Reliability and validity of the 10-m walk test in dual-task conditions among people with chronic stroke

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Background and purpose: The ability to perform a secondary task while walking was suggested to be highly related to “real-life” mobility. There has been a lack of a reliable and validated test for assessing dual-task ability of stroke patients during walking. The aim of this study was to assess the test–retest reliability and construct validity of the 10-m walk test in dual-task conditions among people with stroke.

Methods: Participants were instructed to walk along a 10-m pathway at their comfortable speed under single and two dual-task conditions (namely fruits and serial 3 subtractions). Walking time in each condition and correct response rate (CRR; the number of correct response divided by walking time) for the added cognitive tasks were recorded. The time-matched CRR of the two cognitive tasks was also measured to assess the participants’ performance in the single cognitive task condition. Participants were reassessed again within 1 week. Wilcoxon tests were used to compare the performance in 10-m walk test between single and different dual-task conditions. Intra-class correlation coefficients were used to examine the test–retest reliability of walking time and CRR in all dual-task conditions. Spearman’s rank correlation coefficient was used to examine the intercorrelations among the walking times and CRR measured in the various test conditions.

Results: Twenty-eight chronic stroke patients (9 women and 19 men, mean aged 61.6 ± 6.9 years; > 6 months after onset) participated in this study. The participants were found to take longer to complete the 10-m walk no matter which secondary task (verbal fluency, p < 0.001; serial 3 subtractions, p < 0.001) was added. The CRR was not changed significantly for both naming fruit (p = 0.94) and serial 3 subtractions (p = 0.29) in dual-task conditions when compared with their respective time-matched single-task condition. In all three dual-task conditions, the reliability of the time taken to complete the 10-m walk was excellent (ICC(1,1) > 0.80, p < 0.001), whereas the reliability of the CRR was moderate (naming fruit: ICC(1,1) = 0.59, p < 0.001; serial 3 subtractions: ICC(1,1) = 0.64, p < 0.001). The walking time in all three dual-task conditions are significantly correlated with each other (ρ > 0.80, p < 0.001). The correlations between walking time and CRR measured under dual-task conditions and those under single-task conditions were moderate to excellent (ρ = -0.59–0.86, p < 0.001). The correlations between walking time and CRR measurements of all dual-task conditions in the 10-m walk test at a comfortable speed were found to be reliable and valid. However, walking time is a better outcome for assessing dual-task ability due to its higher reliability.

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Efficacy of a perioperative physiotherapy care programme for patients undergoing abdominal surgery in Tseung Kwan O Hospital

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Background and purpose: Postoperative pulmonary complications (PPCs) such as atelectasis and pneumonia are common in patients following major abdominal surgery, which in turn can lead to suboptimal oxygen saturation and limit tissue healing. Lung expansion is a well-known strategy to prevent PPCs at the early postoperative phase. Patient’s active participation in lung expansion is important. To enhance patients’ compliance and participation, the Physiotherapy Perioperative Care Program (PPCP) was formulated. The aim of this study is to investigate and evaluate the effectiveness of PPCP in optimising oxygen saturation (SpO2), preventing PPCs, and hastening rehabilitation.

Methods: This is a retrospective, pre- and post-test study. From July 2012 to December 2012, a convenient sample of high-risk patients with a smoking history, obesity, a pre-existing lung disease, functional dependence, and age > 60 years who received major abdominal surgery was recruited to participate in PPCP. It consisted of two phases. (1) Preoperative phase. Preoperative chest physiotherapy such as education on the importance of early mobilisation and postoperative exercise was provided to the patients, carers, and nurses in charge. Patients were also prescribed with a spirometer and the Bed-side Chest Physiotherapy Reminder Card with the exercise regime illustrated. The exercise regime included 10 repetitions of chest expansion and 20 repetitions of ankle exercise holds for the Postoperative phase. Intensive chest expansion, coughing exercise, bronchial hygiene, appropriate positioning, and progressive mobilisation exercise were provided by a physiotherapist daily. Reinforcement of postoperative exercise as showed in the exercise card was provided by nurses and carers after physiotherapy services hours. The outcomes of this study included inspiratory capacity measured by a spirometer, SpO2 on Postoperative Day 1–3, incidence of documented PPCs, preoperative and pre-discharge Modified Functional Ambulation Categories (MFAC), and discharge destination.

Results: Sixty-seven patients participated in the programme. Overall, the patients achieved an average of 70% of normal inspiratory capacity upon discharge. The mean SpO2 on Days 1–3 was maintained at 98%, which is above the recommended value. PPCs occurred in 4.4% of patients (n = 3), which is lower than the rate of 9–40% reported in previous research.

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Conclusion: Preliminary results support the PPCP’s effectiveness in maintaining satisfactory SPO2, reducing the incidence of PPCs, and facilitating the return of premorbid functional status in patients after a major abdominal surgery.

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Physical and sociopsychological profiles of a Chinese population with mild to severe depressive disorders—A preliminary report

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Background and purpose: Depression was the fourth leading contributor to the global burden of diseases in 2000 and was estimated to escalate to the fifth place by 2020. Populations at risk include Chinese adults with diagnoses of mild to severe depressive disorders referred from the Department of Psychiatry of Kowloon Hospital were recruited from February 2012 to April 2013. Demographic characteristics, physical parameters [maximum oxygen consumption (VO2max), body mass index (BMI), body fat %, sit and reach test, and maximum hand-grip strength], and self-esteem [Rosenberg Self-Esteem Scale (RESE)] were examined.

