Original Article
An early rehabilitation clinical pathway promoted functional recovery and improved quality of life in patients with ischemic stroke

Aiping Chen[1], Lin Xiao[2]

[1]The First People's Hospital of Jingzhou Rehabilitation Department, Jingzhou, Hubei, China; [2]Department of Pain Management, Guangxi International Zhuang Medical Hospital, Nanning, Guangxi, China

Abstract: Objective: To explore the effects of an early rehabilitation clinical pathway combined with a rehabilitation program on the activities of daily living, motor function and quality of life in patients with ischemic stroke. Methods: A total of 186 patients with ischemic stroke in the Jingzhou First People's Hospital were randomly divided into group A and group B, with 93 cases in each group. Patients in group A were treated with an early rehabilitation clinical pathway and corresponding rehabilitation treatment, and patients in group B were treated with conventional rehabilitation. The Modified Barthel Index (MBI) and the Fugl-Meyer Motor Function Rating Scale (FMA) were used to assess the daily activity and motor functions in the two groups of patients. The stroke specific quality of life scale (SS-QOL) was used to assess quality of life after 3 months of rehabilitation. Results: The difference in value of MBI after treatment and the improvement degree of MBI in group A ((after MBI-before MBI)/(100-before MBI)×100%) were significantly higher than that of group B (All P<0.001). The difference in value of FMA and the degree of improvement in FMA ((after FMA-before FMA)/(100-before FMA)×100%) in patients in group A were significantly higher than those in group B (All P<0.001). The SS-QOL score of patients in group A was significantly better than that in group B (P<0.001). Conclusion: An early rehabilitation clinical pathway combined with a standardized rehabilitation program can promote daily activities and abilities, recover motor functions and improve quality of life in patients with ischemic stroke.

Keywords: Ischemic stroke, early rehabilitation clinical pathway, functional recovery, quality of life

Introduction

Ischemic stroke is a disease with high morbidity and mortality especially in the elderly. Most patients with this disease are accompanied by disability or severe dysfunction, if they survive [1, 2]. Though it has a serious impact on the work and quality of life of patients, it also imposes a serious burden on society and families [3]. Although the current clinical diagnosis and treatment of ischemic stroke has made great progress, and the mortality rate of the disease has also decreased, the disability rate is still high [4]. Therefore, looking for an effective treatment and nursing measures has important clinical significance for patients with ischemic stroke [5]. The 'clinical pathway' is a comprehensive model of standardized clinical treatment for a certain disease based on evi-

dence-based medicine. It is also a way to promote treatment and management of diseases. It's ultimate goal is to standardize medical behaviors, reduce costs and improve treatment effects [6].

Stroke rehabilitation is not only the main content of the rehabilitation medical system, but also an important part of the development of rehabilitation medicine [7]. Some studies have shown that during the neurology treatment, if a targeted rehabilitation nursing intervention can be performed on the patient, not only can the treatment achieve the desired therapeutic effect, but also the patient's outcome can be improved [8]. Evidence-based medicine also proves that the most effective way to reduce morbidity is to perform rehabilitation for patients with stroke [9]. However, there are still

many problems with stroke rehabilitation, such as the lack of uniform standardized treatment methods and procedures and evidence from evidence-based medicine. This has led to a series of problems such as poor quality of life and low satisfaction in patients [10]. Therefore, the standardization of rehabilitation in clinical pathways for patients with stroke is becoming more and more important.

Therefore, we explored the functional recovery and quality of life improvement in the application of early rehabilitation clinical pathway in patients with ischemic stroke, in order to seek more solutions for the rehabilitation of patients with stroke.

Materials and methods

General information

One hundred and two patients with ischemic stroke admitted to the Jingzhou First People's Hospital were selected, including 58 males and 44 females, with an average age of (62.15± 2.71) years. Patients were randomly divided into the observation group and the control group, with 51 cases in each group. Patients in the control group received routine rehabilitation nursing interventions, and patients in the observation group received an early rehabilitation clinical pathway nursing intervention. Inclusion criteria: Patients having ischemic stroke for 7-15 days were included; patients with conscious awareness were included. Exclusion criteria: patients with severe liver and kidney dysfunction, a history of cerebral infarction and cerebral embolism, decompensated cardiac insufficiency, motor dysfunction, cognitive impairment and communication impairment and those who did not cooperate with the treatment were excluded.

