ISSN 2786-6661
eISSN 2786-667X

UDC: 616.831-005.1-071-08:615.82
https://doi.org/10.32345/USMYJ.2(146).2024.98-108

Received: March 10, 2023
Accepted: April 03, 2024

Methods of Evidence-based medicine for patients after stroke with early Spasticity

Homola Alona

National Technical University of Ukraine "Kyiv Polytechnic Institute named after Igor Sikorsky", Department of Biosafety and Human Health, 227 Physical Therapy, PhD student, Ukraine, Kyiv

Address for correspondence:

Homola Alona

E-mail: alhzgv@gmail.com

Abstract: *acute cerebrovascular accident is the main cause of disability. Stroke has different clinical characteristics and consequences that require individual rehabilitation examination and approach. Adverse neurological disorders are accompanied by motor, cognitive, and psycho-emotional consequences. Over the past 20 years, the treatment of acute cerebrovascular accidents has significantly increased the recovery rates of patients. This is due to the progress of international clinical protocols, randomized evidence-based medicine, adequate medication, step-by-step and individualized physical therapy, and occupational therapy strategies for patients. One of the most important contributions to rehabilitation for stroke patients is made by evidence-based medicine. The literature review highlights current evidence and critical appraisal to confirm the effectiveness of evidence-based medicine in rehabilitation interventions to improve movement control, activity, participation, and functioning. The benefits of rehabilitation interventions on spasticity after stroke in the early period have been proven. However, even after medical and rehabilitation, the restoration of motor function remains insufficient to achieve the patient's request, due to inconsistent application of evidence-based medicine. The purpose of the literature review is to analyze the effectiveness of evidence-based medicine in rehabilitation interventions for people after early stroke with spasticity to improve quality of life and motor function. Materials and methods. In this review, we analyzed rehabilitation interventions and evidence-based medicine in physical therapy. We substantiated the materials of the Canadian Clinician's Guide to Stroke Rehabilitation for 2020. The review includes scientific publications in English. Articles and research by scientists published over the past 15 years. A computer search was conducted through the PubMed database. We considered 63 publications that were evaluated according to the following criteria: reliability, validity, and measurability. The changes that have occurred during the research have been analyzed. Conclusions. Spasticity in the late period after acute cerebrovascular accident has significant negative consequential difficulties that patients are unable to cope with on their own. We have found that rehabilitation measures and physical therapy techniques improve the motor functions of patients with spasticity in the early period, provided that the recommendations of evidence-based medicine are followed. The timely use of methods, tools, and an individualized approach to each patient gives positive results. After all, the purpose of physical therapy is not to convince patients that the consequences of stroke are not subject to rehabilitation, but to help and teach patients to be independent and improve the quality of life of people with spasticity in the early or late period. It was also determined that the topic of recovery of patients with late-onset spasticity after stroke is not sufficiently covered. To date, more than half of people after stroke remain limited in everyday activities and have negative consequences – motor disorders, and activity limitations that*

ISSN 2786-6661
eISSN 2786-667X

significantly affect the quality of life and independence. Further research is needed to determine whether it is possible to reduce late-onset spasticity and improve the motor function of patients after stroke with the possibility of further use of the affected limb.

Key words: Review, Arm, Stroke Rehabilitation, Meta-Analysis, Recovery of Function.

Introduction

According to the 2020 press release, the global prevalence of stroke is about 16 million cases per year. The annual number of strokes in Ukraine is more than 110 thousand. The mortality rate is 2-3 times higher than in other countries. After suffering a stroke, 20-40% of the working-age population is disabled. Only 10-20% of people return to work. The incidence of acute cerebrovascular accidents is 1.5 to 2 times higher than the global average. For 2021, the statistics do not differ much from the previous year.

According to the Ministry of Health for 2022, more than 100 thousand Ukrainians become victims of acute cerebrovascular accidents every year. One-third of them are young people under the age of 65.

The Ministry of Health and the National Health Service of Ukraine have jointly substantiated the quantity, quality, and structure of medical services in rehabilitation centers and physical and rehabilitation medicine departments, with which they have signed an agreement to provide quality medical services to patients under the Medical Care for Acute Cerebral Stroke package.

Negative consequences and symptoms of stroke that occur in the acute and early period: aphasia, dysphagia, visual impairment; paralysis, spasticity, loss of sensation in the affected limbs, impaired coordination, ignoring one side of the body, fatigue, paresthesia, pain, and discomfort in the affected limbs, impaired urodynamics and bowel movements. The specific localization of the lesion will be determined by the signs and symptoms that patients manifest after a stroke (Yani et al., 2017).

Upon admission to inpatient rehabilitation, a multidisciplinary team examines the patient on the first day. The team includes a neurologist, a doctor of physical and rehabilitation medicine, a physical therapist, and an occupational therapist. If necessary, it is possible to involve a speech therapist, psychologist, and consultations with other primary and secondary care physicians (Homola et al., 2021).

Depending on the results of the physical therapy and occupational therapy assessment, patients and caregivers are informed of the request and short- and long-term goals are planned. The care provided to stroke patients in the early period can be maximal, intermediate, or minimal in terms of functional performance. The growing dynamics of patients during rehabilitation activities can influence the change of goals, from simple to complex.

In the acute and early period after stroke, physical therapy and occupational therapy are aimed at restoring motor control and motor function of the affected limbs. In the later period, however, the multidisciplinary goals often focus on compensation and independent participation and activities. The rehabilitation team collaborates with the patient and his or her family to achieve the goals. Therefore, there should be consistency in the use of physical therapy and occupational therapy.

In the early period, physical therapy has the following goals: mobilization, verticalization, improvement of coordination and balance, and restoration of walking skills. The use of therapeutic exercises to strengthen the support capacity of the lower extremities and back muscles. Occupational therapy has the following goals: dressing independently, taking care of one's body, hair, and oral cavity, eating, and using therapeutic exercises.

