Study on Various Evidences of Physiotherapy Interventions for Decision Making towards Management of Stroke

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Abstract

Stroke rehabilitation focuses on reducing impairments and functional disability. Regaining functional independence in stroke patients in order to participate in usual self-care and daily activities as independently as possible in the final aim. .For this New treatment approaches to enhance recovery are been tried out globally. Implementing this requires timely understanding of disease in order to decide right approach. Clinical decision making for correct assessment strategies will largely influence appropriate treatment strategies. It is therefore necessary to find out evidences for understanding traditional strategies and learn newer skills for treatment.

Keywords: *Stroke, clinical decision making, evidence based practice, assessment, and management.*

Introduction

Stroke is one of the leading cause of death and impairments worldwide. The effect on patients, their families and economy are increasing day by day due to the long-term physicaland cognitive consequences of stroke. By 2030,stroke prevalence is expected to increase by 25% in the USA[1]. Importance is been given on acute care management for stroke due to the nature of disease. Significant research is going on management as per the stage and duration of disease. Although recovery varies among stroke patients, studies have suggested that functional recovery is predictable inthe first days after stroke[2]. Advances based on animal models have sharpened our understanding of the genetic, molecular, physiologic, cellular, and behavioral adaptations that drive and may limitthe recovery of function[3]. Various therapies are based on changing the mechanisms of learning and memory, enhancing neurogenesis, improving axonal regeneration, facilitating neurotransmitters and growth factors which can facilitate the recovery process in subjects with stroke. Following stroke, the motor recovery is often inadequate. The site of lesion, stage of recovery, assessment strategies and treatment strategies often plays an important role in functional outcome. Long term survival can be predicted by functional outcome at 6 months[4]. Many approaches are based on the principle of neural plasticity.

Effects of stroke: Effect of stroke is decided by site and initial stroke lesion[5]. Altered Consciousness/ attention/alertness, Reduced energy/motivation, Dysphagia, Dysphonia/dysarthria/dysphasia Reduced muscle power/tone, Altered sensation/proprioception, Reduced co-ordination, Change in temperament/ personality, Executive dysfunction/cognitive decline, Perceptual change, Loss of visual acuity/field deficit, Reduced joint stability/mobility, Balance impairment, Altered gait pattern are common impairments following stroke. Motor impairment is the most commonly recognized one[5]. The focus of management is to achieve voluntary motor control in order to reduce disability and promote functional independence. Multiple studies have assessed novel therapeutic interventions that may improve both motor and non motor symptoms. It is

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becoming extremely important to assess the effect, the impact despite limitations in clinical practice. In 2001, the World Health Organization developed and endorsed the International. Classification of Functioning, Disability and Health (ICF)[6].

Clinical decision making: Clinical decision making is a contextual, continuous, and evolving process, where data are gathered, interpreted, and evaluated in order to select an evidence-based choice of action.

In the context of the complex and nature of clinical practice, therapists gathered data that they considered meaningful during patient examination. The findings provide insight into factors influencing assessment decisions and suggest mechanisms to foster translation of research into clinical practice[7]. Physiotherapists used a variety of clinical reasoning strategies and considered many factors to influence their decision-making in the planning and delivery of physiotherapy post-stroke. These included the therapist's clinical experience, patient's presentation and response to therapy, prioritization, organizational constraints and compliance with organizational practice[8].

Education in principles of EBP, EBP self-efficacy, a positive attitude towards research, and involvement in research at work may promote research use in neurological physical therapy practice[9].

Stroke rehabilitation: Stroke rehabilitation is an ongoing process. Goal of stroke rehabilitation is to help you relearn skills that are lost when a stroke affected part of brain. Stroke rehabilitation can help regain independence and improve your quality of life. Multidisciplinary team approach is effective in delivering the necessary care. Accurate prognosis of recovery after stroke canhelp to decide on the type, duration and specificgoals of rehabilitation for individual patients.

Urinary incontinence, sex, pre stroke disability and dysarthria affected the level of outcome after stroke; age, dysphasia, and limb deficit also affected the rate of recovery[10].