All patients and their families agreed to participate in the study and signed an informed consent form. This study has been approved by the Jingzhou First People's Hospital ethics committee.

Treatment methods

The patients in the control group were treated with the routine rehabilitation nursing model, which mainly included routine rehabilitation training and psychological counseling. Patients in the observation group were treated with the early rehabilitation clinical pathway. The specific measures were as follows: (1) The early rehabilitation clinical pathway group was established and supervised by the head nurse. The attending doctor developed a specific early rehabilitation clinical pathway program according to each patient's specific conditions. Then, the patient and their family were informed about the physical rehabilitation training, issued a health manual, and guided in the use of the manual. The patient was introduced to the characteristics of the early rehabilitation clinical pathway. (2) After admission, the patient's vital signs were closely monitored. The patient's family was instructed to help the patient to position the affected limb in the correct position. For example, when the patient was lying down, the affected limb should be raised, and the patient's knuckles and joints should be kept open. At the same time, a soft pillow was placed under the buttocks of the affected side to avoid pressure sores, and the legs of the affected side of the patient were kept in a slightly flexed state. Psychological nursing intervention: The nursing staff actively communicated with the patients and their families, paying attention to the patient's psychological status, and giving timely psychological guidance. The nursing staff alleviated the patient's psychological stress and helped the patient to gradually build confidence in the disease, so that the patient's trust in the medical staff is increased, and the treatment can be better coordinated. Then the patient is trained in language and swallowing functions. The nursing staff communicate with the patient by means of expressions or gestures, encouraging the patient to speak more, and instruct him or her to perform exercises such as stretching the tongue, and gradually recovering the patient's normal diet from liquid food. In daily life, the patient is encouraged and supported in daily activities, such as encouraging patients to get out of bed as soon as possible, or doing their own brushing and combing activities. At the same time, it is more important that the patient's limb function is exercised for recovery. First of all, the nursing staff help the patient to perform passive activities in the joints of the limbs, and also supervise the patient's activity training of the upper and lower limbs on time and in repetition. These include various flexions of the shoulder and elbow joints as well as

abduction, external rotation, internal rotation, adduction and other activities, as well as various flexion activities of the lower limb hip and knee joints, training duration for at least 1.5 h per day. According to the recovery of the patient's limb function, the training intensity is continuously adjusted, so that the patient's progress from passive exercise to autonomous exercise combined with rehabilitation equipment. The patient's activity time is adjusted. The above various rehabilitation measures have been adopted to promote the rehabilitation of patients. (3) A relaxing hospitalization atmosphere is created to enable patients to actively and easily accept treatment and recovery during hospitalization. At the same time, they pay close attention to changes in the patient's condition, and report the targeted treatment to the attending doctor immediately.

Observation indicators

(1) The modified Barthel Index (MBI) [11] and the Motor Function Rating Scale (Fugl-Meyer, FMA) [12] were used to evaluate the daily activities and motor functions of the two groups before and after nursing intervention. The higher the MBI score, the better the effect. The lower the FMA score, the better the effect. (2) The Gugging Swallow Function Assessment (GUSS) [13] was used to assess the swallowing function of the two groups of patients. (3) The Cerebral Neurological Deficit Score (CNS) [14] was used to evaluate the neurological function before and after treatment. (4) The quality of life assessment form was used to assess and compare quality of life between the two groups of patients after 3 months of nursing intervention, including daily life, physical, social and psychological functions. The higher the score, the worse quality of life. (5) After 3 months of nursing, the nursing satisfaction of the two groups of patients was evaluated and compared, ranging from very satisfied, basically satisfied and unsatisfied. Nursing intervention satisfaction = very satisfied percentage + basic satisfaction percentage.

Statistical methods

In this study, SPSS 20.0 software (Boyi Zhixun (Beijing) Information Technology Co., Ltd.) was used for statistical analysis of the data. Measurement data are expressed as mean ± standard deviation (SD). The independent t test was used for comparison between groups, and the paired t test was used for comparison before and after treatment. When $P < 0.05$, there was a statistical difference.

Results

General data comparison

There were no significant differences in gender, age, and BMI between the two groups ($P > 0.05$), so they were comparable (**Table 1**).