Results: A total of 72 participants (59 females and 13 males; mean age 46.85 ± 10.78 years) were recruited. When compared with the local normative data, overall BMI (24.71 ± 3.99 kg/m²) and body fat % (33.20 ± 6.91%) were higher, whereas VO2max (24.50 ± 6.21 mL/kg/min) and RESE (24.29 ± 6.65) were lower. Female participants demonstrated lower flexibility scores (–70.68 ± 10.35 cm), and male participants have lower maximum hand-grip strength (31.39 ± 9.04 kgf).

Conclusion: Preliminary results of this study showed that a Chinese population with mild to severe depressive disorders have lower physical fitness level and self-esteem. Management should target both physical and sociopsychological domains for effective holistic care.

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Effectiveness of an underwater gymnasium programme for patients with osteoarthritic knee

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Background and purpose: Evidence exists that exercise therapy is effective for the management of osteoarthritis (OA) knee. Aquatic exercise provides a low-impact training option for patients with OA knee demonstrating difficulty in weight-bearing activities. The aim of this study was to compare the effects of an underwater gymnasium programme with a land-based physiotherapy programme for the management of OA knee.

Methods: Sixty-five OA knee patients were allocated to receive 12 sessions of either underwater gymnasium exercises (n = 32; the HYDRO group) or land-based physiotherapy training (n = 33; the LAND group). The HYDRO group performed aquatic exercises using underwater treadmill and stepper. The LAND group performed land-based exercises. The Numeric Pain Rating Scale (NPRS), quadriceps strength, 6-minute walk test, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and SF-12 Health Survey were recorded at the baseline and at the end of training.

Results: Significant improvement was observed in both groups in all outcome measures (all p < 0.05). The HYDRO group exhibited significantly greater improvements than the LAND group in terms of pain alleviation (p < 0.05) and enhancement of knee function (p < 0.05). The NPRS in the HYDRO group reduced by 56.3% compared with a 47.6% reduction in the LAND group. The WOMAC reduced by 41.4% in the HYDRO group and by 20.5% in the LAND group.

Conclusion: Both the HYDRO and LAND programmes were effective in reducing knee pain, increasing quadriceps strength and walking endurance, and improving knee function and health-related quality of life for patients with OA knee. The HYDRO programme demonstrated additional benefits in pain relief and enhancement of knee function.

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Neuroprosthetic effect of peroneal functional electrical stimulation on correction of footdrop in stroke cases

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Background and purpose: Footdrop is an important gait abnormality that contributes to reduced balance control and increased risk of fall among stroke survivors. In an attempt to provide peroneal functional electrical stimulation (FES), a neuroprosthetic device has been developed to tackle the footdrop problem during ambulation. The objectives of this study were to determine the following: (1) immediate orthotic effect and (2) therapeutic carryover effects of a peroneal FES on the tasks of functional ambulation in stroke survivors.

Methods: Twelve patients with the diagnoses of first stroke and ankle dorsiflexor weakness that led to footdrop during ambulation participated in the study. All patients underwent gait training on a treadmill with the application of a peroneal FES at a self-selected comfortable pace, 20 minutes a day, three times per week for 6 weeks. Outcome measures included the walking speed test, timed-up-and-go (TUG) test, 6-minute walk (6-MW) test, and timed 12 ascending and descending stairs test. Assessments were performed at baseline under the following conditions in the order of (1) no device and (2) neuroprosthetic peroneal FES, and on completion of training with no device.

Results: Functional ambulation was found to be improved significantly with the peroneal FES, relative to no device, on the walking speed test (27.48%, p = 0.022), 6-MW test (17.37%, p = 0.025), and TUG test (~20%, p = 0.023). Patients tended to walk faster in the stairs test, but it was not significant (p = 0.108). After 6 weeks of training, all gait parameters improved as compared to baseline measurements under the condition of no device.

Conclusion: The performance of functional ambulation was enhanced with immediate orthotic and therapeutic carryover effects by the application of a neuroprosthetic peroneal FES as compared with the no device condition.

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Robot-assisted arm training promotes motor recovery in patients with chronic stroke

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Background and purpose: Restoration of the upper extremity function after stroke remains unpromising. Robot-assisted arm training is intended to provide high-intensity, repetitive, task-specific, interactive movement to the exercised limb. The objective of this study was to evaluate the effects of robot-assisted arm training for promoting motor recovery in patients after stroke.

Methods: Twenty-two patients (11 males and 11 females) with persistent hemiparesis from a single, unilateral stroke within the past 1–5 years participated in the study. In addition to conventional physiotherapy management, all patients underwent performance-based assist-as-needed robotic arm training that targeted motor function of the affected shoulder and elbow, three times per week for 6 weeks. Outcome measures included clinical measures of Fugl–Meyer Motor Assessment of Upper Extremity (FM) and robotic evaluations on speed, positioning, and force of paretic limb movements. Evaluations were performed at baseline and at the end of training.

Results: On completion of the training, the averaged FM score increased significantly by 27.55% (p = 0.011). The movement mean speed increased significantly by 34.36% (p = 0.017); the peak speed increased by 13.24% but was not significant (p = 0.108). The movement smoothness improved significantly by 9.89% (p = 0.003), whereas the joint independence measure increased by 10.48% after training but fell short of significance (p = 0.135). The isometric shoulder force demonstrated an average of 13.54% improvement (p = 0.012) at the end of training.