



## Case Report

### The Use of ICF in Physiotherapy Management for Patient with Ischemic Stroke: A Case Study

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#### Abstract

**Background:** Globally, CVA is the most common cause of disability and death. Approximately 5.5 million people are killed by stroke each year. Stroke is the 'third' leading causes of death in Bangladesh. Physiotherapy management is evidence-based treatment approach that has short-term and long-term effect on functional outcome in patients with CVA. The ICF play an important role in functioning and health for patient with stroke.

**Aim:** The aim of this study is to find out outcome of physiotherapy management by implementing ICF for patient with stroke.

**Method:** A case-based study was conducted. The problem was found by implementing International Classification of Functioning, Disability and Health (ICF).

**Results:** The patient responds well in physiotherapy treatment. After receiving physiotherapy, it was found that improved muscle strength than previous, abolished shoulder pain, improved active movement of shoulder, elbow, wrist, hip, knee, and ankle, improves balance and reduced tonic.

**Conclusion:** The ICF core set reflects the importance of impairments, limitation and activity participation with environmental factors for stroke patients. After receiving physiotherapy management improved the patient's functional status.

#### Keywords

Stroke; Physiotherapy; ICF; CVA

#### Introduction

Cerebrovascular accident (CVA) is the medical term of stroke. When blood supply to the brain is interrupted and then cuts off the supply of oxygen and nutrients that causing damage to the brain tissue [1]. Stroke is affecting 17 million people worldwide and most frequent causes of physical disability. About 50% of the stroke survivors over the age of 64 have hemiparesis and about 26% of the stroke survivor lost independence in activities of daily living [2].

In 2013, stroke was the second most common cause of deaths worldwide and the third most common cause of disability. Stroke is killing 5.5 million people each year. A study found that there are significant disparities in stroke burden between men and women. Men were having consistently greater incidence of ischemic stroke

than women [3]. In United State (US), stroke is the 5<sup>th</sup> leading causes of death but remains a leading cause of disability [2].

Stroke is the third leading causes of death in Bangladesh. World Health Organization ranks Bangladesh's mortality rate due to stroke as number 84 in the world. The reported prevalence of stroke in Bangladesh is 0.3% [4]. Over 30% of people who have a stroke develop persisting disability according to the report of National Clinical Guideline Centre, 2011 [5]. The top five causes of disability in Bangladesh consist of cerebrovascular disease 6.9%, ischemic heart disease 6.5%, neonatal encephalopathy 5.6%, lower respiratory infection 4.6% and low back and neck pain 3.9% [6].

The International Classification of Functioning, Disability, and Health (ICF) is a common language and a classification system that indicates interaction between a person in physical, social, and psychological perspectives and also addresses the impact of such systems on the person's health status [7]. According to ICF, the categories are including: body functions, body structures, activities limitation, restriction of participation, environmental and personal factors [8]. It provides a common concept and standard language for physiotherapy and other rehabilitation disciplines to describe function for patients with stroke [9].

The specialized role of physiotherapists in the care and rehabilitation of people with stroke has been in existence for more than 30 years and the evidence in this area is constantly growing. The first few months are crucial for rehabilitation to reach a maximum potential [10].

The aim of this study is to highlight the physiotherapy management by use of Internal Classification of Functioning, Disability and Health (ICF) for patient with ischemic stroke.

#### Case

Mrs. Y was a 38 years old housewife and lived in a rural area. After getting a night sleep in the morning suddenly she felt weakness at her left side of the body and unable to left upper and lower limb at 24<sup>th</sup> January 2018. Then immediately patient was admitted in local hospital and stayed 4 days. After that, the doctor referred this patient at CRP, Savar for further physiotherapeutic management at 30<sup>th</sup> January 2018. Mrs. Y had no significant medical past history like hypertension, diabetes or any cardiovascular diseases. Her family was an extended one and earning member were 2 therefore their financial status was poor. In education the patient has completed only primary level. Her husband was a farmer. For 3 years the patient was habited with betel leaf.