Comparison of MBI index before and after rehabilitation

The MBI index of the observation group before and after treatment was 33.37±2.91 and 57.21±3.13. The MBI index of the control group before and after treatment was 33.42±2.87 and 46.39±3.25, respectively. The MBI scores of the two groups were significantly improved after treatment, with the score of the observation group being significantly higher than that of the control group ($P < 0.05$; **Figure 1**).

FMA scores before and after nursing intervention

The FMA scores of the observation group before and after nursing were 31.65±2.36 and 48.62±3.63, respectively. The FMA scores of the control group before and after treatment were 32.03±2.45 and 41.42±3.52, respectively. There were no significant differences in FMA scores between the two groups before treatment ($P > 0.05$). After treatment, the FMA scores of the two groups were higher than those before treatment, with the FMA score of the observation group being significantly higher than that of the control group ($P < 0.05$; **Figure 2**).
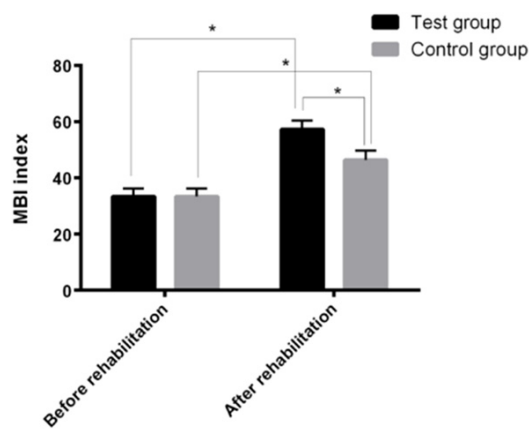
Comparison of GUSS scores before and after nursing intervention

The GUSS scores of the observation group before and after treatment were 12.09±2.11 and 17.35±2.17, respectively. The GUSS scores of the control group before and after treatment were 12.13±2.14 and 15.06±2.09, respectively. Before treatment there was no significant difference in GUSS scores ($P > 0.05$). After treatment, the GUSS scores of the two groups were

Table 1. General information table

Factor		Observation group n=51	Control group n=51	t/X²	P
Sex	Male	28 (54.90)	30 (58.82)	0.160	0.689
	Female	23 (45.10)	21 (41.18)		
Age	≥60	30 (58.82)	31 (60.78)	0.040	0.840
	<60	21 (41.18)	20 (39.22)		
BMI	≥22	24 (47.06)	23 (45.10)	0.039	0.843
	<22	27 (52.94)	28 (54.90)		
Lesion site	Basal ganglia	12 (23.53)	13 (25.49)	0.388	0.943
	Thalamus	13 (25.49)	12 (23.53)		
	Cerebellum	12 (23.53)	14 (27.45)		
	Other parts	14 (27.45)	12 (23.53)		
Coagulation function	APTT s	28.13±2.19	28.11±2.22	0.046	0.964
	PT s	11.64±1.21	11.71±1.19	0.295	0.769
	FIB g/l	3.09±0.16	3.11±0.15	0.651	0.516
	TT s	14.33±1.13	14.29±1.22	0.172	0.864
Liver function index	Serum total protein (g/L)	70.69±2.42	71.01±2.37	0.645	0.501
	Glutamic pyruvic transaminase μmol/L	26.22±4.17	26.19±4.22	0.036	0.971
	Total bilirubin (μmol/L)	11.34±2.11	11.31±2.15	0.071	0.943
Renal function index (μmol/L)	Creatinine	61.81±4.22	62.19±4.18	0.457	0.649
	Urea	5.38±0.49	5.41±0.56	0.288	0.774
	Uric acid	289.44±12.41	292.83±13.05	1.344	0.189
Risk factors	Hypertension	16 (31.37)	17 (33.33)	0.078	0.962
	Diabetes	17 (33.33)	18 (35.29)		
	Heart disease	18 (35.29)	17 (33.33)		

Figure 1. Comparison of MBI index before and after rehabilitation between the two groups of patients. There was no significant difference in the MBI scores between the two groups before and after rehabilitation (P>0.05). The MBI scores of the two groups were significantly improved after treatment, and the MBI score of the observation group was significantly higher than that of the control group, and the difference was statistically significant (P<0.05). Note: *indicates P < 0.05.

