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The clinical application of ICF model for occupational therapy in a patient with stroke: A case report

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Abstract

The ICF (the international classification of functioning, disability, and health) is a globally agreed framework and classification to define the spectrum of problems in the functioning of patients. ICF tools were developed based on ICF Core Set (ICF-CS) for the clinical application of ICF and patient management in the rehabilitation process. The current case report aimed at using ICF-based documentation tools in the occupational therapy process in a patient with chronic stroke. The case was a male who had a stroke 6 months prior to the study. The occupational therapy provided to this patient included 5 patient management components (examination, evaluation, prognosis, diagnosis, and intervention) using the ICF-based documentation tool. After one month, improvement in balance and mobility, going up and down the stairs without help, independent upper and lower body dressing achieved. The ICF was clinically applied to the occupational therapy practice in this case report. Because of the close relationship of ICF tools with the concept of occupational therapy, particularly client-centered approach and holistic evaluation of patients, occupational therapists can use ICF in clinical practice to have a more comprehensive view toward patients' recovery.

Keywords: ICF, ICF tools, Occupational therapy, stroke

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Introduction

Occupational therapy is one of the disciplines of rehabilitation sciences and constitutes a wide range of therapeutic interventions to increase the independency and functional status of patients with disabilities. The major goal of occupational therapy is to increase participation in daily activities to help the patients satisfy their needs based on their cultural and social context (1).

The International Classification of Functioning, Disability, and Health is a classification system, which indicates complex interactions between a person and his/her physical, social, and psychological environments and addresses the influence of such systems on the person's health status (2). According to ICF, components of functioning include body functions, body structures, activities, and participation; and components of disability involve impairments, activity limitations, and participation restrictions. The ICF, introduces a paradigm shift in how disability is conceptualized and, at the same time, provides a classification based on this understanding to describe relevant aspects of health and its determinants to be used for standardized reporting of information on health and disability in clinical practice and research. Body function, body structures, activities, participation, and environmental factors are classified based on ICF categories (3). The ICF provides a common concept and standard language for occupational therapists and other rehabilitation disciplines to describe function (4). To determine the severity of problem in ICF categories, ICF qualifiers

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↑What is "already known" in this topic:
The content and structure of ICF highlight the significant role of ICF in rehabilitation disciplines, particularly occupational therapy. There is a close and conceptual relationship between ICF and clinical models of occupational therapy, and occupational therapists can use ICF in clinical settings.

→What this article adds:
This was the first study on the clinical application of ICF in occupational therapy practice. When using ICF in clinical settings, all health aspects of the patients are considered and a useful window can be opened to provide holistic and client-centered occupational therapy services.

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are used, which are based on numerical scales ranging from 0 to 4 (0 : no problem (0%-4%): 1: mild problem (5%-24%); 2: moderate problem (25%-49%); 3: severe problem (50%-95%); 4: complete problem (96%-100%) (2). Environmental factors are quantified with a negative and positive scale that denotes the extent to which an environmental factor acts as a barrier or a facilitator (0: no barrier; 1: mild barrier; 2: moderate barrier; 3: severe barrier; 4: complete barrier; +0: no facilitator; +1: mild facilitator; +2: moderate facilitator; +3: severe facilitator; +4: complete facilitator). To facilitate the application of ICF in clinical practice, different ICF Core Sets were developed for different conditions (5). Each ICF Core Set includes some ICF categories specified to a particular disease and can be used as a standard index in clinical trials (brief ICF-CS) or multidisciplinary centers (comprehensive ICF-CS) (6). The ICF-based documentation tools were also developed alongside the ICF-Core sets to be used in different rehabilitation stages in clinical settings; the tools included ICF Categorical Profile, ICF Assessment Sheet, ICF Intervention Table, and ICF Evaluation Display (7). Each of these tools can be used at different stages of the patient's rehabilitation process. The ICF Categorical Profile is an illustration of the functioning state of a patient at the time of assessment. Using this tool, a comprehensive picture of the patient's functional status can be provided before starting the treatment program. Because patients' perspectives are included in the ICF Assessment Sheet, it can increase the patients' active participation in goal setting and treatment process. Based on an evidence-based approach, the most appropriate treatment interventions for each of the categories are added in the ICF intervention table. ICF evaluation display helps obtain the followings: providing a comprehensive overview of the rehab cycle, (discussing goal achievement, and making decisions about further steps. Occupational therapists can use such tools to assess the functional conditions of patients and records of various components of patient management in clinical centers (8). In addition, an ICF-based documentation template was suggested by Escorpizo in which different components of patient management, from baseline evaluations to the provided interventions, are recorded (9). Therefore, this case report aimed at applying and indicating the application of ICF-based documentation tools during the occupational therapy process of a patient with chronic stroke.

