical muscle involvement pattern and gait changes, correlated with duration of illness and compares male vs female parameters in patients with this muscular disorder.

Materials and Methods:
23 (14 male) genetically confirmed GNE myopathy patients with median age of 33 years (range 20-49 yrs) and median duration of 5 years of illness (range 3-18 yrs) were recruited and their gait was analysed using GAITRite® pressure sensitive walkway system.

Results :
Analysis showed mean gait velocity of 79.5 cm/sec, mean step length of 51.6 and mean Functional Ambulation Profile-FAP score of 88. Early foot flat, foot drop gait with wider- out toed stance with increased perturbations with increase in pressure at heel and decreased arm swing was observed in these patients. Muscle topography showed predominant weakness in Flexor Hallucis Longus-FHL, Extensor Hallucis Longus-EHL, ankle dorsi-flexors, Hip adductors and knee flexors

with stark sparing of quadriceps and relative sparing of hip- abductors, extensors, flexors; and ankle plantar-flexors. Gait parameters in females were affected to a larger extent than males with similar duration of illness. FAP score and total MRC lower limb score correlated well with duration of illness.

Conclusion:
Duration of illness objectively correlated well with gait velocity, step length, step width and swing to stance ratio. We suggest that females may have a more rapid disease progression. Total MRC-lower limb score and FAP score may be useful to gauge disease progression.

Key Words:
GNE Myopathy; GaitRite; temporo-spatial gait characteristics

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Correlation between Heart Rate Variability and Bladder Sensations during Filling and Voiding Phase of Urodynamic Study in Patients with Myelopathy

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Objective:
Correlation between heart rate variability (HRV) and bladder sensations during filling and voiding phase of urodynamic study-UDS in patients with myelopathy.

Patients and Method:
Myelopathy patients (traumatic and nontraumatic) within 6 months of illness were included. Demographic data, ethiopathological diagnosis & urinary complaints were noted. UDS was performed and simultaneous HRV calculated at each event of filling and voiding phase by recording and calculating standard deviation of normal-to-normal (NN) interval-SDNN, Root mean square of successive differences, total power-TP, average heart rate, high frequency-HF, low frequency-LF and LF/HF ratio and data analysed.

Results:
Study included 30 patients (23 males) with mean age of 31.2 years (range 18-60 years, SD11.6). The mean of LF in normalized units showed an increase from 43.6 ± 14.1 at baseline to 48.9 ± 17.4 at strong desire to void (SDV) and at urgency to 44.1 ± 14.5. HF at baseline 40.4 ± 14.1 reduced to 36.4 ± 12.8 at SDV and rose at urgency to 41.2 ± 13.2. LF/HF at baseline was 1.3 ± 0.8, which increased to 1.6 ± 1.1 at SDV and reduced at urgency to 1.2 ± 0.6. Significant change in mean value was seen in TP (p=0.01) and SDNN (p=0.009) at First Desire to Void-FDV. Significant positive trend was seen in TP (p=0.048) and SDNN (p=0.042) during filling.

Conclusion:
Comparison of HRV measures failed to show significant rise in sympathetic or parasympathetic component in myelopathy patients during urodynamic study and requires more critical evaluation.

Keywords:
Myelopathy; Urodynamic study; Heart rate variability

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Challenges setting up a NZ Spinal Cord Injury Registry in New Zealand

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Background and aims:
The NZ Spinal Cord Impairment Action Plan (2014-2019) provided impetus to establish a long sought after New Zealand spinal cord injury (SCI) Registry. Challenges associated with establishing the New Zealand Spinal Cord Injury Registry (NZSCIR) are presented.

Methods:
A pilot of two registry options preceded a successful business case for a NZ registry funded by the Accident Compensation Corporation (ACC) and two supra-regional spinal centres, in partnership with the Rick Hansen Institute, Canada. Representatives from the supra-regional spinal centres, the Ministry of Health, ACC, consumers and a research organisation formed an implementation governance group to establish the NZSCIR in partnership with the Rick Hansen Institute. The group worked through security, privacy and ethics requirements before developing a priori questions and developing protocols. Two registry coordinator roles were established and a staged implementation plan developed.

Results:
The NZSCIR was launched by the Minister of ACC, in collaboration with the Rick Hansen Institute, in August 2016. Challenges have related to differences between the two supra-regional services, refining the non-traumatic data set, incorporating data capture into current processes, changes of clinical and coordinator staff, increasing workload of the coordinators and data completeness. Consumer factors have included literacy and English as a second language, large questionnaires and whether to consent terminally ill consumers. Set-up of some registry and reporting elements, such as an interactive dashboard have taken more time than anticipated. Staged implementation of community and historic data collection should be complete in 2018.

Conclusions:
From a New Zealand perspective, NZSCIR data will enable measurement of outcomes to help determine whether people with SCI are living well. A partnership with the Rick Hansen Institute has enabled NZ to establish its own registry aligned with the Rick Hansen SCI Registry that will progress research, innovation and improvement for those with SCI.

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First year's data from the New Zealand SCI Registry

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Background and aims:
A national adult spinal cord injury (SCI) registry was established in August 2016 in partnership with the Rick Hansen Institute, Canada. The aim is to collect data for purposes of research and improving outcomes for people with SCI. Findings from the first year of the New Zealand Spinal Cord Injury Registry (NZSCIR) are presented.

Methods:
From 1 August 2016 to 31 July 2017, data was collected for people admitted to either of the two NZ SCI centres. Either a minimal data set (not requiring consent) or the full data set (with consent) was entered. Data was entered by clinicians, two coordinators and extracted by the Rick Hansen Institute. A total of 161 participants were enrolled, with complete records available for 101 participants.

Results:
Of the 161 participants, 67% had a traumatic SCI and 33% had a non-traumatic SCI. Men account for 73% of all SCI and 78% of traumatic SCI. Ages ranged from 15-88 years. Most participants are NZ European (47%). Maori are over-represented in traumatic SCI (27.8%).
The top three causes of traumatic SCI were falls (36%), sports (28%) and transport (23%). Injury to acute admission to SCI service ranged from 0.7-217.8 hours. Time to spinal cord decompression ranged from 4.8-237 hours. Seven participants received surgery within 12 hours and a further 9 within 24 hours. The median length of stay in acute SCI services was 12 days and rehabilitation was 77 days.

Conclusions:

NZSCIR data is potentially useful for service improvement and research. Changes to the minimum data set are planned to improve capture of aetiology data, time to surgery and secondary complications. Collection of non-traumatic SCI data in a registry is unique. Work is underway to improve consent rates and collection of non-traumatic data. Community follow-up and historical data collections are underway.

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Using collective impact to improve traumatic brain injury rehabilitation in NZ

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Background and aims:
Rehabilitation following traumatic brain injuries can be fragmented and unnecessarily prolonged. A rehabilitation provider approached the Accident Compensation Corporation with a proposal to develop a collaborative to improve the rehabilitation journey for consumers with traumatic brain injuries.

Methods:
A collaborative was established in the Auckland region in 2016 using collective impact as a framework to achieve improvements in rehabilitation following a moderate-severe TBI in adults. Collective impact includes five conditions: a common agenda, shared measurement, mutually reinforcing activities, continuous communication and backbone support. The collaborative, consumers, funders, providers and non-government organisations met at least quarterly. The consumer journey from moderate-severe traumatic brain injury to living in the community was mapped and opportunities for improvement identified. Three nested projects with multiple workstreams were identified as priorities for improving the client journey. Members of the collaborative led projects with backbone support from the Accident Compensation Corporation.

Results:
Improving information for consumers, improving transition between services; and gathering and using relevant data and outcome measures were identified as key priorities of the collaborative. A range of consumer resources were identified and access to them improved. Work is now underway to update and translate key resources. Changes to existing processes to remove unnecessary delays and constraints in the system have been achieved resulting in improved coordination and better transition between services. The Institute of Medicine quality framework (IOM6) is being used to guide the relevant collection of data and outcome measures. Several measures are currently being tested.

Conclusions:
Consumers are able to influence priorities and approaches by participating in the collaborative. Collective impact allowed providers to put competition aside by focusing on outcomes that need to be achieved for consumers in a complex system. Backbone support is a vital component of collective impact. Results may be impressive but take time.

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Effects of Electro-acupuncture at Baihui and Shenting on Learning-memory Function and Ex- pression of Purinoceptor P2X7 in Hippocampal CA1 after Cerebral Ischmeia-reperfusion in Rats

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Background and aim(s)
To observe the effect of electro-acupuncture at Baihui (DU20) and Shenting (DU24) on learning-memory function in rats after cerebral ischemia-reperfusion and the possible mechanism.

Method
A total of 42 male Sprague-Dawley rats were randomly divided into the sham group (n=12) and the operation group (n=30). The left middle cerebral arteries of the operation group were occluded with the modified Longa's methods for two hours and reperfused, and 24 qualified rats were randomly divided into the model group (n=12) and the electro-acupuncture group (n=12), and the latter accepted electro-acupuncture at Baihui and Shenting for 7 days. They were

assessed with Longa's score two hours after modeling, and one, three, seven days after intervention. They were tested with Barnes maze since three days after intervention, once a day for five days. The expression of purinoceptor P2X7 in CA1 of the hippocampus were detected with immunofluorescence seven days after intervention, while the expression of interleukin-1ß (IL-1ß) and tumor necrosis factor-α (TNF-α) in CA1 were detected with enzyme-linked immunosorbent assay.

Results
Longa's score was improved in the electro-acupuncture group compared with that in the model group seven days after intervention ($P<0.05$); while the escape latency and the times entering the wrong hole increased in the mod- el group compared with that in the sham group ($P<0.001$), and decreased in the electro-acupuncture group com- pared with that in the model group ($P<0.001$). The expression of P2X7, IL-1β and TNF-α increased in the model group compared with the sham operation group ($P<0.001$), and decreased in the electro-acupuncture group com- pared with that in the model group ($P<0.05$).

Conclusion
Electro-acupuncture at Baihui and Shenting can improve the learning-memory function in rats after cerebral ischemia-reperfusion, which may associate with inhibition of P2X7 to alleviate inflammation in hippocampus.

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Light therapy on post stroke insomnia in rehabilitation unit

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Background:
The aim of this study is to evaluate the effect of bright light treatment in patients with post-stroke insomnia.

Methods:
Randomized, double-blind, placebo-and sham-controlled, 2-week trial in inpatient with stroke in rehabilitation department. The subjective sleep problems were measured by insomnia severity index (ISI) and the objective sleep problems were measured by actiwatch for seven days. For the evaluating efficacy of the bright light therapy, the patients answered the questionnaire regarding sleep (ISI, Pittsburgh Sleep Quality index, and Epworth sleepiness scale) mood state (Patient Health Questionnaire-9 and Generalized Anxiety Disorder-7), fatigue (Fatigue severity scale), quality of life (WHO Quality of Life Scale Abbreviated Version), Patient's physical and cognitive functions were evaluated. The stroke patients with insomnia received the bright light therapy or sham therapy for 30 minutes in the early morning. After 2 weeks of treatment, the patient's sleep problems were evaluated by ISI and actiwatch.

Results:
A total of 63 eligible participants entered the study and 41 patients were randomized to treatment (22 to bright light therapy and 19 to sham therapy). Total ISI score improved significantly more after the bright light therapy than after sham therapy ($F=60.1$, $P < 0.001$). Also, the global PSQI score, the total Epworth sleepiness scale score, the total Patient Health Questionnaire-9, the total Generalized Anxiety Disorder-7, the total Fatigue severity scale, and five domain of WHO Quality of Life Scale Abbreviated Version improved significantly more after the bright light therapy than after sham therapy ($P < 0.001$). Among actigraphy parameter, the improvement of total sleep time and sleep efficiency was revealed by bright light therapy than sham therapy ($P < 0.05$).

Conclusion:
The bright light therapy might be used in future to improve the subjective and objective quality of sleep in stroke patients in rehabilitation setting.

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The trunk function recovery for patients with acute cervical spinal cord injury without major bone injury

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Background and aim:
Sitting is among the most fundamental ADL for cervical spinal cord injury (CSCI) patients. The aim of study was to evaluate the relationship between trunk function and MRI finding including the extent of spinal cord compression for CSCI patients without major bone injury.

Method:
Subjects were 51 patients with CSCI without major bone injury. The function of all patients at 72 hours after injury was modified Frankel (mFrankel) grade B or C, and the International Stoke Mandeville Wheelchair Sports Federation (ISMWSF) classification < Fair. Subjects were assessed at the onset of rehabilitation (6.8 ± 5.7 days) and discharge (50.0 ± 39.1 days) using mFrankel grade and ISMWSF classification. MRI findings including the extent of spinal cord compression were assessed within 72 hours after injury. Spearman's correlation coefficient was used to assess the relationship between improvement rate of mFrankel grade and ISMWSF classification. Mann-Whitney's U test was used to compare the rate of spinal cord compression of "≧ Fair" with that of "< Fair" at discharge. Receiver operating characteristics curve analysis was applied to identify discriminating cut-off values for the extent of spinal cord compression for significant ISMWSF improvement at discharge (≧ Fair). Results: The improvement rate of mFrankel grade was significantly correlated with that of ISMWSF classification ($r = 0.46$, $p < 0.001$). The rate of spinal cord compression of < Fair was significantly higher than that of ≧ Fair ($p < 0.001$). The optimal cut-off values for trunk balance recovery derived were the rate of spinal cord compression 33.2 % in CSCI patients without major bone injury (sensitivity: 76.7 %, specificity: 69.7 %).

Conclusions:
The trunk function recovery was related to lower extremity motor function recovery. The trunk function could be expected improvement of patients with spinal cord compression of < 33.2%.

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Improving processes of stroke rehabilitation care through 'e-Stroke Rehabilitation Coordinated Care Pathway'
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Background:
There is good evidence that stroke units and stroke care pathways improve outcomes like death and significant disability, but on the other hand the pathways associated with stroke rehabilitation have constantly been debated on their perceived benefits. There has been a constant challenge for rehabilitation professionals to provide evidence-based care and reduce variation in clinical practice, especially in acute and sub-acute stroke rehabilitation centers.

Aims:
To reduce variation in clinical practice and to implement evidence based assessments and interventions through 'e-stroke rehabilitation co-ordinated care pathway'.

Methods/ Development of Stroke Rehabilitation Pathway:
On the basis of multidisciplinary model of care, 'stroke rehabilitation coordinated care pathway' was developed at rehabilitation unit, Singapore General Hospital in association with the hospital's quality management department to implement standardized care processes, and for better organization and documentation of patient journey.

Results and Discussion:
The Stroke Rehabilitation pathway documents key clinical events including important assessments and intervention in a time based fashion, which makes it easier to track the rehabilitation management and progress of patients. The quality management department tracked the data from variance data set and compiled the results on quarterly basis to be

reviewed by relevant disciplines. The results showed improved compliance rate on key assessments and interventions by the rehabilitation team, which intern had also provided valuable feedback to the team.

Conclusion:
Stroke Rehab. coordinated care pathway provided an efficient way to implement the best practice guidelines and at the same time provided the way to monitor and improve various care processes involved in a stroke patient care through the rehabilitative process.