higher than those before treatment, and the GUSS score of the observation group was sig-nificantly higher than that of the control group (P<0.05; **Figure 3**).
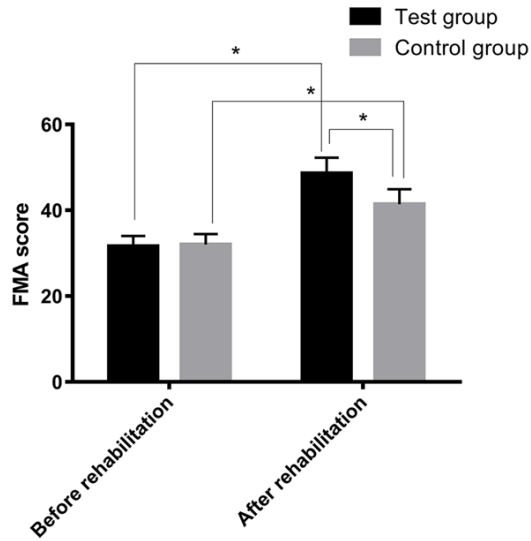
Comparison of CNS scores before and after nursing intervention

The CNS scores of the observation group before and after treatment were 23.24±3.51 and 13.19±3.47, respectively. The CNS scores of the control group before and after treatment were 23.13±3.24 and 17.14±3.41, respectively. There was no significant difference in the CNS scores between the two groups before treatment (P>0.05). The CNS scores of the two groups were significantly improved after treatment, and the CNS score of the observation group was significantly lower than that of the control group (P<0.05; **Figure 4**).

Comparison of quality of life scores after 3 months of nursing intervention

The scores of daily life, physical life, social function and psychological function of patients in the observation group were significantly lower than the control group (P<0.05; **Table 2**). The higher the score, the worse quality of life.
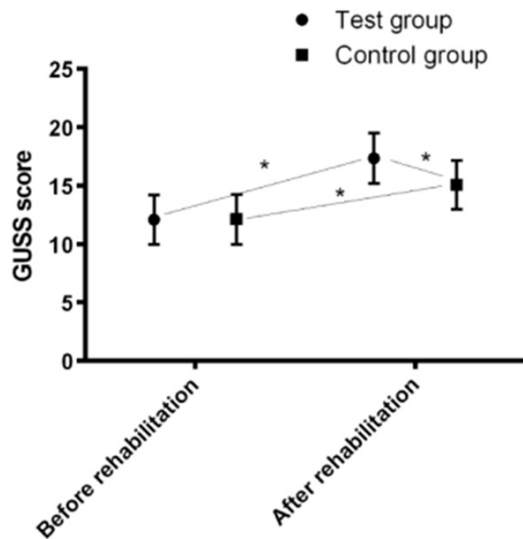
Figure 2. FMA scores before and after nursing intervention between the two groups of patients. There was no significant difference in the MBI scores between the two groups before and after rehabilitation (P>0.05). The MBI scores of the two groups were significantly improved after treatment, and the MBI score of the observation group after treatment was higher than that of the control group, and the difference was statistically significant (P<0.05). Note: *indicates P < 0.05.
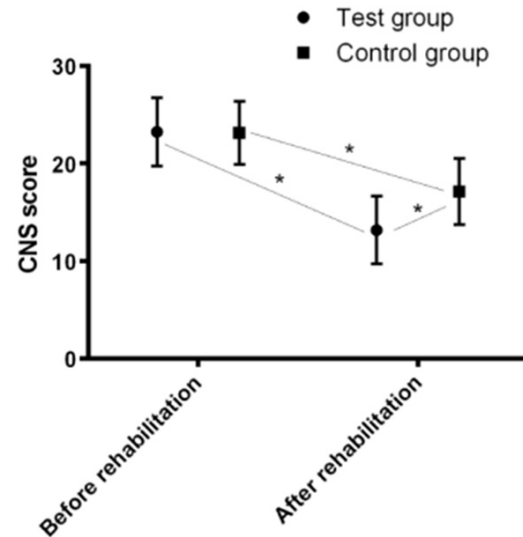
Figure 4. Comparison of CNS scores before and after nursing intervention between the two groups of patients. There was no significant difference in CNS scores between the two groups before and after treatment (P>0.05). The CNS scores of the two groups were significantly improved after treatment, but the CNS scores of the observation group were significantly lower than those of the control group, and the difference was statistically significant (P<0.05). Note: *indicates P < 0.05.