#### Initial examination

At first verbal and written consent was taken from patient. Then, Neurological Assessment of physiotherapy department, Centre for the Rehabilitation of the Paralyzed (CRP) assessed the patient. Patient complaint of- perceive left shoulder pain, unable to move left hand and cannot walk properly.

#### In objective assessment

The vital signs were Blood pressure-13/80 mm (Hg), Pulse-70/minute, Auscultation- no added sound, Respiratory rate- normal.

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At first, posture was observed in sitting and lying position. In sitting– shoulder (left) was asymmetry (depressed), elbow and wrist were flexed, pelvic was posterior tilted, hip (left) was abducted and ankle was plantarflexed slightly inverted. In standing– shoulder was asymmetry, elbow– flexed, pelvic posterior tilted, knee slightly flexed and ankle was in neutral position.

The muscle tone was increased at left upper limb and lower limb muscles.

**Range of motion:** The ROM of U/L and L/L was measured by goniometer. The PROM of U/L and L/L was full. The AROM of left sided shoulder – flexion 45°, extension 10°, abduction 50° and adduction 10°; elbow– flexion 90°; wrist, MCP, PIP and DIP joints had no active movement. The AROM of left sided hip joint– flexion 120°, extension 35°, abduction 35°, adduction 10°, knee– FAROM, ankle– loss 30 dorsiflexion.

**Muscle power:** The muscle power was grade I of shoulder, elbow I and wrist muscle grade 0 in Oxford muscle grade scale. The hip, knee III and ankle group of muscle had grade I.

**Balance:** For balance, Berg balance scale was used. The score was in between 41-56 that indicated independent. Though it indicated independent yet this patient has poor balance.

**Gait analysis**

Initial stance phase– limited knee flexion, poor activation of tibialis anterior that causes poor heel strike, decreased ankle dorsiflexion– poor control of quadriceps. In mid stance phase– limited hip extension, lack of knee extension and excessive lateral pelvic shift– decreased ability to activate hip abductors and control hip and knee extensors. In late stance/ pre-swing– lack of knee flexion and ankle plantar flexion, poor preparation for swing due to weakness of calf muscles. In mid swing phase– poor toe clearance, poor control in knee flexion– normally 35-40° but this patient’s flexion increasing to 60° for swing and poor activation of hamstring. In late swing phase– limited knee extension and ankle dorsiflexion threatening poor heel contact and weight acceptance– decreased dorsiflexor activity were found.

**Diagnosis**

This case was diagnosed as Cerebrovascular Accident with Left sided hemiplegia. The **type of stroke** was Ischemic stroke and right middle cerebral artery was involved.

**Problem list based on ICF**

There are various categories present related the component of body function, structure, activity and participation in ICF core set. This case presented the above impairments (Tables 1-3).

**Physiotherapy Intervention**

Management of stroke patients begins as the acute care during acute hospitalization and continues as rehabilitative care as soon as patient’s medical and neurological status has stabilized. The primary goal of rehabilitation was to prevent complications, minimize impairments and maximize function. The plan of care of Mrs. Y including try to reduce shoulder pain, try to improve posture in sitting and lying, improve positioning, improve active movement, try to reduce asymmetrical weight bearing as possible, improve proprioception, coordination, improve muscle strength, improve gait, power, endurance, improve balance, functional

gross motor and transitional movement as well as activities of daily living. Also educate or counsel patient and care giver about physiotherapeutic intervention, how to take care of this patient, for reduction of weight and lastly for avoiding secondary complications.

**Patient education and counseling**

Provide education to patient and care giver about condition, prognosis and physiotherapeutic management and about secondary complications.

**Postural education**

It was advised that most of the time it is necessary to aware about posture in sitting, lying and standing

**Positioning**

From level II (a) evidence it is suggested that proper positioning is recommended after stroke. Poorer positioning associated with increasing flexor tone of elbow [11].

