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Keywords: *stroke, ICF model, clinical reasoning.*

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An Attribute of a Female Stroke Patient of Bangladesh: Implementation ICF Model and Clinical Reasoning Skill

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Abstract- Stroke is the disorder where the brain is damaged either by a blockage in the blood vessels or rupture of the blood vessels of the brain. It is the 5th common cause of death and the leading cause for disability in most of the countries in the world. It is evident that a major group of the population dealing with a prolonged Disability-Adjusted life years where the clinician and rehabilitation practitioners are treating them with the traditional medical model. As a result, the treatments are often devised according to physical parameters and the outcome remains incomplete and unsatisfactory. Therefore the introduction of the bio-psychosocial model is crucial. This case study focused on a female post stroke patient's successful recovery in functional ability following a rehabilitation protocol which was provided by a bio-psychosocial approach. This study also emphasized how the clinician's expertise, proper Intervention time allocation, appropriate clinical reasoning skill, patient's willingness, and family support acted as the contributory factors for the success.

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I. Introduction

Stroke is the disorder where the brain is damaged either by a blockage in the blood vessels or rupture of the blood vessels of the brain. The risk factors predominantly are high cholesterol, diabetes, smoking, a trial fibrillation, and lack of physical activity. The early and common signs include asymmetry in face, unilateral weakness, unilaterally altered sensation, and troubling speech (Jin, 2014). The American stroke association (2016) described that stroke usually takes place at blood vessels which function is to carry blood and nutrition to the brain tissue. Due to stroke either by occlusion or by rupture of those blood vessels, the brain tissue doesn't get enough oxygen to survive and eventually necroses. They also declared that 80% of stroke is preventable by regular monitoring of blood pressure, maintain the cholesterol, blood sugar in the normal range, being active, having a balanced diet, losing weight, cessation of smoking, and by taking aspirin-like medication prescribed by specialist doctors. It is the third leading cause of death globally, where in the UK it is the major health problem. About 23% of people die within 30 days, where 60-70% of the remaining dies within three years. The morbid portion has prolonged stay in the hospital, reduced quality of life due to long term disability; therefore it is also the leading cause of disability in the UK. This causes a big compromise in the economic sector due to loss of productivity (Parmer, Sumaria & Hashi, 2011). According to the American stroke association (2016), it is the 5th common cause of death and the leading cause for disability in the United States. It is also the leading cause of long-term disability. African American people are more affected by stroke. As stroke affects the central nervous system, especially when the brainstem, the vestibular system is more likely to affected and can cause dizziness, vertigo eventually imbalance. Among the stroke survivor about 40 percent have serious falls within a year of their stroke. women stroke survivors experienced difficulty maintaining their balance while dressing was seven times more likely to fall than women who didn't report balance problems (American heart and stroke Association, 2015). In Bangladesh, it is identified as the third leading cause of death. The mortality is ranked 84 in the world by the World Health Organization in Bangladesh. The prevalence of stroke is 0.3% in Bangladesh which was found in a hospital-based study. The study also found hypertension is the main cause both for ischemic and hemorrhagic stroke. The severity of the economic impact of stroke was further described by the disability-adjusted life years lost was 485 per 10000 people (Islam et al. 2013). It is evident that a major group of the population dealing with Disability-Adjusted life years where the clinician and Rehabilitation practitioners are treating them with the traditional medical model. In this model, the disease is defined strictly based on of organic malfunction (Farre & Rapley, 2010). As a result, the treatments are often devised according to physical parameters. Moreover, there is a clinician centered approach of assessment and management frequently missed the psychosocial aspect of the disease process. Consequently, the treatment outcome remains incomplete and

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unsatisfactory. Therefore the introduction of the biopsychosocial model is crucial. The International Classification of Functioning, Disability and Health (ICF) is a framework to measure health, and disability. It was authorized by the World Health Organization (WHO) in 2001 through the fifty-fourth World Health Assembly of the 191 member states. It is used as a standardized tool or language to describe and measure health and disability across the world (WHO, 2018). This classification system allows a clinician to focus on the bio-psychosocial aspects such as the anatomical or physiological impairment, Environmental, personal issues, participate in daily living events as well as social events (ICF, 2001). Therefore it helps to develop a comprehensive assessment approach and a complete rehabilitation approach. ICF concept further accompanied by sound clinical reasoning skills. Clinical reasoning is thinking and decision-making process which guides practice (Higgs and Jones, 2000). This skill helps the clinician to have informed decision therefore successful rehabilitation. This study will be an attribute of a stroke patient who was treated and rehabilitate successfully at the center for the rehabilitation of the paralyzed (CRP) in Bangladesh. The case came to the author in the month of February 2019. The case had significant improvement throughout the rehabilitation service; therefore it was selected as a successful case history.