Comparison of nursing satisfaction

After the two groups of patients were treated with nursing intervention, the nursing satisfaction of the observation group was significantly higher than that of the control group (P<0.05; **Table 3**).

Discussion

According to epidemiology, patients with ischemic stroke account for more than two-thirds of the patients with stroke, and there is a growing tendency of patients with younger age [15]. At present, ischemic stroke is mainly treated by the thrombolytic method. However, this treatment does not cure the disease very well. Most patients still have a certain degree of dysfunction after treatment, including cognitive dysfunction and motor dysfunction, so it is especially important to carry out rehabilitation training for patients [16, 17]. Because the various sequelae of patients with ischemic stroke will have a serious impact on quality of life of patients, especially in the treatment of patients with ischemic stroke, the recovery of limb motor

Figure 3. Comparison of GUSS scores before and after nursing intervention between the two groups of patients. There was no significant difference in GUSS scores between the two groups before and after treatment (P>0.05). The GUSS scores of the two groups were significantly improved after treatment, but the scores of the GUSS in the observation group after treatment was significantly higher than that of the control group, and the difference was statistically significant (P<0.05). Note: *indicates P < 0.05.

Table 2. Comparison of quality of life scores after nursing intervention between the two groups of patients

Project	Observation group n=51	Control group n=51	t	P
Daily life	28.34±5.19	34.19±5.74	5.399	<0.001
Physical life	18.27±3.81	23.56±4.11	6.741	<0.001
Social function	16.24±3.64	21.42±4.12	6.729	<0.001
Psychological function	11.58±3.24	23.37±3.39	17.96	<0.001

Table 3. Comparison of nursing satisfaction of the two groups of patients

Nursing satisfaction	Observation group n=51	Control group n=51	X^2	P
Very satisfied	40 (78.43)	25 (49.02)	9.543	<0.050
Satisfied	8 (15.68)	8 (15.69)	-	-
Dissatisfied	3 (5.88)	18 (35.29)	13.49	<0.001
Nursing satisfaction	48 (94.12)	33 (64.71)	13.49	<0.050

function and swallowing function is especially important [18].

The early rehabilitation clinical pathway is the standardization of routine early rehabilitation care. Its main features are the development of the clinical pathway table, the implementation of standardized plans and further strengthening of the comprehensive quality of the nursing staff [19]. The current early rehabilitation clinical pathway has been applied in many aspects of clinical practice, such as its application in some surgical operations has achieved good results [20, 21].

However, few studies have reported the use of an early rehabilitation clinical pathway in patients with ischemic stroke. Therefore, in order to find a more appropriate solution for the rehabilitation training of patients with ischemic stroke, we compared the indexes of patients with ischemic stroke using conventional early rehabilitation training and early rehabilitation clinical pathway.

In our study, MBI, FMA, GUSS and CNS scores of the two groups before and after treatment were compared, and the results showed that MBI, FMA, GUSS and CNS scores of the two groups after care were improved compared with those before treatment. However, compared with patients receiving conventional early rehabilitation clinical pathway, all scores of the patients using early rehabilitation clinical

pathway have improved more significantly. The underlying reason may be that patients receive systematic health education to build confidence in treatment.

At present, there are relatively few studies on the application of an early rehabilitation clinical pathway in patients with ischemic stroke, but previous studies have shown that the application of an early rehabilitation clinical pathway in patients with acute myocardial infarction can promote the rehabilitation of patients [22]. Previous studies found that it can effectively improve nerve damage of patients with clinical pathways in patients with acute ischemic stroke [23]. There are also studies that report the implementation of comprehensive rehabilitation care for patients with acute ischemic stroke can effectively promote the recovery of neurological function [24]. The underlying reason may be that the behavior of the nursing staff is more systematic and specialized, and targeted measures are taken for specific problems of patients. Subsequently, we also compared the quality of life and nursing satisfaction of the two groups of patients after treatment. The results showed that the quality of life and satisfaction of the patients in the observation group were significantly higher than those in the control group (P<0.05). This suggests that the application of an early rehabilitation clinical pathway in patients with ischemic stroke can significantly improve quality of life of patients and improve patient satisfaction. There are studies on the application of an early rehabilitation care in patients with acute ischemic stroke, and early rehabilitation care can effectively promote rehabilitation and satisfaction of patients [25]. The underlying reason may be that a care plan is developed for the patient's personal situation, and the patient can experience humanized services every day, thereby reducing the patient's hospital stay and hospitalization costs. Studies have shown that the application of an early rehabilitation care in patients with acute ischemic stroke can not only improve the patient's treatment compliance, but also