If you do not follow the recommendations in the early period and ignore evidence-based medicine, there are consequences that negatively affect rehabilitation in the later period. Therefore, we must value patients' time and avoid methods that are not effective and not aimed at maximizing patients recovery after a stroke. After all, spasticity manifests itself in the early period, when it is easier to stop the process and reduce the possibility of its development. Because in a later period, it is more difficult to reduce muscle spasticity, increase the range of motion and return the affected limb to the patient.

ISSN 2786-6661
eISSN 2786-667X

Spasticity, pain, stiffness, limited range of motion in the affected limbs, and edema are common problems in patients with late-onset stroke. These consequences affect patients quality of life and require long-term care and rehabilitation interventions (Hotter et al., 2018). There is a small number of studies on the restoration of motor function of the arm in the shoulder, elbow, and wrist joints in people after stroke for the possibility of further use in everyday life and habitual activities.

The choice of individual rehabilitation methods in the acute, early, and late periods is significantly different for patients with muscle spasticity. Therefore, it is important to scientifically separate the recommendations of the periods for patients after stroke, individually aimed at the symptoms of the results of primary and intermediate examinations.

Spasticity is a motor disorder caused by damage to the upper motor neuron. It depends on the rate of enhancement of the tonic muscle stretch reflex, which occurs as a result of excessive excitation of the stretch reflex. It is usually common in patients after a stroke with hemiplegia of unilateral limb involvement (Mclellan, 1981).

In 2005, the scientist Pandyan reported that spasticity is a violation of sensorimotor control, manifested as a result of damage to the upper motor neurons, and appears as a periodic or constant persistent involuntary muscle activation (Pandyan et al., 2005).

Spasticity reduces the range of motion in the joints and muscles, pain, discomfort, stiffness, contractures in the affected limbs, and loss of spatial and temperature sensitivity. Coordination and balance deteriorate, there is a lack of confidence in walking, and there is a high risk of falling. Mood changes, poor sleep. Muscle spasticity causes limitations in daily life activities and reduces the ability to achieve the goal in rehabilitation activities (Esquenazi et al., 2023).

Spasticity provokes the formation of contractures, and contractures can increase the symptoms of spasticity in patients (O'Dwyer et al., 1996). The results of clinical trials indicate that the pain syndrome can appear within 1 week and last up to 16 months (Allison et al., 2016). Analyzing the data, more than half of patients after a stroke complain of shoulder pain and continue to report symptoms of pain 16 months later (Lindgren et al., 2007).

Patients after stroke should undergo treatment and rehabilitation measures to identify functional disorders and maintain the general condition of the body, with the consequences of cardiovascular disease, diabetes, poor nutrition, and rethinking bad habits (Maalouf et al., 2023). Detection of functional dysfunctions at early stages makes it possible to further treat and control the consequences of stroke (Kuo and Hu, 2018).

The pattern of spasticity of the affected lower limb has tension under the knee tendons, which limits the range of motion in the knee joint; plantar flexion, and eversion of the ankle joint, which limits the support capacity and full use of the foot. Patterns of spasticity of the upper affected limb: scapular dysfunction, shoulder adduction, internal rotation, arm bent at the elbow with forearm pronation, and flexion of the wrist joint (Wagner, Davids and Hardin, 2016).

Aim

A review of studies and analysis of the effectiveness of evidence-based medicine for the recovery of patients with the consequences of acute cerebrovascular accident in the early period with spasticity was conducted.

Materials and Methods

Analysis and synthesis of modern methods of evidence-based medicine and scientific literature studies used for patients after stroke with spasticity.

In the practice of occupational therapists, after the initial examination of patients with spasticity, negative manifestations are detected: limitation of the range of motion in the affected limbs, pain, which provokes difficulties with dressing, and hygiene procedures and affects the quality of self-care (Bethoux, 2015). In the practice of physical therapists, spasticity impedes free movement and affects the speed of walking on different surfaces. It increases the risk of falling, and impairs balance and coordination (Diaz-Arribas et al., 2020).

Diagnostics and examination are aimed at identifying functional consequences, and rehabilitation measures are focused on the patient's request, not on reducing spasticity (Thompson et al., 2005). Rehabilitation measures after a stroke should take into account the functional limitations and the patient's request to ensure that spastic limbs can be used.

ISSN 2786-6661
eISSN 2786-667X

Ashworth scale (Ashworth, 1964) or Modified Ashworth Scale (Bohannon and Smith, 1987) is used to assess spasticity in patients after stroke and other neurological conditions accompanied by increased muscle tone. Both scales are rated from 0 to 4 points. Where 0 points mean no increase in muscle tone, 4 points mean the affected arm or leg is stiff in a bent or extended position. A +1 point was added to the modified Ashworth scale, which is assessed as the presence of resistance of less than half of the range of motion, and the passive resistance scale (Platz et al., 2008) is also used in neurology departments, as well as in physical and rehabilitation medicine departments.

The values of the modified Ashworth scale were more significant in the examination of affected arms than legs (Meseguer-Henarejos et al., 2018).

There are triggers of spasticity that increase muscle spasticity: pressure ulcers, pain, discomfort; uncomfortable clothes; lying or sitting in one position for a long time; ingrown toenails, damaged skin; constipation or full bladder; fatigue; infections; stress (Kheder and Nair, 2012).

The main rehabilitation goals of people after a stroke are to increase the level of independence in self-care and overall quality of life and, improve the functional capabilities of patients with spasticity (Park et al., 2023; Langton-Frost et al., 2023).

They offer many types of rehabilitation interventions that are adapted specifically to the patient's request (Richards and Cramer, 2023; Batool et al., 2022; Edelstein et al., 2023).

Physical therapy has a significant impact on the motor functions of people after a stroke. Exercise improves coordination and balance, and increases range of motion and muscle strength in the affected limbs. The purpose of physical therapy for spasticity is examination, counseling, and training; selection and use of auxiliary aids. Classes are aimed at improving coordination and balance, restoring the ability to walk with or without aids. Therapeutic exercises to increase the range of functional activity, performing daily activities (O'Brien et at., 2023). Erotherapeutic goals: examination, counseling, training. Recommendations for patients with spasticity are aimed at resuming daily activities (dressing independently and caring for their bodies) and the possibility of cooking with the use of aids (Feng et al 2023; Shen et al., 2023; McAndrew et al., 2000).