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Dietary Changes after Early VFSS in Acute Stroke Patients with Dysphagia

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Background:
We hypothesized that intensive evaluation within 7 days after stroke onset like videofluoroscopic swallowing study (VFSS) helps to choose a proper feeding. This study was to investigate a dietary changing tendency and usefulness after early VFSS in stroke patients with dysphagia.

Methods:
After primary stroke treatment, VFSS was performed within 7 days after stroke onset for neurologically stable patients. We enrolled the patients who dieted the food via nasogastric tube with recovering alert mentality and improving cooperation. Patients were divided into 3 groups according to their brain lesion, cortical lesion (CL), subcortical lesion (SCL) and brainstem/cerebellar lesion (BCL). On the result of VFSS, we checked tendency of changing dietary method and discrepancy of predicting the aspiration risk between the DST and the VFSS.

Results:
One hundred sixty three patients met our inclusion criteria; 61 patients were enrolled to the CL group, 54 to the SCL, and 48 to the BSL group. Patients who had aspiration risk, which penetration aspiration scale (PAS) scores were 6 to 8, were noted in three groups on the VFSS (47.5% in CL, 59.3% in SCL, and 47.9% in BCL). 79.2 % of patients were needed to change their feeding methods after VFSS and patients who could have a normal regular diet (NRD) was only 20.8%. 64.4 % of patients were needed to change their feeding methods after VFSS. Among them, 37.4% of patients should restrict the control of their feeding methods due to aspiration risk. The discrepancy between the result of screening test and VFSS was found 19.0%. Aspiration pneumonia was observed in 12 patients (7.4%) after VFSS during 3 weeks. Only restricting diet group, aspiration pneumonia was observed.

Conclusion:
Early VFSS for acute stroke patients provides a more proper feeding method and helps to manage dysphagia effectively.

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Simultaneous upper and lower limb abobotulinumtoxinA injections and guided self-rehabilitation contracts in spastic hemiparesis: baseline data from the ENGAGE study

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Background and aims:
Guided self-rehabilitation contracts (GSC) are antagonist-targeting strategies (individualised daily home-based self-stretching and active training programmes, prescribed for specific muscles; patients record exercises in a diary). The

ENGAGE study assesses effects of abobotulinumtoxinA (aboBoNT-A; Dysport®) on voluntary movements (composite active range of motion [CXA], degrees) following co-injection of upper (UL) and lower limbs (LL) alongside GSC, in patients with chronic hemiparesis following acquired brain injury. An interim analysis (cut-off December 2017) of ENGAGE baseline (BL) data is presented.

Methods:
International phase 3b/4, prospective, single-arm, open-label study (NCT02969356). Patients, stratified by UL or LL as primary treatment target (PTT), received two consecutive injections of aboBoNT-A 1500 U alongside personalised GSC. Composite endpoint definitions: "CXA, UL" = XA elbow flexors + XA wrist flexors + XA extrinsic finger flexors; "Full CXA, UL" also included XA shoulder extensors + XA pronator teres. "CXA, LL" = XA soleus muscle + XA gastrocnemius; "Full CXA, LL" also included XA gluteus maximus + XA hamstrings + XA rectus femoris.

Results:
BL data (n=157 patients): Mean age, 52.9 years; 66.2% male; injury classification: 91.1%, stroke and 8.9%, brain trauma; mean time since brain injury: 79.5 months. PTT split: 52% UL, 48% LL. Overall, 27% were naïve to botulinum toxin (BoNT) for both UL and LL spasticity (34% UL-naïve; 58% LL-naïve), and 74% were naïve to GSC. Mean (SD) BL aboBoNT-A doses were: PTT UL, 965.9 (70.7) units; PTT LL, 980.4 (182.3) units. The mean (SD) CXA were: UL, 319.5° (118.8); LL, 141.3° (34.4) and Full CXA were: UL, 506.8° (173.4); LL, 635.5° (76.1).

Conclusions:
The ENGAGE study will provide insights into the safety and efficacy of the combination of GSC with aboBoNT-A, simultaneously injected into UL and LL, in adults with spastic hemiparesis.

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Brain Injury Rehabilitation in Traditional Chinese Medicine

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Background and aims:
Treatment of the sequelae of CNS injury has been difficult. While progress has been made in recent years, the rehabilitation rate of patients with CNS injury does not improve a lot. By combining acupuncture therapy, massage and TCM, we are able to significantly improve the patient condition.

We routinely deal with sequelae of brain injury and spinal cord injury by acupuncture therapy and massage, or a combination of traditional Chinese medicine and internal medicine. Such strategies have been effective empirically.

Rehabilitation with traditional Chinese medicine is a science to study the basic theories, therapeutic methods and application. The traditional Chinese medicine has evolute in the long history of clinical practice. The theory was originated from practice and in return guided the practice. It has a long history of thousands of years.

Method:
We help patients to rehabilitate with acupuncture, massage, internal TCM.
Acupuncture is the insertion of thin needles into the skin. The needles will be left in place for twenty to thirty minutes.
Massage is to work and act on the body with pressure. Our therapists use hands, fingers, elbows, or forearm to generate pressure onto the patients body.

Result(s):
After traumatic brain injury, patients suffer from a variety of functional loss, such as walking, talking, eating and dressing. Besides using western medicine, the patients can benefit from external use of TCM such as acupuncture, massage as well as the internal use of TCM. After using
Traditional Chinese Medicine Method, from our experience, about 70% of the patients can recover well.

Conclusion(s):

Patients benefit from combination of Western Medicine and the Traditional Chinese medicine. The patients' daily function was improved. And the secondary injury was prevented. Rehabilitation of Traditional Chinese Medicine is shown effective in treating brain injury and spinal cord injury.

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The Effectiveness of Community-Base Wellness Programmes in Chronic Stroke Survivors: A Case Series

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Objectives:
To determine the effectiveness of a community wellness programme for chronic stroke survivors to improve physical function.

Methods:
A retrospective case series of stroke patients who were enrolled into a community wellness programme: The R.E.A.L. (Re-learn and Enjoy Active Living) programme. It is a volunteer-led, group-based wellness programme that involves activity-based restorative exercises, aiming to help patients gain confidence in daily activities, develop hobbies, improve interests in sports and fitness, community re-integration and develop mindfulness, social and emotional support. This programme involves 3-hour sessions 3 times a week.

Modified Barthel Index (MBI), Timed Up and Go test (TUG) and 6-minute walk test (6MW) were measured at 0 and 3 months

Results:
Out of the 71 subjects in the database, 29 subjects have functional outcome measured both at 0 and 3 months and were thus included. The mean age was 64.4 (standard deviation, SD 12.7) and the mean time since the stroke was 4 years (SD 3.5). The MBI improved from baseline of 80 (25) to 85 (20) at 3 months, while TUG improved from 45.3 seconds (71.5) to 27.3 seconds (30.8) at 3 months. For 6MW, improvement from 180.8m (134.1) to 207.1 (142.4) was also noted at the third month. All the improvements were statistically significant.

No adverse events were reported among all subjects.

Conclusion:
A volunteer-led, community-based wellness programme is safe and effective to improve physical fitness and daily function in a group of chronic stroke survivors

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Time to recovery and rehabilitation of body lateropulsion in patients with brainstem and thalamic infarctions

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Background and aim:
Body lateropulsion involving involuntary falling toward one side and is occasionally overlooked, because of its tendency to improve without specific treatment, including rehabilitation. Ocular torsion, skew deviation, and head tilt are the clinical signs of unilateral brainstem damage involving central vestibular pathways, which are observed in individuals with a single brainstem or thalamic lesion. The triad refers to as the ocular tilt reaction (OTR). Body lateropulsion is often complicated with OTR components in patients with brainstem infarction, and the direction of body lateropulsion is same as that of OTR. Thus, body lateropulsion is considered a vestibular tone imbalance in the roll plane, caused by unilateral lesions to brainstem areas that convey gravitational information for eye-head- coordination. We clinically investigated how body

lateropulsion improves and speculate as to preferable rehabilitation strategies in patients with brainstem and thalamic infarction.

Methods:
We retrospectively reviewed patients with body lateropulsion associated with cerebral infarction. Our review encompassed clinical records, laboratory data, MRI, and ophthalmologic fundus photographs obtained between April 2010 and March 2016. We select patients with brainstem and thalamic infarction, and excluded those with supratentorial or cerebellar infarction.

Results:
We identified 28 patients with body lateropulsion associated with brainstem or thalamic infarction among 1,474 patients admitted with a diagnosis of cerebral infarction. In all patients, body lateropulsion disappeared within four weeks. However, most patients showed mild body imbalance when they stood with one foot or their toes.

Conclusion:
Patients with body lateropulsion exhibited functional ambulation and could perform activities of daily living; however, they exhibited considerable balance issues, especially in static positions. Patients with body lateropulsion might require static rehabilitation for reconstruction of body balance systems.

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Effect of aquatic exercise on the pain, physical activity and QOL for neurological disorders: a systematic review

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Background
Neurological disorders lead to limitations of body, disability and decrease in quality of life (QOL). Patients were experience deficits of sensory, gait, balance, cognitive and depression. In some cases, they experience dementia while aging. The dependency of daily activities increases as the illness progresses, and even death may be accompanied due to respiratory problems. Primary physical exercise is necessary for treating neurological disorder and will aid overall health conditions for improved quality of life.

Aim
Quality of life can be ameliorated by physical function or psychological improvement through aquatic exercise when treating existing neurological disorders. We will review recent trends and examine how the application of aquatic exercise to neurological disorder patients affects pain, physical activity and QOL.

Method
PubMed, SCOPUS and PEDro were systematically searched for relevant studies published between January 1999 and August 2018. The following search terms were used: ‘aqua exercise’, ‘aquatic exercise’, ‘neurological disorder’, ‘pain’, ‘physical activity’, ‘water exercise’ and ‘quality of life’. Study quality was determined by using the PEDro scale.

Result
Eight of the 326 retrieved articles met the inclusion criteria. Participants (n=208) consisted of cerebral palsy (n=32), fibromyalgia (n=20), multiple sclerosis (n=51) and Parkinson’s disease (n=105). The results of studies led to a general consensus: increase physical activity exercising balance and gait to decrease pain. QOL was improved as physical health, mental health and vitality recuperated.

Conclusion
This review documents the positive effects of aquatic exercise on pain, physical activity and QOL of neurological disorder patients. The findings presented indicate that aquatic exercise could be helpful when treating neurological disorders and

should be considered as a mean of reducing pain while increasing physical function and QOL in standard clinical research programs.

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Rehabilitation outcomes of traumatic brain injury

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Background:
To study rehabilitation outcomes of traumatic brain injury patients in terms of functional, cognitive and social issues and survival over 9 years.

Methods:
Retrospective data analysis with IRB approval from Rehabilitation medicine department, Changi General Hospital.

Results:
Inclusion criteria: age above 21 years, minimum follow up of 3 months. Of the 185 patients studied over 9 years. With age range of 21 to 92 years, M: F ratio was 130:44. Majority of the brain injuries were as a result of road traffic accidents, industrial accidents and fall from heights.

36 (24%) patients died during follow up period. Age and co-morbidities associated were associated with mortality.
40% of all the patients were managed conservatively. 60% had neurosurgical intervention done i.e. bur hole, EVD, craniotomy or craniectomy. The incidence of post traumatic seizure was 30%, which was higher in patients undergoing neurosurgical intervention and those with post stroke seizures.

Some patients with moderate to severe brain injury also showed significant functional and cognitive improvement over time whilst some patients with mild injuries without significant CT brain scan findings showed high dependency level and poorer functional outcomes.

Conclusion:
Despite advances in emergency care our knowledge of brain injury remains poor. Younger subjects with mild brain injury may show limited outcomes. The role of neuroplasticity in these patients needs to be explored.

A good social support network for patients with good physical recovery but cognitive impairment can help them to re-integrate in society. Skill development program can help engagement, reduce dependency.

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Two audit cycles of one year pituitary function follow up in severe traumatic brain injury at a regional neurological centre in the UK

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Background and aims:
Evidence demonstrates the prevalence of hypopituitarism after severe traumatic brain injury (sTBI) is higher than previously anticipated. This places an emphasis on screening to detect disease .We audited 2 cyclesof screening for hypopituitarism after sTBI at a regional centre from 2010 to 2014.

Standards:
Standards were set with the Endocrinology department and included:
1)Screening all patients with sTBI for hypopituitarism
2)Blood tests including TFTs, 0900 cortisol, IGF-1, Na, LH/FSH +/- Testosterone/ oestrogen as age appropriate performed at 3,6 and12 months post injury
3)One 'acute cortisol' at 0900 on day 1-7 post injury

Methods:
A retrospective analysis of notes from various sources was undertaken.

Results:
Cycle one
Completed 2010 to 2012 (3 years inclusive) and 36 patients . Acute cortisol testing was undertaken in 7 patients (19.5%). Complete pituitary screening was undertaken in 3 patients at 3 months (9%) and 1 patient (3%) at a year. Incomplete screening was undertaken in a further 12 (33%) patients at various time intervals in the 3 month+ phase. All results in all phases were normal.

Cycle two
Completed in 2013 to 2014 (1 year) after a protocol stamp was introduced in the notes, local education sessions and a poster at an endocrinology conference.
11 patients.10 patients (91%) had acute cortisol tests, 6 (60%) had evidence of hypoadrenalism. Uptake of pituitary testing at 3 months+ phase remained low, only 3 (28%) patients had incomplete pituitary screening in the 3 month+ phase, all tests were normal. 1 patient had a normal pituitary screen completed at one year (9%) .

Conclusion:
A protocol stamp, poster and local education sessions did not appear improve screening in the 3 month+ phase, however the numbers in cycle 2 (taken from 1 year vs. 3 years) may have been too low to be meaningful.

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Sarcopenia in Polio Survivor – A Study from the Initiation of the polio survivor healthy ageing longitudinal study in South Australia

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Introduction
Approximately 350 polio survivors reside in South Australia with a median age of 65-years or greater and many complain of functional decline with ageing, that in part may be attributed to the late effects of polio (LEOP). Polio affects the anterior horn cell leading to muscle atrophy that increases the risk of sarcopenia (aged related loss of muscle mass and function). The relationship of sarcopenia to LEOP is unknown. Is the current definition of sarcopenia as defined by the European Working Group on Sarcopenia in Older People(EWGSOP) applicable to polio survivors? This study aims to examine the prevalence of sarcopenia as defined by the EWGSOP in polio survivors.

Methods
45 people aged 65 years and older who contracted paralytic or non-paralytic poliomyelitis in early childhood have agreed to participate in the study. Measurements of body composition include bioelectrical impedance analysis for muscle mass, grip strength and gait speed. Low skeletal muscle index(SMI) was defined as <8.87kg/m2for men and <6.42kg/m2 for female. Low grip strength, <30kg for men and <20kg for women, low gait speed <0.8m/s. Sarcopenia was defined as low muscle mass plus either a low grip strength or low gait speed.

Results
Preliminary measurements of thirteen patients (six men and seven women; age range 67-82-years, with non-paralytic poliomyelitis) show mean(SD) SMI for men 9.7(0.9)kg/m2, and women 8.7(0.9)kg/m2, mean grip strength 30.9(9.3) kg for men and 20.2 (5.5) kg for women and gait speed of 1.2(0.3) m/s for men and 0.9(0.3) m/s for women.