Rehabilitation therapies: Various therapies have been evolved for stroke care. They are largely influenced by underlying principles. Nervous system is adaptive and has the capacity to reorganize itself. The underlying neurons take over the function in the process of recovery. Establishment of inter neuronal circuits is largely affected by pattern of rehabilitation, amount of repetitions and transference of training in variety of situations. Regular practice with attention, motivation is effective in enhancing motor control.

Animal studies are identifying genetic and biochemical pathways involved in the establishment of new anatomic connections and functional network reorganization (e.g., axonal sprouting, dendrite proliferation, neurogenesis).[11] In same manner a human brain undergoes continuous anatomical, physiological changes following stroke.

Recently published draft guideline on 'Therehabilitation and support of stroke patients', developedby the UK National Clinical GuidelineCentre and commissioned by the National Institutefor Health and Clinical Excellence (NICE), containsa comprehensive list of recommendations on interventionsused in stroke rehabilitation[12].

Interventions for stroke: Pharmacology in stroke: Pharmacologic therapy for stroke may be divided into stroke-specific treatment and stroke prevention[13]. Pharmacologic treatment of a stroke depends upon whether the stroke is ischemic or hemorrhagic. Pharmacotherapeutic options for primary ischemic stroke are tissue plasminogen activator (tPA) and—under defined conditions—antiplatelet agents. Pharmacotherapeutic treatment for hemorrhagic stroke is aimed at controlling the patient's blood pressure and intracranial pressure. Amphetamine showed promise inhighly selected patients for motor gains[14].Aspirin is the only oral antiplatelet agent that has been evaluated for the treatment of acute ischemic stroke. Aspirin therapy (325 mg) should begin within 24 to 48 hours of an ischemic stroke, but not within 24 hours of completion of alteplase therapy[15]. Management of the patient's blood pressure also reduces the patient's risk of another stroke[16].

Peculiar therapies for stroke:

Stem cell therapy: Stem cells can be defined as clonogenic cells that have the capacity to self-renew and differentiate into multiple cell lineages. After a stroke, millions of brain neurons die within minutes. Research has found that stem cells target the area with chemicals that save and rejuvenate that tissue. Optimal time for introducing stem cells seems to be between 36 and 72 hours after the stroke. Cell therapy is emerging as a promising new modality for enhancing neurologic recovery in ischemic stroke[17]. Many studies advocate

stem cell transplantation within thefirst 3 days after ischemia for better functionalrecovery[18]. Cell therapy promotes re-vascularization and reduces cerebral inflammation after stroke and phase II clinical trials of intravenous transplantation of autologous bone-marrow stemcells have reported safety and tolerability in stroke patients[19].

Transcranial direct current stimulation (tDCS): Transcranial direct current stimulation (tDCS) is a form of neuromodulation that uses constant, low direct current delivered via electrodes on the head. It can be contrasted with cranial electrotherapy stimulation, which generally uses alternating current the same way. Transcranial direct current stimulation has enormous clinical potential for use in stroke recovery because of its ease of use, noninvasiveness, safety (does not provoke seizures), and sham mode (important for controlled clinical trials) and because of the possibility to combine it with other stimulation or stroke recovery–enhancing method (eg, simultaneous occupational and physical therapy).

Robotic therapy: Many studies have worked on introducing robotic devices in the management of stroke. Robotic technology has developed remarkably in recent years, with faster and more powerful computers and new computational approaches as well as greater sophistication of electro-mechanical components[20]. Robotic assisted therapy has been found to be effective tool in rehabilitating upper limb motor function. Robot-assisted therapy for stroke rehabilitation is in a dynamic phase of development and has achieved remarkable advances. A small study of 18 patients with chronic hemiparesis reported that using a roboticdevice coupled with virtual reality over 4-weeks improved walking ability in the laboratoryand the community better than robot training alone[21].