**Table 1:** ICF core set for stroke-categories of the component of body function.

ICF Code	ICF Category Title
b235	Vestibular functions
b260	Proprioceptive function
b280	Sensation of pain
b445	Respiratory muscle functions
b455	Exercise tolerance functions
b710	Mobility of joint functions
b715	Stability of joint functions
b720	Mobility of bone functions
b730	Muscle power functions
b735	Muscle tone functions
b740	Muscle endurance functions
b750	Motor reflex functions
b755	Involuntary movement reaction functions
b760	Control of voluntary movement functions
b765	Involuntary movement
b770	Gait pattern functions
b780	Sensations related to muscle and movement functions

**Table 2:** ICF core set for stroke-categories of the component of body structure.

ICF Code	ICF Category Title
s110	Structure of brain
s410	Structure of cardiovascular system
s720	Structure of shoulder region
s730	Structure of upper extremity
s750	Structure of lower extremity

**Table 3:** ICF core set for stroke-categories of the component of activity and participation.

ICF Code	ICF Category Title
d410	Changing body position
d415	Maintaining a body position
d420	Transferring oneself
d430	Lifting and carrying objects
d435	Moving objects with lower extremities
d440	Fine hand use (picking up, grasping)
d445	Hand and arm use
d450	Walking

**Table 4:** Outcome template.

<b>Goal:</b>				
<b>Short term goal (STG):</b>				
1. To normalize muscle tone (STG-1)				<b>Time frame: 1 month</b>
2. To maintain normal range of motion (STG-2)				
3. To improve muscle strength (STG-3)				
4. To improve independence in walking through assistive device (STG-4)				
<b>Long term goal (LTG):</b>				
1. To improve balance (LTG-1)				<b>Time frame: 3 months</b>
2. To improve functional independence (LTG-2)				
3. To improve walking without device (LTG-3)				
<b>ICF categories</b>	<b>Goal</b>	<b>Test value</b>	<b>Intervention</b>	<b>Outcome</b>
<b>Body function</b>				
b735: Muscle tone	STG-1	Elbow flexor: 1+/4 Wrist flexor: 2/4 Knee extensor: 1+/4	Positioning, stretching, weight bearing, ROM exercise.	Elbow flexor: ¼ Wrist flexor: 2/4 Knee extensor: ¼
b730: Muscle power	STG-3	UE: 1/5 LE: 1/5	ROM exercise, strength training	UE: 3/5 LE: 3/5
b710: Mobility of joint function (ROM)	STG-2	Shoulder Flexion: 45° Extension: 10° Abduction: 50° Adduction: 10° Elbow flexion: 90° Wrist ROM: 0°  Hip Flexion: 120° Extension: 5° Abduction: 20° Adduction: 10° Ankle dorsiflexion loss 30°	ROM exercise	Shoulder Flexion: 45° Extension: 30° Abduction: 120° Adduction: 30° Elbow Flexion: 130° Wrist Flexion: 40° Extension: 30° Hip Flexion: 140° Extension: 10° Abduction: 35° Adduction: 15° Ankle dorsiflexion loss 10°
b235: Balance	LTG-1	5/56	Balance training	33/56
<b>Activity and participation</b>				
d450: Walking	LTG-2	Can walk with walking frame	Gait training	Can walk with cane (single)
<b>Environmental factors</b>				
e120: Products and technology for personal indoor and outdoor mobility and transportation	LTG-3	Can walk with cane (single)	Prescribe walking frame	Can walk without helper

**Shoulder mobilization**

A study stated that passive shoulder mobilization was effective for reduction of pain. This was level 1 evidence [12].

**Functional stretching**

Stretching was provided in 10 repetitions by holding 15-20 seconds.

**ROM exercise**

Facilitate active movement (L/L) joints in 10 repetitions in each joint. For preventing the contracture and integrity of Joint ROM is effective.

**Trunk mobilization**

Trunk mobilization by using physio ball and without physio ball is effective to improve trunk control and balance in patients with stroke. The component was pelvic bridging, unilateral pelvic bridging, and forward flexion of trunk, upper trunk rotation, lower

trunk rotation, lateral flexion and weight shifting in side to side and anterior posterior in 6 days a week for 5 weeks [13]. For this case it was not possible to provide this dose. So this component was applied 3 days in a week.

**Dynamic balance practice**

In sitting on the edge of the bed dynamic balance practiced by reaching practice beyond the BOS (base of support) for 10 minutes.