Conclusion
Preliminary data suggests that Participants muscle parameters do not meet the EWGSOP definition of sarcopenia , however, a larger sample size needs to be measured to determine the applicability of this criteria to polio population. Identifying sarcopenia in polio survivors may provide an avenue to treat it and reduce their functional decline.

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Unique rehabilitation challenges in a male patient with anti-NMDAR encephalitis after Herpes Simplex encephalitis

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Background

Anti- N-methyl D-aspartate receptor (NMDAR) encephalitis is an autoimmune disorder of the central nervous system which presents acutely with seizures, disturbances in consciousness and behavioural change. As about 80% of patients with anti NMDAR encephalitis are women, little is known about the rehabilitation needs and outcomes in male patients.

Methods

This is a case report of a 34-year old Chinese male who initially presented with fever, confusion and generalized seizures. He was admitted to hospital where he was diagnosed and treated for Herpes Simplex encephalitis. He subsequently developed dyskinesia and neuropsychiatric disturbances, and was diagnosed to have anti-NMDAR encephalitis. When medically stabilized, he was transferred to a specialist neurorehabilitation unit for ongoing care and continued outpatient rehabilitation after discharge.

Results

His main clinical issues were that of swallowing, poor sleep, irritability and disinhibited behaviour. A positive outcome was achieved using a variety of interventions including behavioural management, psycho-education, psychopharmacology and an integrated multi-disciplinary team approach. Mild memory and executive deficits were persistent in the long term. The clinical challenges encountered throughout his rehabilitation and the approach to ameliorating these is described.

Conclusion

Male patients with anti-NMDAR encephalitis may pose unique rehabilitation challenges, and a long term integrated and multi-disciplinary input by a variety of health disciplines is required in order to improve the long term outcome and quality of life for them and their families. A case series will also be useful to determine the needs and effective approaches across this patient group as a whole.

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The Post Stroke Checklist Identifies Unmet Needs for Health Care in Post-Acute Stroke Patients

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Background and aims:

The functional recovery in status was always evaluated by health-care providers, which may neglect the real needs of stroke patients. Current functional evaluation such as the functional independence measure (FIM) score is lack of psychosocial aspect. Therefore self-perceived report of real needs of stroke patient is important. The post-stroke checklist (PSC) is a questionnaire developed by the World Stroke Organization for the follow-up care and referral needs of stroke patients in recent years. It is designed for feasibility and practicality and leading research results were based on the consensus of Delphi panel. This study aims to identify the level of unmet needs of post stroke patients.

Methods:

A total of 319 stroke patients (190 males and 129 females) were included in one-year-period study. The PSC contains eleven issues including secondary prevention, activities of daily living, mobility, spasticity, pain, incontinence, communication, mood, cognition, life after stroke, and relationship with family. The proportion of “yes” as the answer to each question is expressed in percentage.

Results:

The overall mean age was 70.0±13.3, and the FIM score was 66.5±23.1. Analysis of the 11 questions contained in the PSC revealed that the common problem encounter in post-stroke patients were as the following: daily living activities (77%), mobility (74%), life after stroke (40%), spasticity (39%), communication (33%) and cognition (32%). On the other hand,

mood (30%), pain (24%), incontinence (18%), relationship with family (15%) and secondary prevention (14%) were less frequent problems happened to post-stroke patients.

Conclusions:
The results suggest that the PSC is a comprehensive and useful measurement to find unmet needs in post stroke patient. Because of the length of the disease after the onset, social and cultural differences and different medical systems, unmet needs in post stroke patient may be different.

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Cutoff Values for Obesity in Korean People with Motor Complete Spinal Cord Injury: Body Mass Index and Waist Circumference

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Background and aims
The primary causes of mortality following spinal cord injury (SCI) are cardiovascular diseases, which are usually associated with obesity. However, the reports on the cutoff values for obesity in Asian persons with SCI are scarce. This study aimed to determine the cutoff values of body mass index (BMI) and waist circumference (WC) for obesity in Korean people with motor complete SCI.

Materials and Methods
The study included 72 Korean people with motor complete SCI. BMI (kg/m2) was calculated and WC (cm) was measured in the supine position. Total body fat mass (kg) and the percentage of total body fat were determined using whole-body dual-energy X-ray absorptiometry. Receiver operator characteristic curves were used to determine the cutoff values of BMI and WC for obesity.

Results
BMI 20.4 kg/m2 for both men and women, and WC 81.3cm for men were identified as cutoff values for obesity in Korean patients with motor complete SCI.

Conclusions
Cutoff values for obesity in Korean people with motor complete SCI was presented in this study, which is lower than general population and Western patients with SCI. It would help them get more appropriate assessment and management for obesity.

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Trajectory of disability in activity of daily living in elderly people with locomotive disorders

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Background and aim(s):
As geriatric problems, there are several entities such as frailty, sarcopenia, or locomotive syndrome; these are the terms covering motor dysfunction of aged people. The prevalence of musculoskeletal diseases rapidly increases and our primary goal is the elongation of “healthy life expectancy” in aged society. How can we achieve such goal?

Health check principle indicates that target condition should be common ones with gradual progress because the final goal is to modify its prognosis. Considering these points, our future on locomotive problems management appears to be promising and feasible if we can change the trajectory of dysfunction.

The purpose of this study was to investigate how such motor involvement affects daily activity through a prospective cohort study.

Method:
Total 314 elderly patients who satisfied the designated criteria were recruited from 5 facilities. At each 6 month (baseline, 6, 12, and18 months), we investigated the symptoms and functional status of patients who were engaged in various conservative treatments for locomotive disorders as out-patient basis. These people were mathematically classified into seven classes according to a geriatric locomotive function scale (GLFS-25), and were checked using mixed linear model.

Results:
We assessed 310 patients at baseline, 281 at 6 months, 250 at 12months, and 229 at 18 months.

As for living function, only functionally worse group (GLFS-25: 40 ≤) showed significant improvement at the 2nd, 3rd, and 4th checks compared to the baseline. And the best group (GLFS -25:7 >) slightly deteriorated at the 4th time compared to the baseline. Examining which item changed, the 5 items regarding pain and difficulties of several basic ADL showed significant changes at 4th check.

Conclusions:
We confirmed a certain response of conservative intervention, but its effectiveness was weak. We should seek more efficient treatment to improve living function in elderly people.

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Effects of age on the velocity of hyoid bone movement during swallowing

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Choking in the elderly is observed in clinical practice. Timely and adequate hyoid bone displacement is essential for safe swallowing. We aimed to investigate the effects of age on the velocity of hyoid bone movement by using bolus of different consistencies.

98 healthy participants were allocated into 3 different age groups (20-39, 40-64, and above 65 years old). A ultrasonography machine with a water balloon fixed to the transducer, which provided better contact, was used. Each participant swallowed 10 mL of juices of 3 different consistencies (thin, honey, and pudding-thick juice) while sitting upright. The transducer was placed in the midsagittal plane of the submental area. The velocity and distance of hyoid bone movement during swallowing were recorded.

The average velocity of hyoid bone movement when the participants swallowed 10 mL of honey-thick juice was 34.5 mm/s, 30.3 mm/s, and 26.6 mm/s in the 20-39, 40-64, and above 65 age group, respectively ($p<0.05$). The post-hoc analysis showed a significant difference between the 20-39 and above 65 age groups. The average velocity of hyoid bone movement when the participants swallowed 10 mL of pudding-thick juice was 37.2 mm/s, 36.0 mm/s, and 30.0 mm/s in the 20-39, 40-64, and above 65 age group, respectively ($p=0.07$). The average velocity of hyoid bone movement when the participants swallowed 10 mL of thin juice was 38.7 mm/s, 31.7 mm/s, and 31.3 mm/s in the 20-39, 40-64, and above 65 age group, respectively ($p<0.05$). No significant difference was observed in the comparison of different age groups in this category.

The results demonstrated that the velocity of hyoid movement during swallowing decreased as the age increased. However, the post-hoc analysis only showed a significant difference between the 20-39 and above 65 age groups when the participants swallowed honey-thick juice.

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Evaluation of Cardiopulmonary in Heart Failure Patients by Capacity by Cardiopulmonary Exercise Testing(CPET) before and after Rehabilitation

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Background and aim(s):
Cardiopulmonary rehabilitation has shown the benefits in cardiovascular diseases. Some evidences also revealed the improvement of cardiopulmonary capacity in heart failure patients after rehabilitation. We tried to find the average cardiopulmonary capacity and the efficacy of cardiopulmonary rehabilitation in heart failure patients.

Methods and Materials:
We conducted a study that including 13 patients with heart failure. Cardiopulmonary exercise testing(CPET) was performed to evaluate the cardiopulmonary capacity before cardiopulmonary rehabilitation. Then the patients accepted three-month cardiopulmonary rehabilitation. CPET was followed up after rehabilitation.

Results:
Preliminary data revealed decreased cardiopulmonary capacity in patients with heart failure. The average peak VO2 is 13.51ml/min/kg (3.86 METS) and the average VO2 of aerobic threshold is 8.33 ml/min/kg (2.38 METS). After cardiopulmonary rehabilitation, the cardiopulmonary capacity improved by 0.9MET.

Conclusion:
We concluded decreased cardiopulmonary capacity in patients with heart failure. The reason might be related not only to decreased stroke volume but also to skeletal muscle atrophy. We also found the improvement of cardiopulmonary capacity after heart failure. However, further studies is needed to know the adequate duration of cardiopulmonary rehabilitation in heart failure.

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Review of HAUTI in GEM and Rehab wards in Rural Hospital in Australia.

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Background and aim(s)
Hospital Acquired Urinary Tract infection (HAUTI) is a common problem amongst inpatients in hospital[i]. This review is to inform us about the incidence of HAUTIs in our wards. By comparing the data with larger studies, it will inform the treating teams regarding incidence of HAUTI in our setting, which will enable us to improve our practice to reduce its incidence. Percentage of HAUTI in our setting was compared with 2016 data from Mitchell et al study[i].

Method
This is a retrospective review of data from multiple sources including Australasian Rehabilitation Outcomes Centre (AROC) and Digital Medical Records (DMR). The period of study was from 1st Jan 2017 till 31st December 2017 and all inpatients in the Geriatric medicine (GEM) and rehabilitation wards of a rural hospital were included in this review. Data was analysed using SPSS.

Result(s)
There were 980 patients admitted to the rehabilitation/GEM Wards of a rural hospital during the study period of 1 year. Of these patients, 30 (3.1%) were recorded as having had HAUTI as a complication of their inpatient admission. Thirteen patients were male, while 17 were female. The mean admission Functional Independence Measure (FIM) score was 52, while the mean discharge FIM score was 69, with a mean change of 17. Further data analysis will reveal other details about this group.

Conclusion(s)
The results are comparable to Mitchell et al study of 2016[i] and our results indicate that we have comparable percentage of HAUTIs as reported. The list of comorbidities remains high. This study demonstrates that HAUTI remains a major cause of morbidity in patients and causes loss of rehabilitation time. Further studies are required to elaborate methods to reduce this rate so as to reduce the negative impact of HAUTIs on our patients' recovery.

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Physical Performance Factors Influencing Gait Speed in Patients Surgically Treated for Osteoporotic Hip Fractures

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Background and aim:
This study was undertaken to determine postoperative physical performance factors associative of gait speed in patients surgically treated for hip fracture.

Method:
Cross-sectional data from fifty eight patients (16 males and 42 females; average age 79.1 ± 9.1 years) who underwent a hip surgery due to hip fracture were enrolled in this retrospective cohort study. Patients completed 10 meter walk test (10MWT) to assess gait speed. Additional physical performance tests included timed up and go test (TUG), Berg balance scale (BBS), one repetitive maximum (1RM) of leg extension, leg curl of surgical and non-surgical sides, hip abduction using air-resistance weight machines, and instrumental gait analysis for spatio-temporal parameters at about 6 weeks after hip surgery.

Results:
In the bivariate analyses, postoperative 10WMT had a significant positive correlation with the postoperative TUG ($r=0.85$, $p<0.01$), age ($r=0.57$, $p<0.01$), swing phase duration ($r=0.35$, $p<0.01$), gait cycle duration ($r=0.49$, $p<0.01$) and significant negative correlation with the postoperative BBS ($r=-0.69$, $p<0.01$), 1RM of surgical leg extension ($r=-0.35$, $p=0.01$), 1RM of nonsurgical leg extension ($r=-0.40$, $p<0.01$), 1RM of surgical leg curl ($r=-0.44$, $p<0.01$), 1RM of nonsurgical leg curl ($r=-0.41$, $p<0.01$), 1RM of hip abduction ($r=-0.32$, $p=0.02$), cadence ($r=-0.53$, $p<0.01$), stance phase duration ($r=-0.26$, $p=0.04$). In addition, a presence of dementia was significantly correlated with 10WMT (44.2 sec vs 22.4 sec, $p=0.02$). In the linear regression analyses, the postoperative TUG ($\beta=0.85$, $p<0.01$) was a factor associative of the postoperative 10MWT.

Conclusion:
This study revealed that the presence of dementia, the postoperative balance ability, muscle strength of surgical and nonsurgical legs were significantly associated with postoperative gait speed early after hip surgery due to hip fractures.

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Preoperative Physical Function Influences on Stair Climbing Ability 1 Month after Total Knee Arthroplasty

Bo Ryun Kim

Background and aim:
This study was undertaken to identify preoperative physical performance factors predictive of stair climbing ability 1 month following total knee arthroplasty.

Method:
In this prospective cohort study, we assessed a total of 84 patients (8 males and 76 females; average age 72.0 ± 6.0 years) who underwent a primary unilateral total knee arthroplasty (TKA). Before and 1 month after TKA, patients completed physical performance tests including stair climbing test (SCT), 6-minute walk test(6MWT), timed up and go test (TUG), isometric knee flexor and extensor strength of the surgical and non-surgical knees, and instrumental gait analysis for spatiotemporal parameters. Self-reported disease-specific physical function measured by using the Western Ontario McMaster Universities Osteoarthritis Index (WOMAC) and self –reported quality of life measured by using Euro QOL five dimensions (EQ-5D) questionnaire.

Results:
In the bivariate analyses, the postoperative SCT-ascent had a significant positive correlation with the SCT-ascent, SCT-descent, TUG, preoperative age, and a significant negative correlation with the preoperative 6MWT, peak torque (PT) extensor of surgical knee, PT flexor of surgical knee, PT extensor of the non-surgical knee, PT flexor of the nonsurgical

knee. The postoperative SCT-descent had a significant positive correlation with the SCT-ascent, SCT-descent, TUG, preoperative age, WOMAC function, and a significant negative correlation with 6-MWT, PT extensor of surgical knee, PT flexor of surgical knee, PT extensor of the nonsurgical knee,PT flexor of the nonsurgical knee. In the linear regression analyses, the postoperative SCT-ascent had a significant positive correlation with the preoperative TUG, PT extensor of surgical knee and the postoperative SCT-descent had a significant positive correlation with preoperative SCT-descent, and the age.

Conclusion:
This study demonstrated that preoperative physical function influenced on postoperative stair climbing ability 1month after TKA.