Interventions for Impairments:

Cognitive Impairments: New dementia is seen in 10% of patients after a first stroke and in more than onethird of patients after recurrent stroke[22]. Cognitive rehabilitation is systematic, functionally oriented service of therapeutic activities that is, based on assessment and understanding of the patients brain behavioral deficits. Specific interventions may have various approaches, which include :i) Reinforcing, strengthening or reestablishing previously learned patterns of behavior. ii) Establishing new patterns of cognitive activity through compensatory cognitive mechanisms or impaired neurological systems. iii) Establishing new patterns of activity through external compensatory mechanisms such as personal orthoses or environmental structuring and support. vi) Enabling persons to adapt to their cognitive disability, even though it may not be possible to directly modify or compensate for cognitive impairments, in order to improve their overall level of functioning and quality of life[23] .

Speech impairments: Constraint-induced aphasia therapy(CIAT) was first proposed by Pulvermüller et al. as a therapeutic approach that included the principles of massed practice (3 to 4 hours per day for 10 consecutive days), shaping (the difficulty of the required verbal actions is gradually increased according to the patients' needs) and constraint of compensatory (nonverbal) communication strategies[24]. Studies of both tDCS and rTMS have resulted in language improvements, including receptive and expressive modalities, and may offer future supplementary approaches to conventional therapy[25, 26] .

Locked in syndrome: Brain-computer interface (BCI) is a hardware and software communications system that permits cerebral activity alone to control computers or external devices. The devices are most needed for people with locked-in syndrome from brainstem stroke who are without voluntary control of their limbs. Alterations in the amplitude of the mu rhythm by thoughts about an action, are recorded with electroencephalography electrodes and interpreted by a computer algorithm, allowing patients to select letters or words on a computer screen for communication or to search the Web[27].

Interventions for Mobility:

Functional Electrical Stimulation: Can be used to generate muscle contraction in otherwise paralyzed limbs to produce functions such as grasping, walking, bladder voiding and standing. FES is a technique that takes advantage of peripheral nerves and muscles left unaffected bydamage to the central nervous system.

Aerobic exercise trainingby treadmill, over ground walking, or recumbent cycling, can produce a conditioning effect and increase walking speed and endurance[28]. It has been found to be effective in chronic stroke patients who have recovered with significant motor control[29].

Balance training: Task specific training has been

shown to improve walking performances in post stroke individuals[30]. Over-ground gait training is an integral component of standard physical therapies to improve dynamic balance and ensure safe ambulation in the home. Functional reeducation from supine lying to standing has been found to be effective in achieving central control in turn improves static and dynamic balance.

Strength and fitness: Standard rehabilitative therapies include selective muscle strengthening by isometric and isokinetic exercises to improve the power and endurance of affected and unaffected muscle groups. Sets of moderate resistance exercise with weights or elastic bands are feasible for most patients.

Locomotor training: Body weight-supported treadmill training (BWSTT) enables supervised, repetitive, taskrelated practice of walking. Patients with limited motor control wear a chest harness connected to an overhead lift to reduce the need to fully load a paretic leg. The treadmill induces rhythmic stepping, although the paretic leg and trunk often require physicalassistance by therapists.

Recent advances to enhance plasticity: Sensory stimulation: Sensory stimulation can be given in a number of ways, from passive movement tocutaneous stimulation with transcutaneous electrical nerve stimulation, and even acupuncture.NMES may also work in part by enhancing sensory feedback. Mirror therapy has been found to improve functional recovery.

Transcranial magnetic stimulation: It is still in its theoretical form. Slow rates of repetitive TMS depress cortical excitability and high rates increase excitability. Trials have been undertaken in depression, Parkinson's disease, and dystonia.

Conclusion

Many of the stroke survivors are left with chronic disabilities. Rehabilitation is very important during the initial phase. Early intervention will allow lot of scope in improving functional mobility and independence. Impairment following stroke has been extensively researched and newer approaches have come up. Correct timing of assessment and management is the key of successful outcome. Future of stroke rehabilitation is promising as well as challenging. There has been exceptional revolution in stroke care from rehabilitation point of view.

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