**Pelvic stability or core stabilization exercise**

The core stabilization exercise consist of bridge exercise, bridge exercise with legs crossed, bridge exercise with one leg, curl-ups with straight reaching, curl-ups with diagonal reaching, bird dog exercise, and side bridge exercise can improve pelvic stability and dynamic sitting balance [14].

**Strength training**

Muscle weakness is common in stroke patient. Level 1 evidence supported that strength training program can improve muscular

strength, balance and physical activity. The dose is 8-12 repetition, 1-3 set, 2-3 times a week. 1 repetition maximum should be 50-80% to achieve the muscular strength [15]. There is evidence that strength training can improve upper-limb strength and function without increasing tone or pain in individuals with stroke [16].

#### Endurance training

Low intensity endurance training is effective in mobility, quality of life and muscle power than high intensity exercise. The training component was intermittent walking-10 minutes, 5 minutes of lower limb stretching exercise, progressive resistance training (knee extension and flexion), 5 repetitions, 5 set. It is level 2 evidence [17].

#### Task oriented training

Level 2 evidence reported that task-oriented training can improve the motor performance that will be helpful for gait rehabilitation. This training should be started after 4 weeks of stroke. Every task in 5-10 min, 7 days in a week at least up to 2 weeks [18]. For this case task-oriented training was started after 4 weeks of stroke and it was possible in 3 days in a week and now it is continuing.

#### Balance training

Double leg stance for 10 seconds, tandem stance for 10 seconds, step forward and backward, step sideways on exercise step, sitting on a physio ball with support and bending trunk forward and side to side, walking forward and backward in tandem walking pattern and perform single leg stance for 10 seconds. Continue this training 3 days in a week for Mrs. Y. Balance training exercise by physiotherapist can improve balance and gait [19].

#### Sit to stand practice

Level 2 evidence indicated that sit to stand improve the balance function of stroke patient [20].

#### Gait training

The components of gait in preparation for walking included: symmetrical weight bearing training, weight shifting, stepping training (swinging/clearance), heel strike, single leg standing, push off/Calf rise, sit-to-stand, step-ups, heel lifts, isokinetic strengthening, walking over obstacles, up and down slopes).

#### Trade mill training

Level 1 evidence (systematic review) suggested that there is little evidence to support of trade mill training on gait after stroke [21].

#### Home advice

Advice to patients for doing therapy accordingly and timely.

#### Outcome after re-examination

Re-assessed was done by physiotherapist to see the achievement of goal. It was found that improved muscle strength than previous, abolished shoulder pain, improve active movement of shoulder, elbow, hip and knee, and improve balance, enhanced independence (Table 4).

### Discussion

The purpose of this study was to the use of ICF in physiotherapy management for patient with ischemic stroke. After receiving 3 months physiotherapy, this case improved clinically that was documented in Table 4. Based on short term goal, muscle tone was

reduced at elbow flexor and knee extensor. The muscle power of upper and lower extremity was improved in Oxford muscle grading scale. The active movements of all joints of upper and lower extremity were increased after receiving physiotherapy. The balance was improved in berg balance scale dramatically. Based on long term goal, now this patient can walk without any support. The environmental factors were the facilitator and barrier for this patient previously but after prescribing assistive device now this patient overcome the barrier in indoor and outdoor mobility and transportation.

This case study exhibited the use of ICF in physiotherapy management. This use of ICF core set allows physiotherapist to evaluate and monitor all functional aspect of this case with comprehensive interventions. The most important principle of physiotherapy is to provide client-centered approaches. According to this approach, patients and therapists share to provide a set of information. The therapeutic goal setting is performed by the participation of the patient and the therapist. The use of ICF in clinical practice could help improve the quality of interdisciplinary work processes, including communication between health professionals and patients and their family members or caregiver.

### Conclusion

Physiotherapy management provides a promising way to deliver high quality, satisfying care without increasing health care costs. The ICF play a vital role in functioning and health in patient with stroke. In clinical setting, ICF helps in planning the assessment and treatment procedure. The case report was the first study on the clinical application of ICF in physiotherapy practice for patient with ischemic stroke.

#### Conflict of Interest

The authors have no conflict of interest on this issue.

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