Adaptation or recommendation of ergotherapy equipment to adapt the environment to the needs of patients: installation of handrails in the bathroom or toilet; specialized utensils for cooking or eating (Simning et al., 2023).

Speech and language therapists help patients restore their ability to communicate effectively. They select alternative means of communication and conduct classes to overcome dysphagia and aphasia with the help of special interventions (Richards and Cramer, 2023).

Speech therapists contribute to the improvement of speech and language skills in patients after a stroke and eliminate possible difficulties in eating or drinking liquids. Provide counseling and training in oral care (de Sire et al., 2020).

The selection of rehabilitation measures is based on the individual needs and capabilities of patients after a stroke. Physical therapy and occupational therapy are integral components that accelerate and facilitate the recovery of affected motor functions, promote independence, and improve the quality of life of stroke patients (Kayola et al., 2023).

Review and discussion

The scientific analysis is aimed at early rehabilitation measures applied within seven days of the onset of acute cerebrovascular accident: gradual mobilization, classes with speech and swallowing disorders, and restoration of the affected arm (Bernhardt et al., 2017). A pilot test was also conducted in a public hospital. Early mobilization was used within 24 to 48 hours of the onset of acute cerebrovascular accident (Poletto et al., 2015). The study is important in the early periods of rehabilitation for patients. It emphasizes the potential for recovery of functions in the critical period. However, it is not used if the patient is not in a stable condition. Contraindications: high blood pressure and body temperature, fever, pneumonia, vomiting, diarrhea.

Scientists have conducted an effective randomized control trial, and a possible option for the early period is a modified wheelchair support. It is used to reduce shoulder pain and support the arm in its normal anatomical position (Pan et al. 2018).

Three randomized control trials for stroke patients with shoulder hemiplegia were found. The

ISSN 2786-6661
eISSN 2786-667X

effectiveness of the use of orthopedic dressings and bandages for the upper limb in the early period has been proven. It is used to support the affected arm, reducing the risk of shoulder dislocation during walking skills. They have disadvantages if used for a long time: contractures are formed, which encourage the development of synergy of the flexor muscles, and also prevents patients from using the affected arm if there are positive indicators for the restoration of motor function (Ada et al., 2017; Hartwig et al., 2012; van Bladel et al., 2017).

Splinting in a neutral position on the radiocarpal joint of the affected limb for 4 weeks does not improve motor function (Lannin et al., 2007). A systematic review on the use of splints was analyzed and proved to not affect the motor function of the upper limb of patients after acute cerebrovascular accidents (Lannin and Herbert, 2003). The use of splints is not recommended, as it is a passive method that has insufficient evidence and impact on recovery. Prolonged wearing of splints provokes contractures and, in the presence of spastic muscles, increases the level of spasticity. Orthoses should not be used as a substitute for therapeutic exercises. Especially if the examination shows positive results for restoring the motor function of the arm (Management of Stroke Rehabilitation Working Group, 2010).

The analyzed cross-sectional studies of ankle orthoses show that the device has a positive effect on gait speed (Bleyenheuft et al., 2008; Thijssen et al., 2007; Wang et al., 2007; Pohl and Mehrholz 2006). An ankle orthosis is used for patients with a request and rehabilitation goal to improve gait speed. Prolonged wearing of the orthosis has irreversible functional processes: limitation of the range of motion, stiffness, and creation of myogenic contractures. Therefore, repeated assessments and follow-ups by qualified specialists are recommended for patients with ankle orthoses.

The goal of physical therapy and occupational therapy for patients after stroke is to restore movement functions, independence in daily life, and independence in movement. Individualized therapeutic exercises are selected in combination with treadmill gait training and the use of aids. In addition, during and after rehabilitation activities, caregivers and patients are provided with advice and recommendations for continuing the home rehabilitation program, warnings about possible consequences, and contraindications (Zech et al., 2010).

As a result of the study of acute cerebrovascular accidents, patients are faced with over-extension of the affected knee joint when moving and walking. This significantly affects possible knee pain, reduces speed, and worsens gait asymmetry. Over-extension of the knee joint occurs as a result of weakness of the lower leg muscles, and hamstrings, stiffness of the plantar flexors, and impaired sensation in the hip, lower leg, knee, or foot. Rehabilitation tools should not be used routinely to fix and immobilize the knee joint. The best that a physical therapist can offer a patient is the selection of therapeutic methods to stimulate and stabilize the knee during the support phase (Macko et al., 2001).

After analyzing eight randomized control trials in which researchers evaluated inpatient rehabilitation, traditional and standardized exercises in combination with Kinesio taping for stroke patients with hemiplegia of the shoulder. Seven studies with positive effects: relieving hemiplegic pain, improving functional outcomes of the arm, and reducing the development of possible shoulder subluxation (Huang et al., 2017; Huang et al., 2016; Chatterjee et al., 2016; Griffin and Bernhardt, 2006; Pandian et al., 2013; Pillastrini et al., 2016; Santos et al., 2017; Hochsprung et al., 2017).

Kinesiotaping is widely used in rehabilitation practice for orthopedic patients. The literature is mixed on the improvement of range of motion and the effect on spastic muscles in patients after stroke. There is little evidence and benefits of the long-term effectiveness of taping on the affected limb. Additional careful study and substantiation of the therapeutic mechanisms of kinesiological taping would be useful in further research with neurological patients.

Application of mirror therapy. The patient is seated at a table, and a specialized mirror is placed in the middle of the person's body to block the view of the affected arm. Mirror therapy is similar to the action of visual feedback, during which the movement of the healthy arm is perceived as the movement of the affected arm. This creates the illusion that the two hands are performing the same task. It is believed that this therapy has an effect on

ISSN 2786-6661
eISSN 2786-667X

neuroplastic changes, and may help to increase the excitability of the ipsilateral motor cortex, which is responsible for the affected area (Deconinck et al., 2015).