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Complementary strategy between leg raising and toe lifting in stair ascent

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Background and aim:
The deficiency of toe lifting would be one of the main cause of fall and it was reported that the ability of toe lifting was weakening according to aging. On the other hand, stair ascent would increase the risk of toe tipping and it is one of the major task to be overcome when discharging from rehabilitation ward. The movement of leg raising is one of the complementary strategy when coming up stair with deteriorated toe lifting ability. The aim of this study was to know the relationship between leg raising and toe lifting when both of them were used as a strategy for stair ascent.

Method:
Thirty-two healthy adults (20 men, 12 female), age: 28.09 ± 6.68 years, were recruited to be the participant of this study. Participants climbed the four-step stairway with a 30 degree slope. Kinematic recordings were collected from an 8-camera, three-dimensional motion analysis system(VICON MX) and temporal-spatial parameters, joint range of motion, and horizontal toe clearance (toe-nosing minimum distance, Toe-Tread; TT), and Vertical planter clearance (the tread-plantar maximum distance, Foot-Clearance; FC) were calculated. Multiple regression analyses were performed for independent variables (ankle dorsiflexion maximum values, TT, FC) with using hip flexion angle and other factor such as height and weight etc. as dependent variables.

Result(s):
For the ankle dorsiflexion, the regression coefficient for hip flexion (standard partial regression coefficient: -0.56) was significantly negative($p<0.05$). For the TT, the partial regression coefficient of FC (0.73) was significantly positive ($p<0.05$).

Conclusion(s):
In the toe clearing strategy, ankle dorsiflexion and hip flexion had the complementary relationship and if the toe lifting ability is deteriorated with aging or other reasons, leg raising ability would have the more important meaning in the goal setting for the patients who need stair ascent to go back to their own home.

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THE EFFECT of RELAXATION EXERCISE on BLOOD PRESSURE in the ELDERLY with HYPERTENSION

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Background and aim:
Hypertension is the fourth most advanced disease in the world. Recent years, a relaxation exercise has developed in line with the popularity of mind-body therapy in order to control hypertension, known as the Jacobson's Progressive Muscular Relaxation (JPMR). JPMR training has also begun to be implemented for the elderly. The aim of this study is to evaluate the effect of relaxation exercise on blood pressure in the elderly with hypertension.

Method:
This research used a pre and post test group design. There were 19 elderly with hypertension had to practice relaxation exercise everyday for duration of five days.

Results:
There was a significant difference between the systolic blood pressure before treatment and the end of day 1 (p = 0,002), after treatment of day 1 and the end of day 5 (p = 0,005) also before treatment and the end of treatment day 5 (p <0.001). There was no significant difference between the diastolic blood pressure before treatment and the end of day 1 (p> 0.05), but there was a significant difference between diastolic blood pressure before treatment with the end of day 5 (p = 0.001).

Conclusion:
There is a significant effect of the relaxation exercise on blood pressure in the elderly with hypertension.

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Effects of whole body vibration training using side-alternating vibration platform with tilt table in hospitalized older adults with sarcopenia: A randomized controlled pilot study

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Background and aims
Sarcopenia is defined as the loss of skeletal muscle mass and strength with increased age. Increased activity following whole body vibration(WBV) has been reported in patients with chronic illness, but few studies reported the effect of WBV on the physical function of patients with acute illness. This study aimed to investigate the effects of WBV training using vibration platform with tilt table on muscle mass and physical performance in hospitalized older adults with sarcopenia.

Methods
A total of 14 patients admitted at one university hospital were recruited. Participant were randomized allocated into WBV group using side-alternating vibration platform with tilt table vs. conventional physical therapy composed of passive range of motion exercise and ambulation training. It took 40 minutes a day for both groups to receive the intervention. Initial evaluation included muscle mass, Berg balance scale, 10 meter walking test, Time to up and go (TUG). As a center of path parameters, standard ellipse area (SEA), path length (PL) were evaluated. After 2 weeks, when both groups finished their rehabilitation protocol, 2nd evaluation was conducted.

Results
Muscle mass was 35.37±8.33kg in WBV group, compared with 37.11±7.22kg in control group at initial evaluation. After intervention, it increased slightly to 38.40±8.64kg in WBV group, compared with 35.78±8.74kg in control group. In control group, SEA increased after intervention, but in WBV group, SEA decreased after intervention. PL decreased in both groups after intervention. Berg balance scale score increased in both groups after therapy. Walking velocity and TUG decreased in both groups after intervention.

Conclusion
WBV training may improve muscle mass and physical performance in hospitalized older adults with sarcopenia. Further study with large sample size is needed.

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Strength and Flexibility Training with Elastic Band Improve Gait Pattern and Functional Ability in the Elderly

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Background and aim(s):
Strength, balance and gait function are important for falls prevention in the elderly, and elastic bandage is an easy to access and use tool for exercise. This study aimed to evaluate the effect of strength and flexibility training with elastic band on gait, balance and functional performance in community-dwelling faller and non-faller elderly.

Method, Result(s):
This prospective study was conducted in a tertiary medical center with 2 year-period. All subjects received a home-base exercise program with elastic band which included 8 exercises in which 4 for upper limbs and 4 for the lower limbs. All subjects were assessed for functional assessment by Lequesne's scale, the Functional reach test (FRT) and Timed up-and-go test (TUG), balance by dynamic posturography, and temporo-spatial gait parametersby computerized gait analysis system at initial and 8 weeks after training.

Results:
A total 107 subjects complete the study, aged 70.7 ± 6.0 years and 64% female, with Stability Index 2.73 ± 1.24, Lequesne's scale 4.47 ± 4.59, Functional reach (cm) 31.0± 9.3,and Timed Up & Go 8.88 ± 2.77(sec) . All subjects were divided into two groups: the faller group and non-faller group.In pre-exercise evaluations, the non-faller group had better balance and functional performance($P < 0.05$), and no difference between groups in gait analysis. After elastic band training, the overall subjects got improvement for Lequesne's scale ($P < 0.05$) and gait parameters (cadence, stance and step time, $P < 0.05$), and better improvements were most observed in the non-faller. In the faller group, there was a trend of decreased difference to the non-faller groups after our home-base exercise.

Conclusion(s):
Theraband-conducted strength and flexibility training could improve elderly balance and gait performance, especially in the non-faller group. Therefore, early exercise intervention by elastic band may be crucial for the elderly to prevent a fall.

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Study of interaction effect between arithmetic and balance abilities of cognitive dual task
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Background and aims:
Exploring the mechanism of interaction effect between cognition and balance when perform the calculation-balance dual-task.

Methods:
20 healthy older persons aged 60 to 75 volunteered to join this experiment. Performing single leg+ eyes opened、single leg+ eyes closed、single leg + eyes opened+ calculation、single leg+ eyes closed+ calculation test. Static balance instrument is adopted to test the COP of the maximum displacement in mediolateral (ML) direction、anteroposterior （AP） direction、sway area、sway path length. Recording accuracy of calculation in sitting position when eyes opened and closed before balance test and accuracy of calculation when balance test.

Results:
1. The maximum displacement in ML direction, AP direction, sway area, sway path length when eyes opened is significantly less than eyes closed ($P<0.01$);
2. The maximum displacement in ML direction, AP direction, sway area when eyes closed during the dual task is less than single task ($P<0.05$);
3. The maximum displacement in ML direction, AP direction, sway area, sway path length when eyes opened during the dual task has no statistical difference compared with single task ($P>0.05$);
4. The calculation accuracy of dual task when eyes closed is significantly higher than eyes opened（$P\leq0.01$）, there is no statistical difference when sitting position($P>0.05$);

Conclusions:

1. The stability of balance is greater when eyes opened than the eyes closed.
2. Arithmetic task improve the balance abilities of single leg when eyes closed.
3. Arithmetic task have no effect on balance when eyes opened， maintain balance reduce the accuracy of calculation.

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Impairments in Gait, balance and stepping reactions in Cervical Dystonia

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Background and aims: Impaired balance is common in neurological disorders leading to deficits in function and participation. Cervical dystonia is a neurological movement disorder affecting the head and neck. The effect of this aberrant head posture on physical function in this population is unknown. The aim of the study was to compare balance, mobility, gait and stepping reactions between people with cervical dystonia and control adults.

Method: Spatiotemporal gait parameters and walking speed was assessed using a computerised walkway. Step length and time, and time in single and double support were calculated. For balance, centre of pressure path length was assessed with eyes open and eyes closed to calculate a Romberg's Quotient. Simple and choice reaction times were measured for both lower limbs. Mobility was assessed using the timed up and go and gait speed. Self-reported scales included the Falls Self Efficacy Scale and the Dystonia Discomfort Scale.

Results: There was a difference between groups for most outcome measures. Significantly, timed up and go and walking speed were performed more slowly in dystonia compared to controls. People with dystonia had lower falls self-efficacy. The reduced cervical ROM was correlated with; balance, stepping reaction time and mobility.

Conclusions: People with cervical dystonia displayed deficits in balance, gait and stepping reactions, and had low falls self-efficacy. Studies to further elucidate functional imitations and their impact on activity and participation in daily life in this population are required to inform more effective treatment interventions.

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The relationship between obesity and hepatorenal function

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Background and aim(s):
According to past studies , obesity may lead to metabolic disease, such as hyperlipidemia, DM and other chronic illness. But its relationship with liver and renal disease has not been well studied. Our study attempts to investigate whether obesity cause DM, hyperlipidemia and also liver or renal disease.

Method:
We collected data from the outpatient clinic where multiple companies new employees get their entrance physical examination, in a medical center in southern Taiwan. The basic data of height, bodyweight, waist size, preprandial sugar, cholesterol, liver and renal function were obtained. We calculated the BMI and define men with waist size greater than 90 cm and woman greater than 80 cm as obese. We use SPSS 21.0, with individual t test and Pearson r to investigate the relationship between gender, BMI or waist size to serum AC sugar, cholesterol level, liver or renal function. P value less than 0.05 was defined as significant difference or correlation.

Result:
Or study collected data from 87 new employees receiving initial health examination. 52 males (59.8%) and 35 females (40.2%). Their average age was 34.15+/-14.2 years old, average height 165.66+/-10. 14cm, bodyweight 68.23+/-4.23Kg, waist size 82.1 5+/-11.65cm . The average man's height, bodyweight, waist size, creatinine and triglyceride were higher

than that of the women; BMI, age, waist size, AC sugar, ALT and TG showed a positive relations. Waist size and BMI, AC glucose, ALT, TG, and creatinine also had a significant positive relationship.

Conclusion:
Our study shows not only BMI and waist size can be used to predict if the patient have high blood sugar and hyperlipidemia. It is also related to abnormal liver and renal function. We suggest the clinician can control patients BMI and waist size to reduce DM and hyperlipidemia and protect liver and renal function.

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Multidisciplinary inpatient rehabilitation following heart and/or lung transplantation – examining patient characteristics and clinical outcomes

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Background and aim(s):
Heart and lung transplantation are becoming more common treatment options for patients with end-stage cardiopulmonary disease. Both the incidence and survival of transplant operations are increasing, resulting in heightened interest in optimising long-term patient outcomes, functional ability and quality-of-life. Specialist rehabilitation can help to enhance recovery and functional independence following transplant surgery, especially for frail and debilitated patients. This study aimed to quantify the outcomes of multidisciplinary inpatient rehabilitation following cardiopulmonary transplant, at Australia's largest heart and lung transplant centre.

Method:
A retrospective file audit was conducted to review the medical records of all admissions for inpatient rehabilitation following heart and/or lung transplant at St Vincent's Hospital Sydney, between 2009-2016.

Result(s):
Between 2009-2016, 603 heart/lung transplant surgeries were performed. 116 patients (19.2%) were admitted for inpatient rehabilitation: 49 heart, 65 lung and 2 combined heart-lung recipients. The rehabilitation cohort was comprised of 63 men and 53 women, mean age 53.4±12.2 years. Average rehabilitation length-of-stay was 26.9±2.0 days. Functional Independence Measure (FIM) scores improved significantly with rehabilitation, from 79.8±1.9 on admission to 101.8±2.8 at discharge ($p<0.001$), resulting in a mean FIM efficiency of 0.9±0.1. Physical measures of mobility and balance also improved significantly, including the 6 Minute Walk Test ($p<0.001$), Timed Up and Go ($p<0.001$) and Berg Balance Scale ($p<0.001$). 33.6% of admissions were interrupted by an acute medical complication, however this did not prevent completion of rehabilitation or attainment of functional gains for the majority of cases. 109 patients (94%) were discharged to a private residence following rehabilitation, 2 were transferred to a regional hospital and 5 died in hospital.

Conclusion(s):
Multidisciplinary inpatient rehabilitation resulted in significant functional improvements for debilitated patients following heart and/or lung transplantation. These results support a role for specialist inpatient rehabilitation in optimising functional capacity and independence post-transplant.

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Predictive Factors for Tube Feeding in Patients with Dysphagia Evaluated by Videofluoroscopic Swallowing Study

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Background and aim
We aimed to identify predictive factors for tube-dependency in patients with dysphagia evaluated by videofluoroscopic swallowing study (VFSS).

Methods

A total of 80 patients who were newly diagnosed dysphagia by VFSS from 2014 May to 2016 December and undertook follow-up VFSS within 2 to 6 months were enrolled. The patients were divided into two groups, tube-dependent group (n = 20) and oral-intake group (n = 60), by the results of the follow-up VFSS. The patients' clinical information and VFSS findings at the first diagnosis of dysphagia were compared between the two groups.

Results
The mean age of the enrolled patients was 70 years (SD 13) with 52 men and 28 women. The time interval between the first and follow-up VFSS was 2.3 months (SD 1.5). There were no significant differences in sex, age, and etiology (stroke versus non-stroke) in the two groups (P = 0.265, 0.542, and 0.430, respectively). Among the parameters in initial VFSS, only the aspiration in thickened fluid showed significant differences between the two groups (P = 0.038) while the aspiration in water and initial decision of non-oral intake by the VFSS result showed no significant differences (P = 0.069 and 0.430, respectively). The multiple logistic regression analysis showed that the aspiration in thickened fluid is an independent predictor for tube-dependency in the follow-up VFSS (P = 0.047) after adjustment for sex and age as clinically determined covariates.

Conclusion
The current study showed that the aspiration in thickened fluid in initial VFSS might independently predict the tube-dependency in the short-term follow-up period, while the aspiration in water swallowing failed to reveal the significant difference between the two groups. The results illuminate the importance of the exam of thickened fluid in routine VFSS and encourage further research to identify strong predictive factors for dysphagia.

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Survival outcomes of patients with lower limb amputation following rehabilitation

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Background:
To assess the survival rates in patients with major lower limb amputation following post-acute rehabilitation. Setting: Rehabilitation medicine department, a secondary care hospital in Singapore.

Methods: This is a retrospective analytic study of consecutive patients who were admitted to rehabilitation services from March 2008 to November 2016 with a minimum follow-up of 1 year.

Inclusion criteria: Patients admitted for major dysvascular lower limb amputation, with complete follow-up record available.

Exclusion criteria:
Traumatic amputations, minor amputations, i.e. ray and toe amputation, and incomplete follow-up records.

Results:
Seventy-three patients were followed up, of which 45 (65%) were men and 28 (35%) were women, with mean age of 62.7 (21-88) years. These patients were diagnosed with diabetes mellitus (DM), hypertension (HTN), ischaemic heart disease (IHD), or peripheral vascular disease (PVD), and had vascular interventions. At the time of amputation, patients have either normal renal function, chronic kidney disease (CKD), acute kidney disease, or end-stage renal failure (ESRF), of which some were on haemodialysis (HD).