improve the patient's quality of life and the patient's prognosis [24]. However, the study of clinical pathways in patients with ischemic stroke can improve the quality of life of patients. The above studies can provide some theoretical support for our conclusions, and more conclusions have yet to be further confirmed in subsequent studies. In this experiment, we did not conduct a more detailed experimental exploration, such as the in-depth discussion of the application effect of an early rehabilitation clinical pathway in patients with different severity of stroke. Moreover, we have not excluded psychological factors, which leads to the further accuracy of our conclusions. It is hoped that future scholars can conduct more targeted experiments based on different clinicopathological features and other psychological factors in the study of rehabilitation nursing for post-stroke patients, providing more theoretical basis in clinical care for patients with stroke.

In summary, the application of the an early rehabilitation clinical pathway in patients with ischemic stroke can not only promote the functional recovery of patients, but also significantly improve life quality of patients and improve the satisfaction of patients, so it is worthy of clinical promotion.

Disclosure of conflict of interest

None.

Address correspondence to: Lin Xiao, Department of Pain Management, Guangxi International Zhuang Medical Hospital, No. 8 Qiouyue Road, Nanning 530000, Guangxi, China. Tel: +86-0716-8111888; E-mail: linxiao5434664@163.com

References

[1] Pan A, Sun Q, Okereke OI, Rexrode KM and Hu FB. Depression and risk of stroke morbidity and mortality: a meta-analysis and systematic review. JAMA 2011; 306: 1241-1249.

[2] Tseng MC, Chang KC. PNL8 cost-effectiveness of thrombolysis with RT-PA for acute ischemic stroke in Taiwan. Value in Health 2004; 7: 789.

[3] Netuka I, Mehra MR. Ischemic stroke and subsequent thrombosis within a HeartMate 3 left ventricular assist system: a cautionary tale. J Heart Lung Transplant 2018; 37: 170-172.

[4] Leonarduzzi R, Abry P, Wendt H, Kiyono K, Yamamoto Y, Watanabe E and Hayano J. Scattering transform of heart rate variability for the prediction of ischemic stroke in patients with Atrial Fibrillation. Methods Inf Med 2018; 57: 141-145.

[5] Zhao J, Li X, Liang Y, Zhao L, Zhang X and Liu Y. Evaluation of the implementation of a 24-hr stroke thrombolysis emergency treatment for patients with acute ischaemic stroke. J Clin Nurs 2018; 27: 2161-2167.

[6] Ooi SL, Mcmullen D, Golombick T, Nut D and Pak SC. Evidence-based review of BioBran/MGN-3 arabinoxylan compound as a complementary therapy for conventional cancer treatment. Integr Cancer Ther 2018; 17: 165-178.

[7] Yang G, Deng J, Pang G, Zhang H, Li J, Deng B, Pang Z, Xu J, Jiang M, Liljeberg P, Xie H and Yang H. An IoT-enabled stroke rehabilitation system based on smart wearable armband and machine learning. IEEE J Transl Eng Health Med 2018; 6: 2100510.

[8] Auais MA, Eilayyan O, Mayo NE. Extended exercise rehabilitation after hip fracture improves patients' physical function: a systematic review and meta-analysis. Phys Ther 2012; 92: 1437-1451.

[9] Rahman S and Hanna MG. Diagnosis and therapy in neuromuscular disorders: diagnosis and new treatments in mitochondrial diseases. J Neurol Neurosurg Psychiatry 2009; 80: 943-953.

[10] Walker MF, Hoffmann TC, Brady MC, Dean CM, Eng JJ, Farrin AJ, Felix C, Forster A, Langhorne P, Lynch EA, Radford KA, Sunnerhagen KS, Watkins CL. Improving the development, monitoring and reporting of stroke rehabilitation research: consensus-based core recommendations from the stroke recovery and rehabilitation roundtable. Neurorehabil Neural Repair 2017; 31: 877-884.