The scientific article substantiates that the mirror therapy method has been successful in relieving neuropathic pain (Wittkopf and Johnson, 2017).

Two randomized control trials were found to reduce regional pain syndrome with mirror therapy (Cacchio et al., 2009). One study compared mirror therapy with mindfulness practice (Cacchio et al., 2009).

In summary, mirror therapy can be useful for patients after a stroke to improve motor function. However, it does not affect reducing spasticity in muscle activity.

In research on the biofeedback method, electrodes are attached to the surface of the affected muscles of individuals to obtain information and capture the electrical capabilities of the motor unit. The signals with the result are transmitted through audio or visual feedback, which transforms the information received using a computer. Evidence suggests that this method has no effect on the motor function of the hand and does not train accuracy and coordination. However, the literature has mixed data on increasing the range of motion in the joints of the affected arm and the effect on spastic muscles in patients after stroke (Page and Lockwood, 2003).

Patients after stroke with impaired spatial and temperature sensitivity usually have reduced muscle strength, do not control, and do not use the affected limb in everyday activities, which complicates further recovery (Taub, 1980). Therefore, CIMT therapy is designed to maximize the use of the affected limb (Fritz et al., 2005). The peculiarity of the method is the limitation of the healthy arm when efforts are directed to the maximum use of the affected arm in the implementation of the planned tasks (Taub et al.,1999). Instructions for the use of CIMT therapy, the patient should have active movements, bending the hand by about 20 degrees, and extending the fingers by at least 10 degrees. The patient should have minimal sensory and cognitive impairment. The duration of the method is individually selected for each patient. The data were analyzed (Taub and Morris, 2001), with a positive result for patients in the acute period after stroke. The article also presents evidence that CIMT therapy has harmful effects (Dromerice et al., 2009). This method did not yield the expected results, but it can be used in the acute and subacute periods for patients after stroke.

PNF is proprioceptive neuromuscular facilitation. The technique is used to restore lost motor functions, affect the range of motion, improve endurance, and increase muscle strength. It is used after injuries, after surgery, and after disorders or damage to the central nervous system (Hindle et al., 2012). The PNF method focuses on a neurofunctional approach that combines examination, activation of neuromuscular control, stimulation of motor learning, and the proper use of motor control using various movement patterns. This method combines functional mobility patterns using inhibition, facilitation, strengthening, and relaxation of the muscular system (Etnyre and Abraham, 1986; Alaca et al., 2015).

One of the techniques used is rhythm rotation, when the affected limb is slowly taken out of the spasticity pattern, the physical therapist or occupational therapist performs until the joint is felt to be restricted. When the muscles relax, the affected limb is moved to another range, and the technique is continued.

In a systematic review of the use of PNF, it is an effective method of recovery for patients with late-onset stroke. It has an effective effect on balance, coordination, and gait speed. Improves motor function and activity through proprioceptive, skin, and auditory signals. It can be one of the methods of recovery for neurological patients (Nguyen et al., 2022).

The proprioceptive neuromuscular facilitation technique is justified by the effectiveness of improving the elasticity of spastic muscles after stroke, improving balance in dynamics. Studies, it has shown positive results on passive and active range of motion (Farinatti et al., 2011).

Conclusions

In this literature review, we highlight effective evidence, the latest recommendations, and research in the field of physical rehabilitation to help restore independence and motor activity after acute cerebrovascular accident in patients with spasticity. At the moment, there are enough evidence-based medicine methods to stabilize the condition and restore motor functions of patients after stroke in the

ISSN 2786-6661
eISSN 2786-667X

acute and early period. The use of evidence-based interventions helps to reduce the consequences of disability and significantly improves the ability to restore independence, activity, and participation of patients after a spastic stroke. However, not enough information is available on methods that reduce the outcomes and complications that occur in patients with late-onset spasticity that meet the criteria for the clinical effectiveness of the methods listed in this review, so we need to continue research and promote effective solutions.

The next scientific publication will be devoted to the examination of physical therapy and occupational therapy of patients after acute cerebrovascular accidents.

Acknowledgments

Armed Forces of Ukraine, our support as long as our hearts beat! Military medics, men and women, you are guardian angels! We remember every warrior who laid down his life. We are grateful to everyone who fights for the freedom and independence of our country Ukraine. Forever and ever: Glory to Ukraine! Glory to the heroes!

We are grateful to the Ukrainian Scientific Medical Youth Journal for the support of young and experienced scientists.

Financing

This study did not receive external funding.

Conflict of interests

There is no potential conflict of interest in any form.

Consent to publication

The author has agreed to publish this manuscript.

ORCID ID and authors contribution:

0000-0001-7431-1889 (A, B, C, D, E, F) Homola Alona

A – Research concept and design, B – Collec-tion and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article

REFERENCES

Ada, L., Foongchomcheay, A., Langhammer, B., Preston, E., Stanton, R., Robinson, J., Paul, S., & Canning, C. (2017). Lap-tray and triangular sling are no more effective than a hemi-sling in preventing shoulder subluxation in those at risk early after stroke: a randomized trial. European journal of physical and rehabilitation medicine, 53(1), 41–48. https://doi.org/10.23736/S1973-9087.16.04209-X

Alaca, N., Atalay, A., & Güven, Z. (2015). Comparison of the long-term effectiveness of progressive neuromuscular facilitation and continuous passive motion therapies after total knee arthroplasty. Journal of physical therapy science, 27(11), 3377–3380. https://doi.org/10.1589/jpts.27.3377

Allison, R., Shenton, L., Bamforth, K., Kilbride, C., & Richards, D. (2016). Incidence, Time Course and Predictors of Impairments Relating to Caring for the Profoundly Affected arm After Stroke: A Systematic Review. Physiotherapy research international : the journal for researchers and clinicians in physical therapy, 21(4), 210–227. https://doi.org/10.1002/pri.1634

ASHWORTH B. (1964). PRELIMINARY TRIAL OF CARISOPRODOL IN MULTIPLE SCLEROSIS. The Practitioner, 192, 540–542. https://link.springer.com/referenceworkentry/10.1007/978-0-387-79948-3_1792