On univariate analysis, the comorbidities significantly associated with mortality were IHD (HR=2.34; 1.05, 5.20); p=0.037), systolic wall motion abnormality (SWMA) (sys on echo (HR=2.12 (1.01, 4.46); p=0.048), and ESRF/HD (HR=2.34 (0.96, 5.70); p=0.06). Vascular interventions also affect survival (HR=2.33 (1.08, 5.02); p=0.031). IHD, SWMA, and vascular interventions were all significantly related to mortality ($p<0.05$). Haemodialysis was of borderline significance (p=0.06). Vascular interventions (HR=2.43 (1.13, 5.25); p=0.023) and haemodialysis (HR=2.55 (1.04, 6.20); p=0.040) were found to have a significant independent relationship with mortality.

Conclusion:
From our study, lower limb amputation survival rate at 1 year was 84.93% and at 5 years was 27.39%. Mortality was significantly associated with patients who had vascular interventions and those on haemodialysis.

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Correlation between Increase of Intraoperative Motor Evoked Potentials and Motor Recovery in Surgery of Spinal Cord Tumor

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Background and aims
Intraoperative neurophysiological monitoring (IONM) is commonly used technique for assessing nervous system during spinal or brain surgery. The consensus about the alarm criteria of motor evoked potentials (MEPs) have been evolving to continuously predict the poor functional prognosis after surgery. However, there are no previous study between increase of MEP and outcome of motor function after surgery. This study aims to find out whether the increase of the amplitude of MEPs can imply favorable prognosis in spinal cord tumor surgery.

Methods
The IONM was performed in 115 patients with spinal cord tumor. With excluding 43 patients who were lost to follow up, medical data of 72 patients were analyzed. The amplitude of MEP changes at the end of monitoring compared to the baselines in each muscle were analyzed. The minimum and maximum changes were set to MEPmin (%) and MEPmax (%). Manual muscle tests of 10 key muscles were done on a day before (Motorpre), 48 hours (Motor48hrs) and 4 weeks (Motor4wks) after the surgery were reviewed.

Results
The difference of Motor48hrs from Motorpre (Motor48hrs-pre) positively correlated with MEPmin (Pearson correlation coefficient 0.32, P=0.01), suggesting that smaller the difference of MEPs amplitude, less improvement of muscle strength. Additionally, there was a negative correlation between the amount of bleeding and MEPmin (coefficient -0.28, P=0.02), indicating that greater the amount of bleeding, smaller the MEPmin, implying that the changes of MEPs amplitude were weak. There was no significant correlation between the difference of Motor4wks and Motorpre (Motor4wks – Motorpre) and MEPmin (P=0.06) or MEPmax (P=0.40), respectively.

Conclusion
This study showed that the recoveries of muscle strength were not effective when the increase of MEPs amplitude were low. It could be related to blood loss. For delicate analysis, further studies including various parameters of IONM would be needed.

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Searching for Genetic Factor associated with Dilated Cardiomyopathy in Patients with Duchenne Muscular Dystrophy

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Background and aims
Dilated cardiomyopathy (DCMP) occurring at 2nd -3rd decade in duchenne muscular dystrophy (DMD) is the most frequent cause of death in this genetic disorder. However, some patients do not exhibit symptoms beyond their late 20's. This study was aimed to find genetic differences among subjects with DMD who exhibit early cardiac dysfunctions and who do not until late.

Method
Next generation sequencing (NGS) targeting 212 genes was performed in subjects with progressive muscle weakness during September, 2017 at out-patient clinic in single university hospital. Medical charts including age, recent cardiology consultation records, echocardiography results, whether having pulmonary insufficiency and previous diagnostic status were reviewed among those confirmed with DMD by NGS.

Results
Among 20 subjects who underwent NGS, 9 were confirmed as DMD. One subject (patient 7), being too young, was excluded due to difficulty in determining the presence of DCMP. Four subjects showed small mutations while other 4 showed either deletion or duplication of DMD gene. However, the genetic results did not show consistent mutation pattern correlating to the presence of DCMP, although the subjects had different kinds of variants known to be related to cardiomyopathy which were yet of unknown significance.

Conclusion
Consistent genetic factor related to DCMP was not identified in small number of subjects. However, different variants related to cardiomyopathy were spotted. Further study is required with large number of patients. When performing NGS in DMD, variants of unknown significance also should be accumulated since some of these could be candidates related to occurrence of DCMP.

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An examination of real-world onabotulinumtoxinA utilization for the treatment of upper limb spasticity: The adult spasticity international registry (ASPIRE) study

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Background/Aims:
OnabotulinumtoxinA treatment for spasticity is individualized and dependent on numerous factors. Here, we explore real-world patterns of onabotulinumtoxinA utilization in patients with upper limb spasticity over 2 years.

Methods:
Multicenter, international, prospective, observational study (NCT01930786), examining adult patients with focal spasticity across multiple etiologies treated with onabotulinumtoxinA at their physician's discretion. Assessments include utilization (each treatment visit) and patient/physician satisfaction (5±1 weeks post-treatment).

Results:
Patients (N=731) were on average 53.6 years of age (18.5-93.2 years), 52% female, and predominantly Caucasian (77%). Stroke was the most frequently reported etiology (56%). The most commonly treated upper limb spasticity presentation was clenched fist (52%). Across all clenched fist treatment sessions (N=1505), percentage injected and dose (mode) injected into each muscle are as follows: flexor digitorum superficialis (86%, 50U), flexor digitorum profundus (80%, 50U), flexor pollicis longus (25%, 20U), flexor pollicis brevis (9%, 25U), other (6%, 20U). EMG was frequently used to localize muscles to treat clenched fist (>44%). Across all treatment sessions, 93% of physicians and 86% of patients reported being satisfied/extremely satisfied that treatment helped manage spasticity, 84% of physicians and 76% of patients reported treatment benefit was sustained, and 99% of physicians and 92% of patients would definitely/probably continue treatment with onabotulinumtoxinA. 261 patients (36%) reported 831 adverse events (AEs); 23 AEs in 20 patients (3%) were considered treatment-related. 94 patients (13%) reported 195 serious AEs; 3 serious AEs in 2 patients (0.3%) were considered treatment-related. No new safety signals were identified.

Conclusions:
ASPIRE provides valuable, real-world data on dosing, injection guidance, and muscle targeting over 2 years, that may help guide clinical strategies. This study captured the individualized nature of onabotulinumtoxinA utilization for spasticity, while demonstrating consistently high satisfaction. These results add to the body of evidence on the safety and effectiveness of onabotulinumtoxinA for spasticity.

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Examining the real-world use of onabotulinumtoxinA for lower limb spasticity: The adult spasticity international registry (ASPIRE)

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Background/Aims:
OnabotulinumtoxinA treatment for spasticity is individualized and dependent on numerous factors. Here, we examine real-world patterns of onabotulinumtoxinA utilization in patients with lower limb spasticity over 2 years.

Methods:
Multicenter, international, prospective, observational study (NCT01930786), examining adult patients with focal spasticity across multiple etiologies treated with onabotulinumtoxinA at their physician's discretion. Assessments include utilization (each treatment visit) and patient/physician satisfaction (5±1 weeks post-treatment).

Results:
Patients (N=731) were on average 53.6 years of age (18.5-93.2 years), 52% female, and 77% Caucasian. Stroke was the most frequently reported etiology (56%). The most commonly treated lower limb spasticity presentation was equinovarus foot (59%). Across all equinovarus foot treatment sessions (N=1609), percentage injected and dose (mode) injected into each muscle are as follows: gastrocnemius (79%, 100U), soleus (70%, 100U), tibialis posterior (48%, 50U), flexor digitorum longus (21%, 50U), flexor hallucis longus (8%, 50U) and other muscle (13%, 50U). EMG was frequently used to localize the muscles to treat equinovarus foot (>40%). Across all treatment sessions, 95% of physicians and 85% of patients reported being satisfied/extremely satisfied that treatment helped manage spasticity, 89% of physicians and 76% of patients reported treatment benefit was sustained, and 98% of physicians and 92% of patients would definitely/probably continue treatment with onabotulinumtoxinA. 261 patients (36%) reported 831 adverse events (AEs); 23 AEs in 20 patients (3%) were considered treatment-related. 94 patients (13%) reported 195 serious AEs; 3 serious AEs in 2 patients (0.3%) were considered treatment-related. No new safety signals were identified.

Conclusions:
ASPIRE provides valuable, real-world data on dosing, injection guidance, and muscle targeting over 2 years, that may help guide clinical strategies. The study captured the individualized nature of onabotulinumtoxinA utilization for spasticity, while demonstrating consistently high
satisfaction. These results add to the body of evidence on the safety and effectiveness of onabotulinumtoxinA for spasticity.

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How does ballet alter ankle tendinous morphology and hemodynamics in asymptomatic dancers? An ultrasonographic study

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Background and aims:

Among symptomatic dancers, sonographic abnormalities are common. Whether asymptomatic dancers have any abnormalities remains unknown. Some dancers became cyanosis over distal feet after ballet training. The hemodynamic changes at the feet in ballet are not clearly understood. We aimed to investigate tendon morphology and hemodynamic changes in ankles of asymptomatic pre-professional ballet dancers with ultrasonography (US).

Method:
In 25 dancers and 14 non-dancers, B-mode US was used to measure cross-sectional areas (CSA) of flexor tendons in the ankle. Doppler US was used to measure peak velocity of posterior tibial artery in three ankle postures: the neutral position, passively and forced actively plantar flexion (en pointe). The big toe oxygen saturation was recorded in neutral position and during 1-minute en pointe. Nonparametric Mann-Whitney test was used for between-group comparison and Wilcoxon signed-rank test for within-group comparison.

Results:
Ankle plantar flexion range of motion was significantly larger in dancers ($p < 0.01$). The flexor hallucis longus (FHL) tendon CSA was larger in dancers (0.26 cm^2 [0.2, 0.3] vs 0.21 cm^2 [0.17, 0.24], $p < 0.01$), while other flexor tendons were not different between two groups (all $p > 0.05$). The peak velocity was significantly higher in passively plantar flexion than in neutral position ($p < 0.01$, in both groups). The blood flow was undetectable during en pointe, more frequently in dancers (54.9% vs 14.3%, $p < 0.01$). Oxygen saturation decreased during en pointe more prominently in dancers (85% [80, 90] vs 94% [84, 97], $p < 0.01$). Ankle hypermobility and the FHL muscle contraction may decrease the blood flow of posterior tibial artery, more frequently in ballet dancers.

Conclusion:
US showed the FHL tendon thickening and en pointe-related vascular compromise in pre-professional dancers, even when they were asymptomatic.

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Correlation of Electrodiagnosis and Magnetic resonance imaging on Brachial plexopathy

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Background:
The diagnosis of brachial plexopathy is based on clinical findings and electrodiagnostic testing. As diagnostic imaging technique, magnetic resonance imaging is the modality of choice for depicting anatomy and pathology of brachial plexus. The aim of this study is to analyze the findings of both electrodiagnostic testing and magnetic resonance imaging of brachial plexopathy and to verify the correlation between findings of these two tests.

Methods:
We retrospectively recruited 73 patients who were evaluated brachial plexus both by electrophysiologic test and by magnetic resonance imaging. Depending on the degree of coincidence between findings of electrophysiologic test and magnetic resonance imaging, they were divided into three groups, ‘completely match’, ‘partial match’ and, ‘almost mismatch’.

Results:
After exclusion of 4 patients who were under 18 years, total of 69 patients (Male 41, Female 28, Mean age 48.49 ± 14.36 years) were enrolled for this study. Forty cases were of right side and the 28 cases were of left side. Eighteen cases were caused by trauma and 32 cases by brachial neuritis, 8 cases by cancer 5 cases by etc. Six cases were suspected of brachial plexopathy, but eventually there was no specific brachial plexus disease. As the degree of coincidence between electrodiagnostic testing and MRI, 47.7% of cases was classified as completely match, 34.1% as partial match and 18.2% as almost mismatch. Twenty-nine out of 64 cases were classified ‘Completely match’, 21 out of 64 cases were ‘Partial match’, and fourteen cases were ‘Almost mismatch’. According to the classification of the etiology, there was no statistically significant difference between correlation and etiology of brachial plexus injury.

Conclusions:

The results of MRI and Electrodaignosis findings of brachial plexus injury are well correlated each other in majority cases. Overall, EMG and MRI are complementary modalities in the evaluation of brachial plexus injury.

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Association Standards 《Basic requirements for prevention of fall in the elderly》

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Aims:
Falls among the elderly have attracted worldwide attention. World Health Organization, American Geriatrics Society and British Geriatrics Society, Health Promotion Board And Ministry of Health have developed guides to the prevention of falls for the elderly. These guidelines suggest that preventive interventions such as exercise, improvement of the environment, vitamin D supplementation, and reducing side effect of drugs. However, the overall integrated intervention program is not given.

Methods:
This standard section refers to "AGS/BGS:2010 Summary of the Updated American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for Prevention of Falls in Older Persons" and "MOHC: Technical guide for the intervention of fall in the elderly". The contents of cognitive and balance function training were increased. A number of hospitals jointly drafted, reached expert consensus, and finally formed group standards.

Results:
This standard specifies the basic requirements for the prevention and intervention of falls in the elderly, including risk assessment, prevention intervention and management requirements after fall to help medical personnel to regulate falls prevention in the elderly. And this standard applies to the formulation of a fall prevention intervention strategy for older persons over 60 years of age, for use by medical institutions and community medical staff, and for the use of the elderly family members and the elderly themselves.

Conclusions:
The standard has been applied in many communities, reducing the risk of falls for the elderly.
Keywords: Association Standards, Fall, the elderly

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Effectiveness of Wearable Power-Assist Locomotor (WPAL) for patients of upper limb dysfunction

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Objective:
We have developed Wearable Power-Assist Locomotor (WPAL) for gait reconstruction of patients with paraplegia. The adaptation criteria of WPAL is complete paraplegia patients, L1-Th4 neurological level. For using WPAL, upper limb function is required to grasp and control walker, and trunk function is required to move their body. Therefore, in the case of Th3-C6 neurological level patients, we consider individually whether it can be used or not. The purpose of this study was to use the WPAL with patients of upper limb dysfunction,and to compare the walking with the WPAL and conventional orthoses.

Methods:
The subjects were 4 upper limb dysfunctionpatients with C6-Th10 neurological level disorder who were able to walk using bilateral knee-ankle-foot orthoses with a medial single hip joint. In patients who can not grip walker, they performed WPAL training by wrapping around a walker using a bandage. Futhermore, patients who can not control the trunk sufficiently, they used a trunk corset. The walking duration and distance were measured for subjects for walking at a comfortable speed while wearing their own orthoses or WPAL. The level of assistance required for walking was evaluated using the Functional Ambulation Category (FAC) test.

Results:

The duration and distance of walking with the WPAL were longer than use of orthoses. FAC scores of WPAL were same or higher than use of orthoses, indicating less assistance was needed with the WPAL.

Conclusions:
The present results suggested that the WPAL training for patients of upper limb dysfunction is effective for gait reconstruction.