II. The Case History

The case is Mrs. X; Aged 50 years old lady who was the mother of 6 children had a stroke in December 2018. She was the principal of a renowned secondary school in Bangladesh. While continuing her duty suddenly she couldn't raise her left upper limb, and within a few seconds she fell. She was taken to the Local medical college hospital and stayed one day. The next day, she was taken to the Tertiary Neuroscience hospital at Dhaka city. She went through conservative management. After fifteen days she was discharged and came back to her home town. She came with his elder son to CRP in the 2nd week of January 2019. She was assessed and treated by a qualified Physiotherapist in the Neurology outpatient Department of CRP. She had already treated eight sessions of physiotherapy. The investigator (article writer) reassessed him. Her initial situation found by the previous therapist that she was completely bed-bound and dependent. She developed Left-sided hemiplegia with no sitting and standing balance. She was unable to obtain any postural change by herself. She and the entire family members were very frustrated. She was reassessed by the author of this article and found that the patient developed left sided hemiplegia following a history of feeling unwell for the last few days before the incident. The patient was thoroughly assessed and discovered that she was hypertensive and diabetic for many years and not under control. Often she used to refuse the treatment. She used to have an intensive, stressful working situation as she was holding a superior position at her school. She also had some familial issues regarding her husband. She was on sick leave from her school and was very anxious about her job. She wanted to go back to her work as soon as possible. She was an educated patient, and she could understand the instruction very well. On examination, it was found that she was hypertensive for many years and other vital signs were stable. She needed moderate support for rolling, sitting, standing. She cannot able to walk. She had a limitation in the ROM at shoulder flexion and abduction. She developed shoulder pain, but didn't have any shoulder subluxation. She had a Lack of Balance and upper limb activities. Her physical examination also revealed that she had moderate spasticity at her left upper limb, which was more in the distal segment. After eight sessions of conventional management within two weeks, she had no significant improvement and became very frustrated. The new investigator assessed her according to the ICF core set guideline in a multidisciplinary team setting. Many unrevealed issues, especially the psychosocial aspect, revealed, and for her treatment, the hospital assigned Physiotherapist, Occupational therapist, and Psychologist. The treatment continued for sixteen sessions within three and half months. Within this time patient went through an intensive treatment strategy which included some evidenced-based treatment such as Standing balance training with biofeedback, body weight supported parallel bar instead of the treadmill, circuit training, water-based exercise, Constraint-Induced Movement Therapy (CIMT), strength and cardio-respiratory exercises along with conventional management, and psychological counseling. Several pieces of evidence were found from the scientific literature, which were presented in the following paragraph. Only a few of them were chosen as mentioned above, which were convenient. After completion of the treatment, the patient now has good sitting and standing balance. Her muscle tone reduced, and the upper limb becomes more functional. She still has fine motor difficulties. She had no pain at the shoulder. Most of the activities of daily living are now independent. She still has a problem in gait. She was satisfied and hopeful to continue her job again.

III. Evidence- Based Physiotherapy in Stroke Rehabilitation

The therapist treated the patient by the evidence-based treatment approaches, which will provide a better outcome. To implement the ideas, proper training of therapists, improvement of infrastructure with high technology assessment and

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treatment devices and timing of treatment sessions are important.

— A systematic review by Pang, Charles worth, Lau, and Chung (2012) found that 20-40 minutes aerobic exercise such as Treadmill, and cycle ergo meter, 3–5 days per week is beneficial for enhancing aerobic fitness, walking speed and walking endurance in people who have had mild to moderate stroke and are suppose to have low cardiovascular risk with exercise.

— A systematic review by Veerbeek, Wegen, Peppen, Wees, Hendriks, Rietberg, and Kwakkel (2014) found the following features.