Case report

The case was a 53-year-old single male who had a hemorrhagic right hemisphere stroke 6 months prior to the study. He lived in an apartment on the third-floor with his wife and son, and was a driver in a private company. Prior to onset of stroke, he participated in various recreational activities, such as cycling and football. He was hypertensive and used to smoke. He had a relatively supportive family and was transferred to the hospital immediately after the stroke and received preliminary medical care. He stayed in the intensive care unit (ICU) for 3 days and in the neurology ward for 1 week. Then, he was discharged and regularly received physiotherapy services at home. However, he had weakness and imbalance in his left limbs. He could walk short distances with a quad cane; he depended on others for some ADL, such as toileting and dressing. His range of motion was limited due to spasticity and pain and he almost had no functional use in his upper limbs. He participated in this study after completing the written consent form. The current report was conducted 6 months following a comprehensive assessment of his functional status.

Examination

The comprehensive ICF Core Set of stroke was considered as the main reference in this case study (10). Since there are different categories in stroke ICF Core Set that are relevant to the services of all health care providers, such as physicians and nurses, and considering the results of a study by Glässel et al. in 2010, only the categories attributed to the occupational therapy were selected and applied for the patient (8). By the documentation template suggested by Escorpize, all the tests, assessments, and interventions, which could be performed by an occupational therapist, were recorded in the ICF Core Set categories for stroke. The occupational therapist identified some difficulties in the patient's body functions, such as reduction of proprioception function (b260) and mobility of joint functions (b710) in upper and lower joints of the affected body side. Also, the patient developed an increase of muscle tone function (b735) in one side of the body. Imbalance and incoordination were observed and recorded by the evaluation of inventory movement function (b755) and control of voluntary movement functions (b760). The occupational therapist diagnosed some limitations in most mobility domain categories, such as hand and arm use (d455), walking (d450), and moving around under different circumstances (d460). In addition, the patient had some problems in the self-care domain, such as toileting (d530), washing (d510), and dressing (d540). Evaluation of the code d850 remunerative employment revealed that the patient could not drive (d4751: Driving motorized vehicles) and go back to work as a driver at that time. He was capable of performing some leisure activities, such as crosswords and watching TV; however, his capability in performing other activities, such as cycling, was completely limited.

Evaluation

The results of stroke ICF Core Set categories showed different limitations in mobility and self-care of the patient. These limitations were mainly associated with neurological damages (motor-sensory dysfunction) caused by the stroke and the inability to functionally use the affected side of the body that limited the participation in leisure and work activities.

As soon as all ICF Core Set categories were graded based on the qualifiers, a comprehensive definition as ICF categorical profile was provided regarding the functional status of the patient (Fig. 1). The patient's family (e310) and the therapist (e355) were supportive and facilitators. Since the patient used a quad cane, the code e120 was also added as an environmental facilitator. The patient was