Batool, A.; Kashif, A.; Nawaz, M.H.; Khan, A.A.; Iqbal, N.; Shahid, M.K. (2022). Global Overview of SARS-CoV-2 Induced COVID-19 in 2020: Biological Characterization, Epidemiology with Social, Economic and Environmental Implications. RADS J. Biol. Res. Appl. Sci., 13, 83–122. https://jbas.juw.edu.pk/index.php/JBAS/article/view/391

Bernhardt, J., Godecke, E., Johnson, L., & Langhorne, P. (2017). Early rehabilitation after stroke. Current opinion in neurology, 30(1), 48–54. https://doi.org/10.1097/WCO.0000000000000404

Bethoux F. (2015). Spasticity Management After Stroke. Physical medicine and rehabilitation clinics of North America, 26(4), 625–639. https://doi.org/10.1016/j.pmr.2015.07.003

Bleyenheuft, C., Caty, G., Lejeune, T., & Detrembleur, C. (2008). Assessment of the Chignon dynamic ankle-foot orthosis using instrumented gait analysis in hemiparetic adults. Annales de readaptation et de medecine physique : revue scientifique de la Societe francaise de reeducation fonctionnelle de readaptation et de medecine physique, 51(3), 154–160. https://doi.org/10.1016/j.annrmp.2007.12.005

Bohannon, R. W., & Smith, M. B. (1987). Interrater reliability of a modified Ashworth scale of muscle spasticity. Physical therapy, 67(2), 206–207. https://doi.org/10.1093/ptj/67.2.206

Cacchio, A., De Blasis, E., De Blasis, V., Santilli, V., & Spacca, G. (2009). Mirror therapy in complex regional pain syndrome type 1 of the upper limb in stroke patients. Neurorehabilitation and neural repair, 23(8), 792–799. https://doi.org/10.1177/1545968309335977

ISSN 2786-6661
eISSN 2786-667X

Cacchio, A., De Blasis, E., Necozione, S., di Orio, F., & Santilli, V. (2009). Mirror therapy for chronic complex regional pain syndrome type 1 and stroke. The New England journal of medicine, 361(6), 634–636. https://doi.org/10.1056/NEJMc0902799

Chatterjee, S., Hayner, K. A., Arumugam, N., Goyal, M., Midha, D., Arora, A., Sharma, S., & Kumar, S. P. (2016). The California Tri-pull Taping Method in the Treatment of Shoulder Subluxation After Stroke: A Randomized Clinical Trial. North American journal of medical sciences, 8(4), 175–182. https://doi.org/10.4103/1947-2714.179933

de Sire, A., Baricich, A., Ferrillo, M., Migliario, M., Cisari, C., & Invernizzi, M. (2020). Buccal hemineglect: is it useful to evaluate the differences between the two halves of the oral cavity for the multidisciplinary rehabilitative management of right brain stroke survivors? A cross-sectional study. Topics in stroke rehabilitation, 27(3), 208–214. https://doi.org/10.1080/10749357.2019.1673592

Deconinck, F. J., Smorenburg, A. R., Benham, A., Ledebt, A., Feltham, M. G., & Savelsbergh, G. J. (2015). Reflections on mirror therapy: a systematic review of the effect of mirror visual feedback on the brain. Neurorehabilitation and neural repair, 29(4), 349–361. https://doi.org/10.1177/1545968314546134

Díaz-Arribas, M. J., Martín-Casas, P., Cano-de-la-Cuerda, R., & Plaza-Manzano, G. (2020). Effectiveness of the Bobath concept in the treatment of stroke: a systematic review. Disability and rehabilitation, 42(12), 1636–1649. https://doi.org/10.1080/09638288.2019.1590865

Edelstein, J., Kinney, A. R., Keeney, T., Hoffman, A., Graham, J. E., & Malcolm, M. P. (2023). Identification of Disability Subgroups for Patients After Ischemic Stroke. Physical therapy, 103(3), pzad001. https://doi.org/10.1093/ptj/pzad001

Esquenazi, A., Zorowitz, R. D., Ashford, S., Maisonobe, P., Page, S., & Jacinto, J. (2023). Clinical presentation of patients with lower limb spasticity undergoing routine treatment with botulinum toxin: baseline findings from an international observational study. Journal of rehabilitation medicine, 55, jrm4257. https://doi.org/10.2340/jrm.v55.4257

Etnyre, B. R., & Abraham, L. D. (1986). H-reflex changes during static stretching and two variations of proprioceptive neuromuscular facilitation techniques. Electroencephalography and clinical neurophysiology, 63(2), 174–179. https://doi.org/10.1016/0013-4694(86)90010-6

Farinatti, P. T., Brandão, C., Soares, P. P., & Duarte, A. F. (2011). Acute effects of stretching exercise on the heart rate variability in subjects with low flexibility levels. Journal of strength and conditioning research, 25(6), 1579–1585. https://doi.org/10.1519/JSC.0b013e3181e06ce1

Feng, F., Luo, X. C., Chen, Y. J., Li, J. J., Kang, H., & Yan, B. H. (2023). Effects of Tai Chi Yunshou on upper-limb function and balance in stroke survivors: A systematic review and meta-analysis. Complementary therapies in clinical practice, 51, 101741. https://doi.org/10.1016/j.ctcp.2023.101741

Griffin, A., & Bernhardt, J. (2006). Strapping the hemiplegic shoulder prevents development of pain during rehabilitation: a randomized controlled trial. Clinical rehabilitation, 20(4), 287–295. https://doi.org/10.1191/0269215505cr941oa

Hartwig, M., Gelbrich, G., & Griewing, B. (2012). Functional orthosis in shoulder joint subluxation after ischaemic brain stroke to avoid post-hemiplegic shoulder-hand syndrome: a randomized clinical trial. Clinical rehabilitation, 26(9), 807–816. https://doi.org/10.1177/0269215511432355