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Factors associated with voice disorders in early intervention professionals
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Background:
To meet the requirements of children with special needs, early intervention professionals dedicate themselves to early treatment that starts from short-term solutions and extends to long-term ones. They spend time in communication, including providing advice and education over the phone. The earlier the treatment for children is administered, the more likely the professionals are to experience voice conditions such as hoarseness; however, information on this topic in Taiwan is limited. This is the first study to investigate the root cause of voice disorders in early intervention professionals.

Methods:
This study administered a questionnaire to 206 early intervention professionals (30 men and 176 women), including pediatric neurologists, rehabilitation physicians, psychiatrists, otolaryngologists, dentists, preschool teachers, social workers, physical therapists, occupational therapists, speech therapists, and psychologists. Statistical analysis was performed using SPSS, including a chi-square test, ANOVA, and descriptive statistics.

Results:
Participants were aged between 20 and 55 years with voice disorders of various severity levels (i.e., 0, 1, and >2). The results of the statistical analysis revealed that the age range for which hoarseness of voice was the most prevalent was 20–29 years. In terms of profession, most participants with this voice disorder were preschool teachers (30.65%), occupational therapists (22.58%), and physical therapists (20.97%). Other factors affecting voice disorders were voice abuse and voice misuse.

Conclusions:
Factors resulting in voice disorder among early intervention professionals were determined. The results of this study may be used to improve the workplace environments of these professionals. In the future, voice disorder problems can be improved with the help of hospitals and institutions.

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Defining the Sport related Concussion
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Background: Concussion is defined as a traumatically induced transient disturbance of brain function and involves a complex pathophysiological process. This definition is also used for defining Sport related Concussion (SRC). What constitutes as a concussion varies amongst both academics and health professionals. SRC should be distinguished from other forms of head injuries such as mild Traumatic Brain Injury (mTBI). The aim of this paper was to systematically review the definition of SRC and examine the differences between sport concussion and non-sport concussion definition.

Methods:
Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines the search was conducted. The data source included MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials using the key terms including sport, athlete, game, soccer, AFL, rugby, football in combination with sport related concussion, sport

concussion, sport head injury, brain injury, brain trauma. Inclusion criteria were studies published in English between 2000 and 2018. Abstracts, protocol papers and review were excluded.

Results:
The research generated 11270 articles. Duplicate articles and studies not dealing with concussion as their focus of research were excluded. First International Conference on Concussion in Sport presented concepts of “simple concussion” and “complex concussion”. These concepts were abandoned during the third International Conference on Concussion in Sport in 2008. The Zurich Consensus statement was developed for use by physicians, therapists, certified athletic trainers, health professionals, coaches, and other people involved in the care of injured athletes. Concussion was defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces.

Conclusion: There is a lack of homogeneity regarding definition of sport related concussion. In literature there seem to appear no definitive agreement for it. Research evaluating the definition and diagnosis criteria of concussion in sport is limited and future research should be directed toward formulating a standard definition.

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Validity and Reliability of the Postural Assessment Scale for Hippotherapy in Children with Cerebral Palsy

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Background and aims:
The aim of this study was to develop the Postural Assessment Scale for Hippotherapy (PASH) that can be scored on dynamic posture and function while riding on horseback and to determine the validity and reliability of a development edition of PASH in children with cerebral palsy (CP).

Method:
Twenty-eight children with CP, aged 5-10 years, presenting with variable function (Gross Motor Function Classification System [GMFCS] level I-IV) were enrolled in this study. The PASH consists of the following seven items: 1) hands up, 2) trunk rotation, 3) reaching, 4) standing up, 5) stand up and down, 6) backward sitting, and 7) side sitting. Items 2, 3, and 7 are evaluated on both the left and right sides. Scoring is based on a 4-point ordinal scale. For assessment of validity of PASH, the relationship of PASH with Gross Motor Function Measure (GMFM)-88, GMFM-66, and Pediatric Balance Scale (PBS) was evaluated. For reliability assessment, the inter-rater and intra-rater reliabilities of PASH were analyzed.

Results:
PASH was strongly correlated with motor ability; GMFM dimension D and E scores; GMFM-88 total score; GMFM-66; and PBS total score. In addition, there was a significant difference in the PASH score among the GMFCS levels ($F=25.95$, $df=3$, $p<0.001$). PASH showed significantly high inter-rater and intra-rater reliabilities.

Conclusion:
We could objectively evaluate the postural and functional performance for hippotherapy in children with CP using PASH. In addition, we could identify that PASH is a valid tool. The results of this study contribute to providing a communication tool for all professionals in the field of hippotherapy.

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Validity of SNAP Data

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Accuracy OF SNAP Coding DATA
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BACKGROUND AND AIM(S)
SNAP data is collected against each rehabilitation episode for activity based funding (ABF) and benchmarking. ABF is intended to be used for improving efficiency of health facilities and to ensure that facilities are transparently funded for the number and types of patients.
The purpose of this study was to determine the accuracy of the SNAP coding data, as there are no current published studies reporting on this.

Method
This retrospective study compares all categories of the SNAP data except FIM, for 100 rehabilitation episodes between January and June 2015 to independently coded data collected from medical records. The selected rehabilitation records were randomly generated by computer.

Result(s)
It was found that 27% of episodes did not identify delay in the commencement of rehabilitation episode. Incorrect impairment codes were assigned to 35% patients and 70% episodes had an incorrect date of documented multidisciplinary plan. Date of rehabilitation referral was incorrect in 47% episodes, however only 14 episodes out of 100 were incorrectly filled for timing of initial rehab assessment. Premorbid carer status was incorrect for 62 and services were incorrect for 26 out of 100 episodes. 31% had incorrect premorbid whereas 46% had incorrect post-discharge employment status. Comorbidities affecting rehab care were incorrectly filled in 70% of episodes. Leave days during admission were not mentioned in 77 episodes. 27% episodes were inaccurate for services upon discharge. The dates when patients were ready for discharge were incorrect for 13 episodes, hence affecting if there was a delay in discharge.

Conclusion(S)
Incorrect SNAP data collection can impact funding, benchmarking as well as planning activities. Further training and quality checking of SNAP data coding may result in an improvement.

References
AROC v4 SNAP Data dictionary for analysts 2016

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Depressor effect elicited by transcutaneous nerve stimulation on the right shoulder of normal subjects

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Background and aim(s):
Transcutaneous nerve stimulation (TENS) has been widely used for patients suffering from adhesive capsulitis in clinical practice. Nevertheless, the potential impact of TENS on autonomic and visceral function through somatic-visceral reflex has not been well established.

Method:
In the current study, we recorded electromyogram of normal subjects in response to TENS treatment (using build-in program) on the right and left shoulder for 5 min.

Results:
While TENS on the left side exhibited no effects, that on the right side display a small but significant depressor effect. TENS of the identical parameters on right and left wrist or ankle did not affect the heart of subjects.

Conclusions:
We suggest TENS at the right shoulder could excite vagal nerve that exhibits depressor effect by inhibiting the sino-atrial node. Our finding suggest a potential impact of TENS on heart rate that needs to be take into consideration for clinical application.

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Linking “soft” and “hard”: Goal Achievement Scaling (GAS) method and Functional Independence Measure (FIM) in general inpatient rehabilitation population

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Background and Aims

Goal Achievement Scaling (GAS) is a method of measuring rehabilitation outcomes that is patient specific but therapist dependent, demonstrated to be feasible only in selected rehabilitation populations.

There is a gap in understanding of the relationship between GAS and Functional Independence Measure (FIM) in general rehabilitation population.

Aims are to investigate:

a) Feasibility of GAS method for different diagnostic streams in a general rehabilitation unit;
b) Differences in GAS goal achievement score between diagnostic streams;
c) Association between GAS and FIM change.

Methods

Prospective study conducted in a general rehabilitation unit in tertiary referral metropolitan hospital, enrolling cognitively intact patients regardless of their inpatient admission diagnostic stream. GAS process: therapists determine levels of achievement of multiple patient nominated rehabilitation goals; GAS score calculated from patient-determined goals’ importance, therapist-determined goals’ difficulty and level of achievement. Statistical analyses: robust linear regression using GAS score, FIM change, diagnostic stream, baseline GAS score, age and gender.

Results

100 participants with, median age 63 years (IQR 54-72), 53% male. Diagnostic streams comprised of 16% amputees, 27% musculoskeletal, 20% neurological, 23% other/deconditioning, 14% spinal. Median GAS score was 57.2 (IQR 50-64), median GAS score change was 23.4 (IQR 14-29). There was marked variability in the GAS score between diagnostic streams (ranging from spinal (median 62.65 (IQR 54.00-68.60) to amputees (median 53.05 (IQR 42.40-57.30)) (p=0.058). Adjusting for age and baseline FIM, one point increase in GAS Score was associated with an 0.58 point increase in FIM change (95%CI: 0.28-0.89, p<0.001). There was no ceiling effect observed in GAS score, while ceiling effect was present in FIM at discharge.

Conclusions

GAS method is feasible in general rehabilitation inpatient population. There are significant differences in GAS scores between diagnostic streams. Although both GAS and FIM can track patients’ progress, GAS score does not exhibit ceiling behaviour.

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Demographic Characteristics of Moderate-to-Severe Traumatic Brain Injury in Canterbury

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Background and aim(s):

Prior studies reporting the incidence and prevalence of traumatic brain injury (TBI) have predominately utilised data from the North Island, which may not be representative of the Canterbury region (Feigin et al., 2013). With 12.7% of the New Zealand population residing in Canterbury, census data have revealed important region-specific differences, such as

higher proportion of people aged 40 and over. Thus, clarification regarding demographic characteristics of moderate-severe TBI in the greater Canterbury region is indicated.

Method:
A retrospective review was conducted regarding moderate-severe TBI (e.g., Glasgow Coma Scale Score < 9; Post-Traumatic Amnesia > 24 hours) from 2015 - 2017 in the greater Canterbury region (n = 142). Descriptive statistics report age, gender, self-identified ethnicity and aetiology of the TBI; result were compared to existing national incidence data.

Result(s):
TBI affected men more than women (73.6% male). Average age was 41.72 years (SD = 18.97); there were no significant differences in length of stay for individuals under 40 ($\bar{x}$ = 32.2; SD = 27.5) compared to those over 40 ($\bar{x}$ = 33.6; SD = 24.9). Predominant injuries included motor vehicle accidents (37%), falls (22%), and assault (9%) consistent with prior research, but individuals from Canterbury demonstrated a larger proportion of bicycling (15%) and equestrian injuries (6%). Further demographic, ethnicity and rehabilitation outcome data will be discussed.

Conclusion(s):
The present study is the first to describe demographic and injury-related characteristics of moderate-to-severe TBI in the greater Canterbury Region. Results are consistent with findings of increasing age of Canterbury residents, alongside unique modes of injury specific to this region. These differences suggest that region-specific incidence and prevalence data is needed to promote targeted prevention efforts, to employ well-planned rehabilitation programmes and to accurately characterise the impact of TBI across New Zealand.

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Behavioural Indicators of Emerging Consciousness following Severe Traumatic Brain Injury: A Case Series

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Background and aim(s):
Since 2017, the ACC Emerging Consciousness Pathway has been implemented for individuals recovering from disorders of consciousness following traumatic brain injury. Documenting emergence from minimally conscious states (MCS) can be challenging as the decision relies on subjective observation of behaviours over time (Coleman et al., 2009; Klein et al., 2013). Prior research has indicated a risk of misdiagnosis as high as 43% in non-specialist units (Andrews et al., 1996). Reliable implementation of criteria for emergence is paramount to determine eligibility for intensive rehabilitation, prognostication, and support to family and whānau (Bekinschtein et al., 2007).

Method:
A retrospective review of a consecutive patients admitted from 2017 under the ACC Emerging Consciousness Pathway was undertaken (n = 3; 1 female); all participants emerged from MCS during neurorehabilitation. Reported features include demographic and injury characteristics, as well as rehabilitation outcomes.

Result(s):
Participants were aged $\bar{x}$ = 38.7 years (SD = 7.5); average length of acute hospitalisation was 39.3 days (SD = 2.9). Time from admission under Emerging Consciousness Pathway to transition to intensive rehabilitation was 47.7 days (SD = 21.1). Methods to determine emergence from a MCS (Giacino et al., 2002) included object use (n = 1), communication (n = 1), and both functional object use and communication (n = 1). Medical complications limiting reliable functional capability included spasticity and apraxia of speech. Outcomes such as the Wessex Head Injury Matrix (Shiel et al., 2000) will be discussed.

Conclusion(s):
The present findings highlight differences in criteria to determine emergence from MCS. Predicting emergence from MCS can be subjective and can be biased towards ability to communicate and perform upper limb movements (Coleman et al., 2009; Gillthwaites, 2006). This has important implications for determining eligibility for intensive residential rehabilitation in New Zealand. Further research and development of national protocol is indicated.

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Responsiveness of the International Classification of Functioning, Disability and Health (ICF) rehabilitation set in post-acute stroke patients

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Background and aim:
To enhance the clinical use of International Classification of Functioning, Disability and Health (ICF) core set in the clinical practice, its responsiveness should be described. The purpose of this study was to determine the changing patterns of the ICF rehabilitation set in post-acute stroke patients in the convalescent rehabilitation ward.

Methods:
We included the post-acute stroke patients who were admitted to the convalescent rehabilitation in the four hospitals in Japan in this observational cohort study. The physiatrists prospectively filled in the ICF rehabilitation set at admission and discharge by using five-grade qualifiers. In this study, qualifier 2 to 4 was considered as a problem. Then, extension index was calculated for entire the ICF core set. Responsiveness was measured as the change of Extension Index in the ICF rehabilitation set. Correlation between changes in the ICF core set and improvement in Functional Independence Measure (FIM) was analyzed using Spearman's correlation coefficient.

Results:
The study included 146 post-stroke patients (70 women, mean age 72.3 years, mean FIM score improvement: 21.1). Extension index of the ICF rehabilitation set was significantly improved during the hospitalization (mean index at admission 58.3, mean at discharge 42.7; $p < 0.01$). Effect size in the ICF rehabilitation set was large (1.05). We found a significant and moderate correlation between improvement in the ICF rehabilitation set and changes in FIM score ($r = 0.59$, $p < 0.01$).

Conclusion:
Our results indicate that the ICF rehabilitation set can detect the changes in functioning and disability in patients who receive inpatient rehabilitation program for post-acute stroke.

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Potential parameters for wrist-worn single accelerometer and gyrosensor in functional evaluation of upper extremity in hemiplegic stroke

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Previously many studies on accelerometers and gyrosensors were performed for upper extremity movements in stroke, yet there exist no standardized methods with significant clinical relevance. We aimed to determine parameters and appropriate tasks that may serve as potential clinical outcome measures, which can be measured with a single sensor on the wrist. Ten healthy volunteers and nine patients with hemiplegic stroke were recruited to perform Action Research Arm Test (ARAT) and selected activities of daily living (ADL), with wearable multiple IMU sensor based motion capture system. Acceleration of the wrist and hand sensors in three global orthogonal directions and Euler angles of sensors in each segment of the upper limb with reference to their proximal segment were measured. ARAT score and Brunnstrom stage were evaluated for all patients. Average amplitude and maximum amplitude of the movement segments, logsum and logsum per time was extracted and analyzed. Logsum was defined as integration of all displacements or changes for corresponding measurements. Of the parameters that showed significant differences between healthy subjects and

patients and also significant correlation with clinical measures, average amplitude of forearm supination/pronation angle during ARAT domain 4 tasks demonstrated significant decline of the value in severely impaired patients compared to normal subjects (29.83%) and profound difference between severely and mildly impaired patients (48.46%). During ADL tasks, logsum per time for supination/pronation showed significant difference between severity levels (38.33%). Average amplitude of acceleration in x-axis (left-right) and z-axis (up-down) of hand and wrist sensors during ARAT tasks demonstrated a range of 45 to 62% value compared to healthy subjects, with 21.6 to 35.1% difference along the severity spectrum. Although accurate measurement with single wrist sensor may not be possible, specific parameters may play a significant role in simple or serial functional evaluation as an important predictor of clinical outcome measures.