- Standing balance training with biofeedback in the early and late stages of stroke rehabilitation, which consists of a force platform with force sensors to measure the weight on each foot and the center of pressure to give visual or auditory feedback to a patient found to be effective in reducing postural sway, therefore, improve balance.
- Body-weight supported treadmill training, which is the partial body support by a harness, was effective for comfortable gait speed and walking distance.
- Electromechanical-assisted gait training with functional electrical stimulation was found to be effective in improving balance and walking ability in the early stage of rehabilitation.
- Speed-dependent treadmill training without body-weight support was effective in improving gait speed and step width.
- Circuit class training which the supervised circuit class training is focused on gait and mobility-related functions and activities, in which patients train in groups in various work stations. This was effective for early and late stages of stroke rehabilitation to improve walking distance, balance, walking ability, and physical activity.
- Water-based exercises using the properties of water, designed by a qualified physical therapist with a suitably heated hydrotherapy found to be effective in improving muscle strength.
- Constraint-Induced Movement Therapy (CIMT) consists of immobilization of the non-paretic arm for 90% of the waking time for 2-3 weeks and is combined with repetitive task-specific training of the paretic arm improve arm-hand activities, self-reported amount of arm-hand use, and self-reported quality of arm-hand movement in daily life.
- Mixed strength and cardio-respiratory exercises including patients in the early rehabilitation phase and late rehabilitation phase were found beneficial for motor function of the paretic leg (synergy), muscle strength of the leg, comfortable gait speed, maximum gait speed, walking distance, aerobic capacity, heart rate during work, balance, physical activity, and quality of life.

— Another systematic review by Tayson and Kent (2013) found that Using AFO has an immediate improvement in functional ambulation, walking speed, step and stride length, weight distribution in standing.

— A systematic review by Corbetta, Imeri, and Gatti (2015) found Virtual Reality-Based Rehabilitation (VRBR) was beneficial in walking speed, balance and mobility in people with stroke. It is the technology-dependent intervention that creates an effect of a situation of particular action, which doesn't exist in the reality. It enables the simulated practice of functional tasks at higher doses than the traditional one.

IV. Implementation of ICF

ICF was established to promote a common understanding of disability and health by every practitioner. To incorporate that WHO and ICF Research Branch developed "ICF Core Sets," which provides the essential categories for the specific health condition. It was done through a scientific process by a group of multidisciplinary experts (Bickenbach, Cieza, Rauch, Stucki & Gottingen, 2012).

The following table will demonstrate the case in hand on the light of "Brief ICF core set for Neurological conditions for post-acute care" (ICF research Branch, 2017).

Body Functions = physiological functions of body systems (including psychological functions)	
Temperament and personality functions	-conscious about any situation.-emotionally stable -very much confident about improvement.-well interactive. -but often become a little nervous when an activity not performed well.
Energy and drive functions	-motivated -moderate energetic -very often has lack of appetite.
Thought functions	-participates in the family problem solution but feel unstable about his own decision. Depends on elder son for final decision making.
Higher-level cognitive functions	She has developed a brief problem in planning, making judgment. Often feel lack of confidence.
Mental functions of language	Normal

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Seeing functions	Normal
Blood pressure functions	Hypertensive for last few years but now it is under control by medication.
Additional respiratory functions	Normal, seasonal flu.
Ingestion functions	Feel sometimes a little difficulty in chewing due to dental problem. Often swallowing takes a little more time therefore aspirates.
Weight maintenance functions	BMI 21.5- Normal
Thermoregulatory functions	Normal
Urination functions	urge incontinence
Muscle endurance functions	Affected lower limb become fatigue quickly after walking approximately 10-15 meter.
Gait pattern functions	Slow hemiplegic gait. use one point stick .