Hindle, K. B., Whitcomb, T. J., Briggs, W. O., & Hong, J. (2012). Proprioceptive Neuromuscular Facilitation (PNF): Its Mechanisms and Effects on Range of Motion and Muscular Function. Journal of human kinetics, 31, 105–113. https://doi.org/10.2478/v10078-012-0011-y

Hochsprung, A., Domínguez-Matito, A., López-Hervás, A., Herrera-Monge, P., Moron-Martin, S., Ariza-Martínez, C., Granja-Dominguez, A., & Heredia-Rizo, A. M. (2017). Short- and medium-term effect of kinesio taping or electrical stimulation in hemiplegic shoulder pain prevention: A randomized controlled pilot trial. NeuroRehabilitation, 41(4), 801–810. https://doi.org/10.3233/NRE-172190

Homola A., Prokopovych Ye., Antonova-Rafi Y. (2021) Physical therapy for patients after stroke. Scientific and practical journal. Art of medicine, 1(17), 18 – 26. https://art-of-medicine.ifnmu.edu.ua/index.php/aom/article/view/589

Hotter, B., Padberg, I., Liebenau, A., Knispel, P., Heel, S., Steube, D., Wissel, J., Wellwood, I., & Meisel, A. (2018). Identifying unmet needs in long-term stroke care using in-depth assessment and the Post-Stroke Checklist – The Managing Aftercare for Stroke (MAS-I) study. European stroke journal, 3(3), 237–245. https://doi.org/10.1177/2396987318771174

Huang, Y. C., Chang, K. H., Liou, T. H., Cheng, C. W., Lin, L. F., & Huang, S. W. (2017). Effects of Kinesio taping for stroke patients with hemiplegic shoulder pain: A double-blind, randomized, placebo-controlled study. Journal of rehabilitation medicine, 49(3), 208–215. https://doi.org/10.2340/16501977-2197

Huang, Y. C., Leong, C. P., Wang, L., Wang, L. Y., Yang, Y. C., Chuang, C. Y., & Hsin, Y. J. (2016). Effect of kinesiology taping on hemiplegic shoulder pain and functional outcomes in subacute stroke patients: a randomized controlled study. European journal of physical and rehabilitation medicine, 52(6), 774–781. https://pubmed.ncbi.nlm.nih.gov/27575012/

Kayola, G., Mataa, M. M., Asukile, M., Chishimba, L., Chomba, M., Mortel, D., Nutakki, A., Zimba, S., & Saylor, D. (2023). Stroke Rehabilitation in Low- and Middle-Income Countries: Challenges and Opportunities. American journal of physical medicine & rehabilitation, 102(2S Suppl 1), S24–S32. https://doi.org/10.1097/PHM.0000000000002128

ISSN 2786-6661
eISSN 2786-667X

Kheder, A., & Nair, K. P. (2012). Spasticity: pathophysiology, evaluation and management. Practical neurology, 12(5), 289–298. https://doi.org/10.1136/practneurol-2011-000155

Kuo C.L., Hu G.C. (2018) Poststroke spasticity: a review of epidemiology, pathophysiology, and treatment. International journal Gerontol, 12, 280–284. https://www.sciencedirect.com/science/article/pii/S1873959818300073

Langton-Frost, N., Orient, S., Adeyemo, J., Bahouth, M. N., Daley, K., Ye, B., Lavezza, A., & Pruski, A. (2023). Development and Implementation of a New Model of Care for Patients With Stroke, Acute Hospital Rehabilitation Intensive SErvices: Leveraging a Multidisciplinary Rehabilitation Team. American journal of physical medicine & rehabilitation, 102(2S Suppl 1), S13–S18. https://doi.org/10.1097/PHM.0000000000002132

Lannin, N. A., & Herbert, R. D. (2003). Is hand splinting effective for adults following stroke? A systematic review and methodologic critique of published research. Clinical rehabilitation, 17(8), 807–816. https://doi.org/10.1191/0269215503cr682oa

Lannin, N. A., Cusick, A., McCluskey, A., & Herbert, R. D. (2007). Effects of splinting on wrist contracture after stroke: a randomized controlled trial. Stroke, 38(1), 111–116. https://doi.org/10.1161/01.STR.0000251722.77088.12

Lindgren, I., Jönsson, A. C., Norrving, B., & Lindgren, A. (2007). Shoulder pain after stroke: a prospective population-based study. Stroke, 38(2), 343–348. https://doi.org/10.1161/01.STR.0000254598.16739.4e

Maalouf, E., Hallit, S., Salameh, P., & Hosseini, H. (2023). Eating Behaviors, Lifestyle, and Ischemic Stroke: A Lebanese Case-Control Study. International journal of environmental research and public health, 20(2), 1487. https://doi.org/10.3390/ijerph20021487

Macko, R. F., Smith, G. V., Dobrovolny, C. L., Sorkin, J. D., Goldberg, A. P., & Silver, K. H. (2001). Treadmill training improves fitness reserve in chronic stroke patients. Archives of physical medicine and rehabilitation, 82(7), 879–884. https://doi.org/10.1053/apmr.2001.23853

Management of Stroke Rehabilitation Working Group (2010). VA/DOD Clinical practice guideline for the management of stroke rehabilitation. Journal of rehabilitation research and development, 47(9), 1–43.