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Analysis of Various Health Related Factors Correlates Most with Depression in Chronic Neurologically Disabled: A Cross Sectional Study

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BACKGROUND:
As we know depression comes out after any neurological conditions even as a normal way in all human being at any age and further may give hurdle for the life span of the people;but there is a dearth of literature which identifies the factors most strongly associated with depression in neurological conditions

OBJECTIVE:
To identify the correlation between depression and various associated factors such as cognitive,functional,social status and QOL in neurologically disabled and to find out the factor which affects depression most.

SAMPLE:
42 participants diagnosed with stroke,head injury,spinal cord injury and Parkinson's disease of at least had 6 month of duration,aged between 20-79 year of both genders assigning the subject by convenient sampling.

OUTCOME MEASURES:
We used Beck Depression Inventory(BDI), MMSE, BARTHEL INDEX(BI),Multidimensional Scale of Perceived Social Support(MSPSS), WHOQOL-BREF.

METHOD:
We divided the participants accordingly to the individual condition in four groups; total score for each data was noted and correlation was done between following: BDI & MMSE, BDI & BI, BDI & MSPSS, BDI-WHOQOL-BREF.In our study,we did an overall correlation between the above variables for all subjects and then according to individual neurological condition.

RESULT:
Data was analyzed using SPSS 17.0 version shows that are clinically depressed with very less cognitive impairments,mild functionally disabled with poor social support and have poor QOL.Our study showed significant ($p < 0.05$) correlation between depression and other factors with all neurological conditions except head injury.The correlation between BDI with BI, MSPSS and WHOQOL-BREF showed significant results except MMSE.

CONCLUSION:
From the results it can be concluded that the majority of the patients have depression related to reduced QOL, poor social support and functional status in the same order. So intervention should emphasize the importance of the patient's QOL and social support also. The future researches are required to done with large sample size, other neurological conditions and different durations to validate current hypothesis.

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Trial of FIMFAM as a routine outcome measure on Brain Injury Rehabilitation Unit

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BACKGROUND AND AIMS
The FIM (Functional Independence Measure) is the current outcome measure being used to classify level of functional impairment across all rehabilitation settings. The FIM was intended to be sensitive to change in an individual over the course of a comprehensive inpatient medical rehabilitation program, but is not specific to the brain injured population. It has both a ceiling and a floor effect and has few cognitive, behavioural, and communication related functional items. On the contrary, the FAM (Functional Assessment Measure) was developed as an adjunct to the FIM to purposely address these less emphasised areas.

This pilot study was developed to analyse the benefits of FIMFAM as a routine outcome measure, to develop a reproducible implementation protocol, and to demonstrate that the FIMFAM is a more suitable outcome measure in patients undertaking inpatient brain injury rehabilitation.

METHOD
A series of face to face education workshops were complemented with the development of a self-guided education kit and competency quiz. Pre and post-trial surveys were disseminated. Endorsement and dedication from the clinical team was imperative, and the six month study was driven by a small and enthusiastic working party.

RESULTS
Pending analysis.

CONCLUSION
We require better assessment tools to objectively measure the functional impact of brain dysfunction. The FIMFAM has been validated psychometrically, and is currently being used across a variety of other rehabilitation services including the United Kingdom.

This research appropriately explores the use of FIMFAM as a more suitable outcome measure for patients with brain dysfunction.

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Relationship between cognitive assessment methods and rehabilitation outcomes.

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Background and aim(s)
Cognitive impairment is common in rehabilitation patients, and cognitive status is a significant predictor of functional outcomes. Although the degree of cognitive disability is reflected using the Cognitive subscore of FIM (FIMCog), cognitive screening tools such as the MoCA are then used to formally screen for cognitive impairment. The correlation between FIMCog and MoCA has not been thoroughly investigated, and the relationship of the MoCA to functional outcomes is unclear. The aims of this study are to compare the MoCA with FIMCog to evaluate whether these measures are congruous, and to determine whether the MoCA and FIMCog can be used to predict functional outcomes in rehabilitation patients.

Method
A retrospective analysis was conducted on all patients admitted to the Mater Private Rehabilitation Unit from May 2017 to October 2017. The FIM was completed for all patients at admission and discharge. The MoCA was administered on clinical suspicion of cognitive impairment. The correlation between MoCA and FIMCog was examined with Pearson's and Spearman's correlation. Functional outcomes were assessed using discharge disposition, and Relative Functional Gains (RFG) and Relative Functional Efficiency (RFE). Associations between rehabilitation outcomes and MoCA or FIMCog were examined using multiple linear regression models.

Result(s)
478 patients were included, 116 of these had a MoCA completed. There was a moderate correlation between MoCA and FIMCog scores at admission. Patients with higher MoCA scores and FIMCog scores at admission were more likely to have greater RFG and RFE, and were more likely to be discharged to a private residence.

Conclusion(s)
This study supports the construct validity for MoCA and FIMCog. Both the MoCA and FIMCog at admission can predict functional outcomes and discharge disposition in rehabilitation patients. Recognising cognitive impairment early may facilitate evaluation of rehabilitation potential, goal-setting and planning future care.

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An Audit of Mortality in Adult Developmental Disability

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Background:
Mortality in known to be increased in groups with a number of medical conditions such as epilepsy, abnormal swallowing, respiratory control and mobility issues etc. Many of these factors are seen in Developmental Disability populations but there is limited data available. This observational project looked at deaths in sequential referrals to an adult developmental disabilities clinic of a tertiary referral hospital.

Methods:
Sequential deaths were recorded over a period from October 2009 to December 2017 and records kept of demographics (date of birth, age, sex, etc.,) and cause of death as available at the time of logging. Descriptive analysis of the available data was conducted to help guide future research.

Results:
132 patients were known to have died with mean age 43 (range = 17 to 82), with 66 male and 66 female. The three most common disability diagnoses were Cerebral Palsy (34%), genetic disorders (30%) and non-specified intellectual disability (26%). Major causes of death were predominately respiratory (61%), cardiac (10%) and cancer (7%). However, cause of death was unknown in 17% of patients. Palliative care services were involved in just over half of this group (67 people).

Conclusion:
Respiratory disease was the most frequent cause of death during the 8 year period in which data was collected, being slightly more frequent in those who were seen by palliative care. Further work is underway to compare this group with other causes of disability (such as TBI) and with the general population.

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Developmental difficulties and parental concerns for school-age children who were born premature or with birth complications

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Background
Canadian newborns born preterm or experiencing complications in-utero or during birth are often followed by an multidisciplinary medical and rehabilitation team monitoring these patients' development and referring them for services as needed. Follow-up is ensured up to 5 years of age, despite the growing body of evidence suggesting that important developmental challenges could appear after school entry.

Aims
1) Document parental developmental concerns and access to services pre- and post-school age of children who once were followed in a neonatal follow-up clinic in Quebec, Canada; 2) Assess their current developmental difficulties.

Methods
The medical charts of a historical cohort of children enrolled in a neonatal clinic 2005-2012 were reviewed. Parents were invited to complete an online survey collecting developmental concerns and access to services, and three validated questionnaires evaluating their child's current development in terms of motor functioning (DCD-Q); sensory processing patterns (Sensory Profile); and behaviour (CBCL).

Results
Medical charts were retrieved for 273 patients. Of these, 50.6% were female and mean gestational age was 31.6 weeks. Of the 86 families who completed the online survey, most reported developmental concerns before and after the age of 5 (61.2% and 54.8%, respectively). Among those who had concerns after school start, 86,7% consulted rehabilitation and health professionals; of these 43,6% received a new diagnosis. Overall, the prospective screening for developmental difficulties indicated that some children had motor difficulties (33,3%), sensory difficulties (37,9%) and behavioural difficulties (22,5%); of these, some had no public rehabilitation services.

Conclusions
Most children born premature or with complications around birth experienced developmental challenges before and after school-age. While these challenges are often managed by a medical and rehabilitation team before school-age, this study pointed to important gaps in the long-term follow-up of these at-risk children. Current studies identify risk factors and experiment early intervention for these children.

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Language and motor speech control in children with cerebral palsy of different motor severities

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BACKGROUND AND AIM:
Language and motor speech production is often impaired in children with cerebral palsy (CP). This study investigated the language and motor speech control in children with cerebral palsy of different fine motor severities.

METHODS:
Fifty children with CP, who aged 3-12 years and were manual ability classification system (MACS) levels I-IV, were collected. They were classified into two groups based on the manual ability classification system (MACS) levels: group A (levels I-II) and group B (levels III-IV). Outcome measures were preschool language Preschool Language Impairment Scale (PLIS)/ Language Impairment Scale (LIS), Peabody Picture Vocabulary Test (PPVT) and modified Verbal Motor Production Assessment for Children (mVMPAC), including global motor control, focal oromotor control, and sequencing areas.

RESULTS:
Group A had better PPVT scores and language function in comprehension, expression, and global domains than group B ($p < 0.01$). Furthermore, group A had better mVMPAC scores in global motor control, focal oromotor control, and sequencing areas than group B ($p < 0.01$).

CONCLUSION:
The findings of this study suggest that the language and motor speech functions are associated with the fine motor functions in children with CP.

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Who are we transitioning to? To compare priorities of adult rehabilitation physicians to those of paediatricians in neurodisability, when transitioning young people with severe and complex disability

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Background and aims:
Young people (YP) with complex disability can face difficulties transitioning from paediatric to adult services. We propose that knowledge of what is available or considered part of adult rehabilitation services may contribute to this. We compared the priorities of the paediatrician with the adult rehabilitation physicians, to illustrate where similarities or differences in working practice and hence expectations exist

Methods:
Ten anonymised multi-disciplinary discharge reports for YP aged 19 to 25, were reviewed by physician training in adult rehabilitation medicine.

Their assumptions of care needed and what they could provide were compared with those assumed by the paediatrician in neurodisability, who knew the young person.

Results:
The paediatrician assumed the medical management of all young people would be overseen in an adult rehabilitation service. However, the rehabilitation medicine physician determined that other care pathways would also be appropriate in half of the cases.

Core themes emerged:
1)Care planning and goal setting is contemplated differently, with multidisciplinary input being considered by the adult physician much more than the paediatrician
2)Similar medical needs were identified, with paediatricians being more likely to identify gastrointestinal / scoliosis specific needs and rehabilitation medicine physicians more likely to identify assistive technology or bladder care needs.
3)Perceptions did not account for potential mental health or cognitive/ behavioural concerns in most cases
4)Expectations were determined differently with the adult physician focusing on multidisciplinary input and the paediatrician centred on participation and pain

Conclusions:
Rehabilitation physicians and paediatricians approach YP transitioning services differently. Assumptions about medical care are likely to impact young peoples' experience of services. These differences in care provision can compound the difficulties experienced by young people transitioning into adult care. An awareness of these issues can facilitate an increase in 'preparedness' of young people moving to adult services.

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Performance Analysis of Insole for Disabled Person Using Cyclic Compression Test

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INTRODUCTION OR PURPOSE
Durability is one of the evaluation scales of insole performance. Hemiplegic disabled person with stroke shows asymmetric gait, so the pressure on unaffected foot is higher and elasticity of material of unaffected insole reduces faster than that of affected foot. This study is to measure the durability of insole by material characteristics using cyclic compression test.

METHODS
In this study, we made 10 soft-type insoles and 10 rigid-type insoles for testing. Insole size is determined to be 240mm based on the right foot and basic insole is constructed of medial arch support and heel cup excluding all kinds of pads. For cyclic compression test, we measured the thickness of insole($\mathbf{t}_o$), and then placed it on fatigue test and applied loading from 98N to 981N. Velocity of loading compression was 1Hz, and frequency of compression was 80,000 with reference to the Durability Test in KS G 4300 Section 9.1. After completing cyclic compression test, we left it at room temperature for 24 hours and measured thickness($\mathbf{t}_o$) and rate of change.

RESULTS
Before cyclic compression test, average height of insole heel of soft-type and rigid-type was 6.77±2.30cm and 7.58±1.89cm respectively. After testing, average height of insole heel was 5.33±2.03cm, 6.35±1.05cm respectively. Compared with before and after, reduction rate of height of heel was measured 20.32% for soft-type and 15.15% for rigid-type.

CONCLUSION
Study results show that compression reduction rate of rigid-type was lower than that of soft-type, so higher hardness is considered higher durability. Rigid-type is more durable and can be used for long time, however, the effect of stability was not tested and disabled person with stroke may feel uncomfortable during walking due to hard material. Accordingly, further clinical research is needed considering stability and cushion function in relation to insole hardness.

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COP Changes of Patients with Stroke by Wearing Customized Insole

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INTRODUCTION OR PURPOSE
Hemiplegic patients with stroke have characteristics of asymmetric weight supporting and imbalance between COP(Center of Pressure) of unaffected and affected, which reduce their gait ability. Insole is used to improve abnormal condition of feet and gait asymmetry, and has a role to improve function of feet, prevent or correct distortion of feet by adjusting feet alignment and supporting feet. The purpose of this study is to examine the effect of wearing of customized insole on COP changes of patients with stroke.

METHODS
The subjects of this study are 7 disabled persons diagnosed with stroke(Hemiplegia). COP was measured using Pedar-X (Novel, Munich, Germany). Data was acquired in static standing state with eyes open and staring ahead for 30 seconds by wearing just shoes. This test was repeated 3 times. In addition, the same test is performed by wearing both insole and shoes. COP changes of disabled persons with stroke by wearing insole are determined by standard deviation (SD), velocity and displacement.
Results are analyzed using SPSS 18.0 program and significance is verified using Wilcoxon nonparametric test (significant level $p<0.05$).

RESULTS
The study result is as follows; as for unaffected foot, there was no significant difference in all COP related parameters in relation with and without insole. In the other hand, as for affected foot, there was no significant difference in velocity and displacement by wearing insole, however, SDAP showed significant difference.

CONCLUSION
Affected side showed significant difference in relation with and without insole, which is due to the reduction of COP movement by wearing insole. However, there is a limit to generalize this result since subjects of this study are 7, so further research is needed by increasing the number of subjects.

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A quantitative gait marker and fall risk assessment using triaxial accelerometry

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Background and aim:
Due to spatial and technological limitations, walking at a high cadence for a long distance is difficult to observe using a traditional gait analysis laboratory. Method: To explore the relationship between the quantitative gait marker, e.g. cadence, and fall risk, a gait recording system with a specific synchronization mechanism was developed in this work to

acquire 3D acceleration signals from the bilateral lower extremities under different cadences. Meanwhile, algorithms for gait cycle characteristic detection were proposed for analyzing gait at different cadences. Results: In the analysis, the correlations among low, moderate, and high cadences were computed. The results showed that a higher cadence leads to greater motion strength in the terminal foot swing and also a smaller degree of motion strength at the starting foot swing. We also found that the trend of lower foot clearance to the ground become obvious as the cadence becomes higher, especially when it is higher than 120 beats per minute. Conclusion: In conclusion, walking at a high cadence may increase the degree of fall risk on an uneven surface.