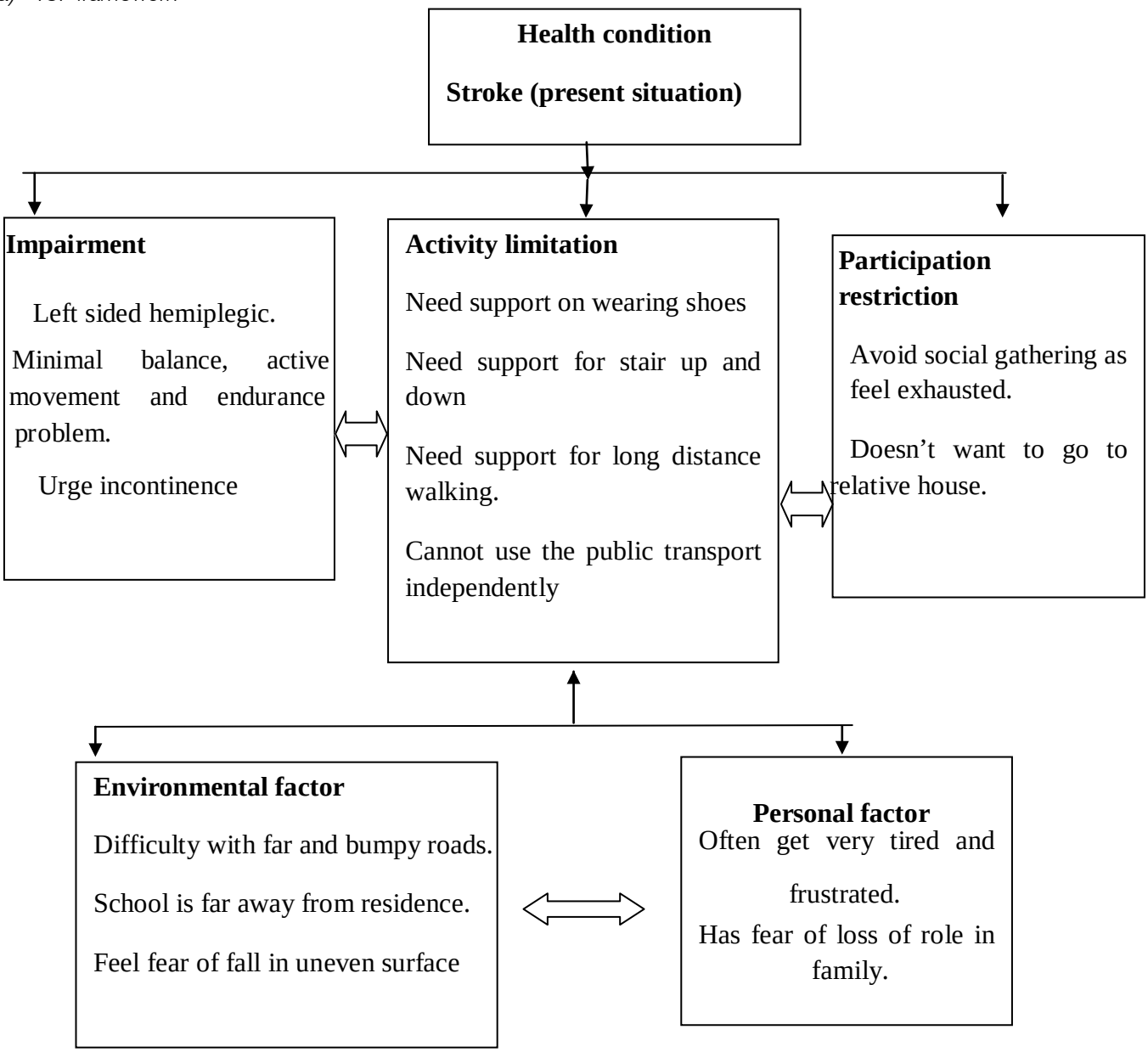
Body structure anatomical parts of the body such as organs, limbs and their components	
Brain	Hematoma in right capsule-ganlionic and temporal region with mild generalized atrophy of brain. 5/12/2018) Resolving cerebral hematoma. (3/1/2019)
Body	Left sided hemeplegia

ACTIVITIES AND PARTICIPATION execution of a task or action by an individual and involvement in a life situation	
Listening	Regular listen to audio of Quran. Feel no difficulty.
Acquiring skills	Feel lack of interest and tiredness.
Writing	Normal as she is a person with right side dominance.
Solving problems	Not quite confident.
Changing basic body position	Rolling, sit to stand, stand to sit is independent. Need effort and time. Walking need support from walking stick. Sometimes manual support needed to continue.
Transferring oneself	Floor transferring needs support. Otherwise same level transferring is independent.
Fine hand use	Complete loss at affected hand.
Walking	Need walking device and sometimes manual support, hemiplegic gait.
Moving around in different locations	Difficult
Moving around using equipment	At space constraint becomes difficult. Otherwise can do well with the help of only walking stick.
Caring for body parts	Independent. Bathing need a minimal support.
Toileting	Minimal support
Dressing	Moderate support. For wearing shoe need maximum support
Eating	Independent
Drinking	Independent

ENVIRONMENTAL FACTORS make up the physical, social and attitudinal environment in which people live and conduct their lives	
Products or substances for personal consumption	Delayed swallowing, often feel problem with big size tablets or capsule
Products and technology for personal use in daily living	Likes to read news paper. Hold with unaffected limb. In other technology no interest. Watch Television as well.
Products and technology for personal indoor and outdoor mobility and transportation	Use public transport (rickshaw) with the help of his son.
Products and technology for communication	Use mobile phone holding by unaffected upper limb.
Health professionals	Has treated by doctor, physiotherapist, occupational therapist and speech therapist. Stay very near to the hospitals.
Individual attitudes of extended family members	The family attitude is very positive and caring.