McAndrew E. McDermott S. Vitzakovitch S. Warunek M, Holm M.B. (2000). Therapist and Patient Perceptions of the Occupational Therapy Goal-Setting Process. Physical and Occupational Therapy in Geriatrics 17, 55–63. https://www.researchgate.net/publication/232051110_Therapist_and_Patient_Perceptions_of_the_Occupational_Therapy_Goal-Setting_ProcessA_Pilot_Study

Mclellan D. L. (1981). Spasticity: disorder motor control. Journal of Neurology, Neurosurgery, and Psychiatry, 44(10), 961. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC491190/

Meseguer-Henarejos, A. B., Sánchez-Meca, J., López-Pina, J. A., & Carles-Hernández, R. (2018). Inter- and intra-rater reliability of the Modified Ashworth Scale: a systematic review and meta-analysis. European journal of physical and rehabilitation medicine, 54(4), 576–590. https://doi.org/10.23736/S1973-9087.17.04796-7

Nguyen, P. T., Chou, L. W., & Hsieh, Y. L. (2022). Proprioceptive Neuromuscular Facilitation-Based Physical Therapy on the Improvement of Balance and Gait in Patients with Chronic Stroke: A Systematic Review and Meta-Analysis. Life (Basel, Switzerland), 12(6), 882. https://doi.org/10.3390/life12060882

O'Brien, S. R., Barry, M., Davidson, E., Porzi, L., Spink, M., & Weatherbee, D. (2023). Physical therapist clinical reasoning in home care for walking assistive device prescription: A description of practice. Physiotherapy theory and practice, 39(1), 80–88. https://doi.org/10.1080/09593985.2021.1996495

O'Dwyer, N. J., Ada, L., & Neilson, P. D. (1996). Spasticity and muscle contracture following stroke. Brain : a journal of neurology, 119 (Pt 5), 1737–1749. https://doi.org/10.1093/brain/119.5.1737

Page, T., & Lockwood, C. (2003). Prevention and management of shoulder pain in the hemiplegic patient. JBI library of systematic reviews, 1(4), 1–28. https://doi.org/10.11124/01938924-200301040-00001

Pan, R., Zhou, M., Cai, H., Guo, Y., Zhan, L., Li, M., Yang, Z., Zhu, L., Zhan, J., & Chen, H. (2018). A randomized controlled trial of a modified wheelchair arm-support to reduce shoulder pain in stroke patients. Clinical rehabilitation, 32(1), 37–47. https://doi.org/10.1177/0269215517714830

Pandian, J. D., Kaur, P., Arora, R., Vishwambaran, D. K., Toor, G., Mathangi, S., Vijaya, P., Uppal, A., Kaur, T., & Arima, H. (2013). Shoulder taping reduces injury and pain in stroke patients: randomized controlled trial. Neurology, 80(6), 528–532. https://doi.org/10.1212/WNL.0b013e318281550e

Pandyan, A. D., Gregoric, M., Barnes, M. P., Wood, D., Van Wijck, F., Burridge, J., Hermens, H., & Johnson, G. R. (2005). Spasticity: clinical perceptions, neurological realities and meaningful measurement. Disability and rehabilitation, 27(1-2), 2–6. https://doi.org/10.1080/09638280400014576

Park, J.E. (2023). Identifying Nursing Interventions Captured in Patients with Stroke by Korean Nursing Students: Nursing Interventions Classification Study. J. Korean Gerontol. Nurs., 25, 69–75. https://jkgn.org/upload/pdf/jkgn-25-1-69.pdf

Pillastrini, P., Rocchi, G., Deserri, D., Foschi, P., Mardegan, M., Naldi, M. T., Villafañe, J. H., & Bertozzi, L. (2016). Effectiveness of neuromuscular taping on painful hemiplegic shoulder: a randomised clinical trial. Disability and rehabilitation, 38(16), 1603–1609. https://doi.org/10.3109/09638288.2015.1107631

ISSN 2786-6661
eISSN 2786-667X

Platz, T., Vuadens, P., Eickhof, C., Arnold, P., Van Kaick, S., & Heise, K. (2008). REPAS, a summary rating scale for resistance to passive movement: item selection, reliability and validity. Disability and rehabilitation, 30(1), 44–53. https://doi.org/10.1080/09638280701191743

Pohl, M., & Mehrholz, J. (2006). Immediate effects of an individually designed functional ankle-foot orthosis on stance and gait in hemiparetic patients. Clinical rehabilitation, 20(4), 324–330. https://doi.org/10.1191/0269215506cr951oa

Poletto, S. R., Rebello, L. C., Valença, M. J., Rossato, D., Almeida, A. G., Brondani, R., Chaves, M. L., Nasi, L. A., & Martins, S. C. (2015). Early mobilization in ischemic stroke: a pilot randomized trial of safety and feasibility in a public hospital in Brazil. Cerebrovascular diseases extra, 5(1), 31–40. https://doi.org/10.1159/000381417

Richards, L. G., & Cramer, S. C. (2023). Therapies Targeting Stroke Recovery. Stroke, 54(1), 265–269. https://doi.org/10.1161/STROKEAHA.122.041729

Santos, G. L., Souza, M. B., Desloovere, K., & Russo, T. L. (2017). Elastic Tape Improved Shoulder Joint Position Sense in Chronic Hemiparetic Subjects: A Randomized Sham-Controlled Crossover Study. PloS one, 12(1), e0170368. https://doi.org/10.1371/journal.pone.0170368

Shen, J., Gu, X., Yao, Y., Li, L., Shi, M., Li, H., Sun, Y., Bai, H., Li, Y., & Fu, J. (2023). Effects of Virtual Reality-Based Exercise on Balance in Patients With Stroke: A Systematic Review and Meta-analysis. American journal of physical medicine & rehabilitation, 102(4), 316–322. https://doi.org/10.1097/PHM.0000000000002096

Simning, A., Caprio, T. V., & Lam, K. (2023). Older Adults Receiving Rehabilitation Services Are More Likely to Get Bathing and Toileting Equipment Installed. The American journal of occupational therapy : official publication of the American Occupational Therapy Association, 77(1), 7701345010. https://doi.org/10.5014/ajot.2023.050084

Thijssen, D. H., Paulus, R., van Uden, C. J., Kooloos, J. G., & Hopman, M. T. (2007). Decreased energy cost and improved gait pattern using a new orthosis in persons with long-term stroke. Archives of physical medicine and rehabilitation, 88(2), 181–186. https://doi.org/10.1016/j.apmr.2006.11.014