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OSSEOINTEGRATED IMPLANTS FOR TRANS FEMORAL AMPUTEES: RADIOGRAPHIC EVALUATION OF BONE REMODELING

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INTRODUCTION

Osseointegration is a novel method to overcome persistent socket prosthetic issues in amputees by anchoring a transcutaneous implant directly onto the skeletal residuum. Although similar technologies have been widely applied in the area of hip and knee arthroplasty, little evidence exists in the literature reporting the bone remodeling effects of osseointegrated implants. Stress shielding results in the reduction of bone density due to the implant removing the stress that is usually exerted on the bone, which greatly reduces implant stability. This paper investigates the bone remodeling effect and quantifies it in two of the most common osseointegration implants.

METHODS

This is a prospective study of 50 patients with trans-femoral amputations, consisting of 35 males and 15 females, aged 20-73 (mean 48.2) years at surgery, with minimum two-year follow-up. Two implants, the Integral Leg Prosthesis (ILP) and Osseointegrated Prosthetic Limb (OPL), with differences in tapering, coating and bone ingrowth regions were examined. Radiographs were taken at 6 months, 1, 2 and 5-years post-surgery. The surrounding bone was defined using inverse Gruen zones and graded into 5 levels of bone growth or resorption.

RESULTS

Results obtained at 1 and 2 year follow-ups were compared to the 6-month follow-up values as a baseline. Significant bone growth near the proximal zones of the implant was observed on patients with the ILP implant. This was accompanied by significant resorption towards the distal end indicating the occurrence of stress shielding. The OLP implant demonstrated much more uniform bone density throughout the length of the implant.

DISCUSSION

Results obtained at 1 and 2 year follow-ups were compared to the 6-month follow-up values as a baseline. Significant bone growth near the proximal zones of the implant was observed on patients with the ILP implant. This was accompanied by significant resorption towards the distal end indicating the occurrence of stress shielding. The OLP implant demonstrated much more uniform bone density throughout the length of the implant.

DISCLOSURES

Dr. Al Muderis consults for and receives royalties from companies including: Osseointegration International Pty Ltd (Australia), Osseo-PL Inc (USA), Osseo-PL GmbH (Germany), AQ Implants GmbH (Germany) and Permedica S.P.A (Italy).

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Plantar Pressure Distribution in Patients with Flexible Flatfoot: Measured by Platform System and In-Shoe System

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Flatfoot is characterized with insufficiency of the medial longitudinal arch and flexible flatfoot is the most predominant type which leads to numerous clinical problems. This study aimed at investigating the plantar pressure distribution in flexible flatfoot patients with platform system and in-shoe system. Nineteen flexible flatfoot patients and fifteen normal subjects were recruited. Foot Function Index (FFI) was used for subjective symptoms report, and higher scores indicated

worse clinical condition. Plantar pressure were assessed with Emed-X system and Pedar in-shoe system. Student independent-t test was used for statistical analysis, and statistical significance was set at $p<0.05$. The results showed that the total score of FFI was significantly higher in flexible flatfoot patients. Emed-X system revealed that there were significantly greater contact area, peak pressure, foot maximum force and force-time integral in the medial midfoot area in flexible flatfoot patients. While Pedar in shoe system showed that there was significant decrease of peak pressure in lateral rearfoot. In conclusion, the findings of Emed-X system confirmed the crucial change of medial midfoot in flexible flatfoot patients, while the findings of Pedar in-shoe system illustrated the alteration of lateral rearfoot. These biomechanic features can be further applied in the orthosis design.

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Dynamic Stability on Stair Climbing in KOA Patients with Electro-acupuncture Treatment

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Background and aim(s)
Margin of stability (MOS) in anterior-posterior (AP) and medial-lateral (ML) directions reflect the stability during walking. Our previous study has shown that electro-acupuncture(EA) relieved knee pain and improved the joint loading ability during stair climbing in knee osteoarthritis (KOA) patients. The effect of EA on dynamic stability was explored in this study.

Methods
KOA patients were randomized into the treatment (EA) group (n=18) and control (minimal acupuncture, MA) group (n=18). Gait of stairs climbing was measured before and after treatment. MOS and its components were analyzed.

Result(s)
MOS in both anterior-posterior (AP) and medial-lateral (ML) directions during descending was more than those during ascending($P<0.05$). MOS - AP during Step1(level to stair) was also more than in Step2(stair to stair) during both ascending and descending ($P<0.05$). After EA treatment, MOS - AP at toe off event and minimal MOS - ML during descending was decreased ($P<0.05$). MOS-AP at toe off event during descending after EA was less than after MA ($P<0.05$).

Conclusion(s)
KOA patients showed more instable in stair descending than in ascending, and similar in stair-stair than in level - stair. May need to focus on interventions more at stair-stair during descending. EA may improve both AP and ML stability and partly better than MA during descending, but the effect is limited. Different effects of EA and MA may imply various biomechanical impact.

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Practical learnings and activity impact of large scale service move

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Background and aim(s)
In October 2017, Southern Adelaide Rehabilitation Services were relocated from the Repatriation General Hospital, to the Flinders Medical Centre, a tertiary hospital 5km away. This review aims to:
1.assess impact on service delivery
2.summarise practical learning points for building design and service development

Method
Mixed methods retrospective analysis

Result(s)
Activity
The move significantly impacted service continuity; the 3 week ambulatory service closure caused 40% reduction in outpatient activity taking 3 months to recover (overall reduction of 1450 occasions of service).

Inpatient activity dropped by 18% in October and a further 16% in November (total of 35 episodes), returning to baseline by December. This was partially offset by increased home rehabilitation activity (additional 33 episodes), a strategy utilised to manage demand. The service move saw a net activity reduction of 125 NWAUs ($611,000*).
*based on the Independent Hospital Pricing Authority, 2017/18 National Efficient Price of $4910/NWAU

Nursing Hours
Pre-move, the Nursing Hours Per Patient Day (NHPPD) across the 55 bed inpatient unit averaged 6.2 NHPPD. This increased by 20% (7.4 NHPPD) over the move periods and has since averaged at 6.75 NHPPD (including 1:1).
Pre-move, Nursing 1:1 averaged 2.9 FTE across the unit. This increased to 9.7 during the move period, and has averaged 11 FTE since.

Time to transfer
There has been a 15% reduction in average time from acute admission to rehabilitation admission (18.7 to 15.9 days)

Practical Learnings
Qualitative review has highlighted the importance of multilevel and multidiscipline staff engagement and information provision throughout a move process. Ongoing review of physical and service design is necessary to accommodate for the unexpected.

Conclusion(s)
The move impacted activity and nursing hours despite nil significant change in overall casemix. Altered ward design and team structure have required ongoing review of service delivery models.

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Improving access to pain management services for injured New Zealanders

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Background and Aims:
Between 2014 and 2016 ACC completed a redesign of its pain management services to address key challenges in service delivery. An action research approach was utilized to support the co-design of these services, and to ensure the needs of patients, clinicians and ACC staff were met. A new service model was developed and demonstrated in Auckland in conjunction with community and tertiary pain services, and with the support of the New Zealand Pain Society and the Faculty of Pain Medicine.

Method:

An independent research organization undertook action research to support development of the service design which was completed in three phases:
(1) evaluation design and context,
(2) data collection and formative feedback,
(3) data integration and analysis.

A mixed methods design drew on interviews with clients (n=8), and interviews/focus groups with ACC staff (n=30) and clinicians (n=11). Data was examined to monitor the demonstration. Information was gathered over a three-month period (April – June 2016) with rapid feedback provided fortnightly.

Results:
Action research enabled ACC to make ongoing refinements to the service delivery model to enhance the experience and outcomes of participants. Making changes to the service in "real-time" enabled moderations to be tested in the context in which the programmes are delivered.
Key changes to the service delivery model included: (1) triage procedures for clients, (2) increased focus on setting expectations, (3) greater collaboration between ACC staff and service providers, (4) increased education about pain management, and (5) strengthened early intervention opportunities.

Conclusions:
An action research approach to pain management service co-design allowed incremental changes to be made based on feedback, and tested a service delivery model in context. Only those changes which improved client outcome and experience were adopted in the new service, while engagement and satisfaction of clinicians working in the services were increased.

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Person centered and goal directed rehabilitation- How are we doing in Queensland?

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Background and Aim
Goal-setting in rehabilitation is recommended in organisational and professional guidelines. However, goal setting practices are inconsistent across rehabilitation settings. This study aimed to review goal-setting practices in Queensland Rehabilitation Services.

Method
An electronic survey was distributed to staff working in rehabilitation across Queensland, Australia through the Statewide Rehabilitation Clinical Network. The survey covered several topics including; structure of goal setting, and barriers to implementing goal setting.

Results
A total of 181 responses were received. Goal setting was used consistently by 85% of staff. Rehabilitation staff used goal setting; to establish the rehabilitation program, to ensure patient centered care, to evaluate outcomes, to improve team communication and as an intervention strategy to increase engagement and support adjustment. Staff consistently prioritised including clients in goal setting (91%). However, only 48% of respondents consistently gave clients information about goal-setting and only 33% of staff consistently gave copies of goals to clients. Half of staff did not develop action plans to support goal pursuit. A total of 30% of staff used either the Canadian Occupational Performance Measure or Goal Attainment Scaling whilst 35% of staff stated no particular tool was used when goal setting.
Barriers to implementing goal setting included; patient factors, lack of coordinated interdisciplinary processes to support goal setting and a lack of staff skill and confidence. Staff identified enablers to goal-setting practices including a joint team philosophy for goal setting (56.6%) and organizational support (54.2%).

Conclusion
Rehabilitation staff indicated that they prioritised goal-setting practices with clients however their report of activities conducted failed to demonstrate the use of comprehensive goal-setting practices. Further contextual analysis of

barriers to implementing goal setting is needed to develop and implement tailored strategies to improve client engagement in goal-setting and implement goal directed rehabilitation.

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Transitional Care - Ten Years' Experience in an Inpatient Unit of an Outer Metropolitan Hospital in Sydney

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Background and Aims

Camden Hospital is a 50 bed subacute facility which provides subacute inpatient care to over 280,000 residents of southwest Sydney. The Medical Transit Unit (MTU) is a 20 bed unit in Camden Hospital that was converted from an acute unit to a subacute unit in 2006 to complement the existing 20 bed rehabilitation unit and to assist in the flow of patients out of Campbelltown Hospital.

The aim of this presentation to outline the outcomes achieved by the MTU, and reflect upon its development and challenges, particularly over the period 2008 - 2017.

Method

Patient outcomes over the period 2008-2017 will be reviewed including the number of episodes of care, average length of stay (LOS), discharge destination and Incident data. Various internal and external factors influencing service outcomes and development will be discussed.

Results

Patient throughput and LOS have fluctuated over the period 2008-2017. The incident rate has fallen over the same period. Several factors are felt to have contributed to the various outcomes, including the development of an acute inpatient geriatric service at Campbelltown Hospital, changes in admission criteria, the introduction of the National Disability Insurance Scheme (NDIS) and the development of new models of rehabilitation care.

Conclusion

The MTU was initially developed mainly to facilitate the flow of subacute patients out of Campbelltown Hospital. Over its existence, the MTU has had to adjust to numerous internal and external factors in order to optimise its utility for both Campbelltown Hospital and Camden Hospital.

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Interdisciplinary trauma rounds

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Current practice of multidisciplinary rehabilitation across the world largely include referral to rehabilitation facilities followed by review and transfers. A new approach with trauma team has been implemented at Changi General Hospital since 2014.

This has streamlined pathway. As soon as trauma is activated following patient’s admission, the lead nurse proactively involves all the members with trauma whatsApp group for communication. The various members review the patients early on including their intensive care stay.

Regular rounds take place on every Thursday, when detailed discussions include: surgical team, nurse specialist, pharmacists, physiotherapist, occupational therapist, speech therapist, neuropsychology, medical social worker, Dietician, rehabilitation physician.

The early potential rehabilitation issues based on the type of injuries are established and preventive strategies for any complications are applied.

PT,OT, ST and Psy OT input is sought and appropriate action plan regarding type of therapy is decided.

MSW input with all the details of patients social situation financial aspects, and more often that foreign worker's overseas details are discussed. The members who have not reviewed patient aims to review them within 24 hours and address the issue based on the discipline.

Issues addressed include: nutrition, diet, speech and swallowing, skin care, continence, tracheostomy care, range of movements, spasticity management, DVT/PE prophylaxis. Addressing early complications related to specific injuries: autonomic instability and dysreflexia, seizure prophylaxis, unwanted medications: sedative hypnotics.

Emphasis is given for liaison with family members and giving them comfort and support.

Conclusion:
Over the years the team has developed successful rapport and confidence. This has reduced the referral time to rehabilitative services. Early input of various discipline may reduce complications.

In patients needing repatriation and compensation, the teamwork helps to reduce stress on family members.
Details of total numbers of trauma round patients and outcomes will be provided in final poster.

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GEOGRAPHIC AND RESOURCE DISTRIBUTION OF PUBLIC ADULT SPASTICITY CLINICS ACROSS NSW AND ACT

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BACKGROUND
Botulinum toxin A is commonly used for spasticity management, however the procedure can cause pain and anxiety. Analgesia and anaesthesia can improve safety and experience for the patient, particularly in vulnerable populations such as children and intellectually disabled. There is inequity in accessing botulinum toxin for spasticity, and currently there is no available database of public spasticity clinics in NSW/ACT.

AIM
The aim of this project was to map the geographic distribution and available resources for adult public spasticity clinics that use botulinum toxin in NSW/ACT.

METHOD
A list of public hospitals within NSW/ACT was obtained from www.myhospitals.gov.au. A questionnaire reviewing botulinum toxin administration practices and clinic resources was delivered to all hospitals identified as having a "rehabilitation unit".

RESULTS
65 hospitals were identified as having a "rehabilitation unit", and questionnaire completion rate was 100%. 25 clinics administer botulinum toxin for spasticity management; 68% located in metropolitan centres and 32% were regional/rural.

Sedation protocols and resources varied between clinics. 3 clinics (12%) regularly used procedural sedation or anaesthesia; all located in Sydney. 40% clinics seldom used, but could access procedural sedation or anaesthesia.

40% of clinics had physician-only assessment prior to injection. 100% of clinics referred patients to allied health post-injection, although availability of therapists varied between clinics. All clinics were wheelchair accessible, and 80% had access to hoist.

CONCLUSION
There is geographical inequity in accessing botulinum toxin for spasticity management, with majority of clinics in metropolitan centres. Only 3 clinics in Sydney regularly use sedation/anaesthesia, potentially preventing transition and intellectual disabled populations from accessing botulinum toxin. There is inequity in accessing allied health

therapists, and 20% facilities do not have access to a hoist. Further research is needed to determine why these inequities exist, and to provide support for patients and clinics to improve access for all.