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a) ICF framework



V. Differential Diagnosis with Clinical Reasoning

This case came with a typical history and physical presentation of Stroke, which allow the investigator to recognize the pattern of a stroke patient very quickly. Here the investigator used her pattern recognition skill as the case was very familiar. Experts' reasoning in the non-problematic situations is pattern recognition, which is the automatic direct retrieval of information from a good and structured knowledge base (Higgs and Jones, 1995). Clinical reasoning is the skill that enables a clinician to think about a certain condition and to take proper decision; therefore it's a process of thinking and decision making (Higgs et al.1995). This reasoning skill depends entirely from clinician to clinician according to their knowledge, cognition, meta-cognition, practical experience, clinical expertise and so on. Such as Novice clinician are more likely to use hypothetical deductive where an expert will recognize the pattern instantly from the experience of similar cases. However, the following two differential diagnosis also came in mind and was excluded by the symptoms and investigations.

The differential diagnosis

1) TIA (transient Ischemic attack) -excluded as the symptoms persisted.
2) ICSOL (Intracranial space-occupying lesion-Tumor) - excluded through the CT scan, which shows Hemorrhagic stroke rather than any tumor.

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1. Treatment outcome

Domains	On initial Assessment	2 month after the initial assessment (approximately middle)	On Discharge(after 4 months)
Observation (general and local)	Came with wheel chair. Bed bound. Look very frustrated. No external device	Use walking stick, Looks confident	Can walk with the minimal support. Need stick for a long distance. Very confident.
Balance(Burg Balance scale)	0	36	45
Muscle tone Modified Ashworth scale score	3	1	1
AROM	No Active ROM –Lt upper limb. Hip had few degrees of dragging motion , knee and ankle was Zero	10 -15 degrees of shoulder elevation. Ankle dorsi flexion zero degree Hip flexion improves to 120 degree. Few degrees other hip motion.	All lower limb joints has function Range with residual loss. Few degress of dorsiflexion achieved. Upper limb remains same.
PROM	Full with normal end feel. Left side had end range pain and movement limitation on shoulder all movement	Full, except shoulder flexion. End range few degrees lost. No pain at shoulder.	Same as before
Pain	Left shoulder joint pain VAS- 7	VAS -5	No pain
Muscle Strength	No muscle power at upper limb and lower limb	Increase strength shoulder, elbow muscles, weak wrist flexor and extensor and fine motor function of hand.	She can use her upper limb for gross motor function but still has problem with fine motor function.
Functional Activities (FIM score)	1- Total assistance For sitting, standing, transferring, bed mobility, walking.	5-sitting, 5 standing, 4-transferring, 5 bed mobility, 4-walking.	6-sitting, standing, transferring, bed mobility. 5- walking
Psychological aspect	Very confused, frustrated.	Look confident	Very confident and optimistic.
Upper limb function (gross and fine motor)	No gross and fine motor function.	A little movement in shoulder only.	Full active 'Range of motion in shoulder and elbow.
MRI/CT scan	Haematoma in right capsulo-ganglionic and Temporal region with mass effect.	----	Resolving cerebral heaematoma with mass effect (right) oedema

VI. Patient's Perspective

The patient was very satisfied about the therapeutic service of CRP. She strongly believes that therapeutic service played the most important role for her improvement. She was also thankful that therapists gave her the idea to go back to her job as soon as possible.

VII. Learning Points

- It is very imperative to have a comprehensive assessment to diagnose and treat a case properly.
- Proper clinical reasoning skill is very obliging in making a decision.
- The assessment should be carried out according to the ICF guideline.
- Treating a patient is not only the duty of the clinician only but also the other health professional, care-provider, family members, and society.

VIII. Discussion and Conclusion

This case focused on a series of successful recovery in functional ability. The clinician expertise, Intervention time allocation, proper reasoning skill,

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practical or clinical skill, patient's willingness, and family support, which all acted as a contributor. Additionally, early referral and management also played an immense role in the improvement. According to The Clinical practice Guideline of American heart and stroke association, early diagnosis and treatment are crucial for stroke management (Jauch et al. 2013). Although the upper limb function was not achieved at all, the patient was developed a parallel skill which could compensate for the purpose in a satisfactory proportion. It is very vital to incorporate the evidence-based practice in the regular therapeutic regimen, which was not present effectively. The upper limb function needed careful consideration. Therefore, therapists should concentrate on ICF based rehabilitation strategies, evidence-based practice and sound clinical reasoning skills for the betterment of the service.

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