Thompson, A. J., Jarrett, L., Lockley, L., Marsden, J., & Stevenson, V. L. (2005). Clinical management of spasticity. Journal of neurology, neurosurgery, and psychiatry, 76(4), 459–463. https://doi.org/10.1136/jnnp.2004.035972

van Bladel, A., Lambrecht, G., Oostra, K. M., Vanderstraeten, G., & Cambier, D. (2017). A randomized controlled trial on the immediate and long-term effects of arm slings on shoulder subluxation in stroke patients. European journal of physical and rehabilitation medicine, 53(3), 400–409. https://doi.org/10.23736/S1973-9087.17.04368-4

Wagner, L. V., Davids, J. R., & Hardin, J. W. (2016). Selective Control of the Upper Extremity Scale: validation of a clinical assessment tool for children with hemiplegic cerebral palsy. Developmental medicine and child neurology, 58(6), 612–617. https://doi.org/10.1111/dmcn.12949

Wang, R. Y., Lin, P. Y., Lee, C. C., & Yang, Y. R. (2007). Gait and balance performance improvements attributable to ankle-foot orthosis in subjects with hemiparesis. American journal of physical medicine & rehabilitation, 86(7), 556–562. https://doi.org/10.1097/PHM.0b013e31806dd0d3

Wittkopf, P. G., & Johnson, M. I. (2017). Mirror therapy: A potential intervention for pain management. Revista da Associacao Medica Brasileira (1992), 63(11), 1000–1005. https://doi.org/10.1590/1806-9282.63.11.1000

Yani, S., Wibisono, H., & Prabowo, E. (2017). Intervention of Bobath Method and Neuro Muscular Taping (Nmt) in Post-Stroke Patients Against Disorders Intervention of Bobath Method and Neuro Muscular Taping (Nmt) in Post-Stroke Patients Towards Balance Disorders. Physiotherapy Faculty of Health Sciences UPN "Veteran" Jakarta, 3(3), 187–193 file:///C:/Users/38097/Downloads/bari,+10-16+Intervensi+metode+bobath+dan+neuro+muscular+taping+(nmt)+Pada+penderita+pasca+stroke+terhadap+gangguan+Keseimbangan.pdf

Zech, A., Hübscher, M., Vogt, L., Banzer, W., Hänsel, F., & Pfeifer, K. (2010). Balance training for neuromuscular control and performance enhancement: a systematic review. Journal of athletic training, 45(4), 392–403. https://doi.org/10.4085/1062-6050-45.4.392

Методи доказової медицини для пацієнтів після інсульту зі спастичністю ранього періоду

Гомола Альона

Аспірант, кафедра біобезпеки і здоров'я людини, Національний технічний університет України "Київський політехнічний інститут імені Ігоря Сікорського", Київ, Україна

Address for correspondence:

Homola Alona

E-mail: alhzgv@gmail.com

ISSN 2786-6661
eISSN 2786-667X

Анотація: *гостре порушення мозкового кровообігу головна причина інвалідизації. Інсульт має різні клінічні характеристики та наслідки, що вимагають індивідуального реабілітаційного обстеження та підходу. Несприятливі неврологічні розлади супроводжуються руховими, когнітивними та психо-емоційними наслідками. За останні 20-ть років лікування гострого порушення мозкового кровообігу значно зросли у показниках відновлення пацієнтів. Завдяки прогресу міжнародним клінічним протоколам, рандомізованим методам доказової медицини, адекватного медикаментозного лікування, поетапної та індивідуальної стратегії з фізичної терапії, ерготерапії для пацієнтів. Один із найважливіших внесків у реабілітацію для пацієнтів після інсульту мають методи доказової медицини. У літературному огляді висвітлені сучасні дані та критична оцінка, щодо підтвердження ефективності методів доказової медицини в реабілітаційних заходах, для покращення контролю рухів, активності, участі та діяльності. Доведена, користь реабілітаційних втручання на спастичність після інсульту у раньому періоді. Але навіть, після медикаментозної та медичної реабілітації, відновлення рухової функції залишається не достатнім для досягнення запиту пацієнта, за рахунок не послідовності застосування методів доказової медицини. Опис літератури має на меті, відобразити ефективність впливу методів доказової медицини на реабілітаційні втручання осіб після інсульту раннього періоду зі спастичністю, за для підвищення якості життєдіяльності та поліпшення рухових функцій в уражених кінцівках. Матеріали та методи. У огляді ми проаналізували реабілітаційні втручання та методи доказової медицини з фізичної терапії. Обгрунтували матеріали Канадського довідника клініциста з реабілітації пацієнтів після інсульту за 2020 рік. В огляд увійшли наукові публікації англійською мовою. Статті та дослідження науковців опубліковані за останні 15 років. Компютерний пошук здійснювався через базу даних PubMed. Розглянуто 63 публікації, які оцінювались за критеріями: надійність, валідність, вимірюваність. Проаналізовані змін, що відбувались на протязі здійснених наукових досліджень. Висновки. Спастичність у пізньому періоді після гострого порушення мозкового кровообігу, має значні негативні наслідкові труднощі, з якими пацієнти не мають змоги впоратись самостійно. Ми виявили, що реабілітаційні заходи та методи з фізичної терапії поліпшують рухові функції пацієнтів зі спастичністю у ранньому періоді, за умови дотримання рекомендацій доказової медицини. Вчасне використання методів, засобів та індивідуальний підхід до кожного пацієнта дають позитивні результати. Адже, мета фізичної терапії не переконати пацієнтів в тому що наслідки після інсульту не підлягають реабілітації, а допомогти та навчити пацієнтів самостійності та підвищети якість життєдіяльності осіб зі спастичністю у раньому чи пізньому періоді. Також визначили, що не достатньо розкрита тема відновлення пацієнтів після інсульту зі спастичністю у пізньому періоді. На сьогоднішній день більша половина осіб після інсульту залишаються обмеженими у побутових діях та мають негативні наслідки – рухові порушення, обмеження активності що значно впливають на якість життя та незалежність. Необхідне подальше дослідження, щоб виявити, чи можливо зменшити спастичність у пізньому періоді та поліпшити рухову функцію пацієнтів після інсульту з можливістю подальшого користування ураженою кінцівкою.*

Ключові слова: огляд, рука, реабілітація після інсульту, мета-аналіз, відновлення функції