[11] Bang DH, Shin WS and Choi HS. Effects of modified constraint-induced movement therapy with trunk restraint in early stroke patients: a single-blinded, randomized, controlled, pilot trial. NeuroRehabilitation 2018; 42: 29-35.

[12] Liepelt-Scarfone I, Lerche S, Behnke S, Godau J, Gaenslen A, Pausch C, Fassbender K, Brockmann K, Srulijes K, Huber H, Wurster I, Berg D. Clinical characteristics related to worsening of motor function assessed by the Unified Parkinson's disease rating scale in the elderly population. J Neurol 2015; 262: 451-458.

[13] Mandysová P, Ehler E, Škvrňáková J, Černý M, Bártová I, Pellant A. Development of the brief bedside dysphagia screening test - revised: a cross-sectional czech study. Acta Medica (Hradec Kralove) 2015; 58: 49-55.

[14] Yuan J, Guo X, Liu Z, Zhao X, Feng Y, Song S, Cui C and Jiang P. Vitamin D receptor activation influences the ERK pathway and protects

against neurological deficits and neuronal death. Int J Mol Med 2018; 41: 364-372.

[15] Yao XY, Lin Y, Geng JL, Sun YM, Chen Y, Shi GW, Xu Q and Li YS. Age- and gender-specific prevalence of risk factors in patients with first-ever ischemic stroke in china. Stroke Res Treat 2012; 2012: 136398.

[16] Masala C, Solla P, Liscia A, Defazio G, Saba L, Cannas A, Cavazzana A, Hummel T, Haehner A. Correlation among olfactory function, motors' symptoms, cognitive impairment, apathy, and fatigue in patients with Parkinson's disease. J Neurol 2018; 265: 1764-1771.

[17] Pedroso VSP, Brunoni AR, Vieira ÉLM, Jorge RE, Lauterbach EC, Teixeira AL. Early psychiatric morbidity in a Brazilian sample of acute ischemic stroke patients. Clinics (Sao Paulo) 2018; 73: e55.

[18] Nielsen PR, Andreasen J, Asmussen M and Tonnesen H. Costs and quality of life for prehabilitation and early rehabilitation after surgery of the lumbar spine. BMC Health Serv Res 2008; 8: 209.

[19] Eppeland SG, Diamantopoulos AP, Soldal DM and Haugeberg G. Short term in-patient rehabilitation in axial spondyloarthritis - the results of a 2-week program performed in daily clinical practice. BMC Res Notes 2013; 6: 185.

[20] Greising SM, Warren GL, Southern WM, Nichenko AS, Qualls AE, Corona BT and Call JA. Early rehabilitation for volumetric muscle loss injury augments endogenous regenerative aspects of muscle strength and oxidative capacity. BMC Musculoskelet Disord 2018; 19: 173.

[21] Xiong Y, Liu W, Zhou Z, Lin H, Lin M, Liu J, Niu G, Wang W, Jia Y, Leung TW, Liu D, Fan X, Yin Q, Zhu W, Ma M, Zhang R, Liu G, Wang S, Xu G and Liu X. Angioplasty and stenting in middle cerebral artery: results from multicenter China interventional stroke registry. Int J Cardiol 2014; 174: 189-190.

[22] Kubo N, Seki Y and Saito M. [Clinical pathways for early rehabilitation program in patients with acute myocardial infarction]. Nihon Rinsho 2003; 61 Suppl 5: 576-581.

[23] Zhang SX, Yao YH, Zhang S, Zhu WJ, Tang XY, Qin YY, Zhao LY, Liu CX and Zhu WZ. Comparative study of DSC-PWI and 3D-ASL in ischemic stroke patients. J Huazhong Univ Sci Technolog Med Sci 2015; 35: 923-927.

[24] Chen L, Fang J, Ma R, Gu X, Chen L, Li J and Xu S. Additional effects of acupuncture on early comprehensive rehabilitation in patients with mild to moderate acute ischemic stroke: a multicenter randomized controlled trial. BMC Complement Altern Med 2016; 16: 226.

[25] Hu MH, Hsu SS, Yip PK, Jeng JS and Wang YH. Early and intensive rehabilitation predicts good functional outcomes in patients admitted to the stroke intensive care unit. Disabil Rehabil 2010; 32: 1251-1259.