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Evaluation (6 months following stroke)											
Patient Goal(PG) : independent living in the community											1
Long term goal(LTG): resumption of work activities											2
Short term goal(STG1):Mobility											1
Short term goal(STG2) : Self-care											0
ICF Categories	ICF Qualifier									Related to LTG or STG	Goal value
					0	1	2	3	4		
b110: Consciousness functions											
b114: Orientation functions											
b140: Attention functions											
b144: Memory functions											
b156: Perceptual functions											
b167: Mental functions of language											
b260: proprioceptive function										STG1	1
b265: touch function										STG1	0
b2801: painin body part										STG1 STG2	1
b7101:Mobility of several joints										STG1	1
b7302: Power of muscles of one side of the body										STG1 STG2	1
b7352: Tone of muscles of one side of body										STG1	1
b755: Involuntary movement reaction function										STG1	1
s720: structure of shoulder											
s730: structure of upper extremity											
d4101: Squatting										STG2	2
d4105:Bending										STG1 STG2	0
d4106:Shiftingthe body's center ofgravity										STG1	0
d4151:Maintaining a squatting position										STG2	1
d420: transfering oneself											
d430: lifting and carrying object											
d440:Fine hand use											
d445:Hand and arm use										STG2	1
d 4500: Walking short distances										STG1	0
d4501:Walking long distances										STG1	2
d4502:Walking on different surfaces										STG1	1
d4503:Walking around obstacles										STG1	2
d4551:Climbing										STG1	1

Fig. 1. ICF Categorical profile

motivated to take part in the occupational therapy program, while he had accepted his current conditions.

Diagnosis

The ICF Assessment Sheet (Fig. 2) used in this stage relies on the clinical reasoning of the therapist. The sheet, which provides a comprehensive definition about the functional conditions of the patient, constitutes 2 parts: The upper part indicates complications experienced by the patient and is completed via a routine interview with the patient. In the lower part of the sheet, which reflexes the viewpoint of the therapist, the reasons and causes of the experienced complications are transferred into the ICF categories. Hence, finding an association between patient's complications and the causing factors is facilitated; for example, the factors that caused the patient's mobility complications (the upper part of the sheet) can be identified via the ICF lists completed by the therapist based on his/her examinations and assessment of the patient (for example, tone of muscle (b735) and mobility of joint function (b710). The relationship is then shown by the connecting lines (Fig. 2).

Prognosis

The prognosis was favorable, comparing the improvement observed in neurological conditions (stroke recovery) of the patient and other studies with hemorrhagic stroke (11).

Plan of care

The goals of the therapeutic program were established by the participation of the patient and by considering different components of ICF. The patient's goal (PG) was to regain his independence. The long-term goal (LTG) of the patient was to regain his capabilities to drive and go back to work. Short-term goals (STG) are achieved within a short-term cycle by rehabilitation practitioners (7). Two short-term goals (STG) were identified for the patient. First, mobility improvement, particularly the ability to walk without a cane and going up and down the stairs; second, improvement in the patient's capabilities to achieve maximum independence in activities of daily living (ADL), such as toileting and dressing. The goals were entered into the ICF Categorical Profile and ICF Assessment Sheet. The interventional targets were selected according to the goals that were set by talking to the patient. For example, according to the first short-term goal, the selected interventional targets were increased muscle tone, involuntary motor reactions, and reduced muscle strength in the affected side of patient's body. Such activities as

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ICF Categories	ICF Qualifier									Related to LTG or STG	Goal value
					0	1	2	3	4		
d460: moving around in diffrenet locations					■	■	■	■		STG1	1
d465: moving around using rquipments					■	■	■				
d470: Using transportation					■	■	■	■			
d4751 Driving motorized vehicles					■	■	■	■	■	LTG	2
d510:washing					■	■	■			STG2	0
d530: toileting					■	■	■	■		STG2	2
d 540: dressing					■	■	■			STG2	0
d550: eating					■	■					
d850: remunerative emplioyment					■	■	■	■	■	LTG	2
d9201: sport					■	■	■	■			2
Influence of environmental factores	Facilitator					Barrier					
	+4	+3	+2	+1	0	1	2	3	4		
e120: Product and technology for personal indoor and outdoor mobility and transportation			■	■	■					STG1	+4
e310: immediate familly		■	■	■	■						
e355:health professional	■	■	■	■	■						
e410: individual attitude of immediate family members			■	■	■					STG1 STG2	+4
Personal factors(PF)	Influence of personal factors										
	Positive			Neutral			Negative				
Motivated to attend occupational therapy sessions	■	■	■								
Hoping for recovery	■	■	■								
Accept current situation	■	■	■								

Fig. 1. Continue

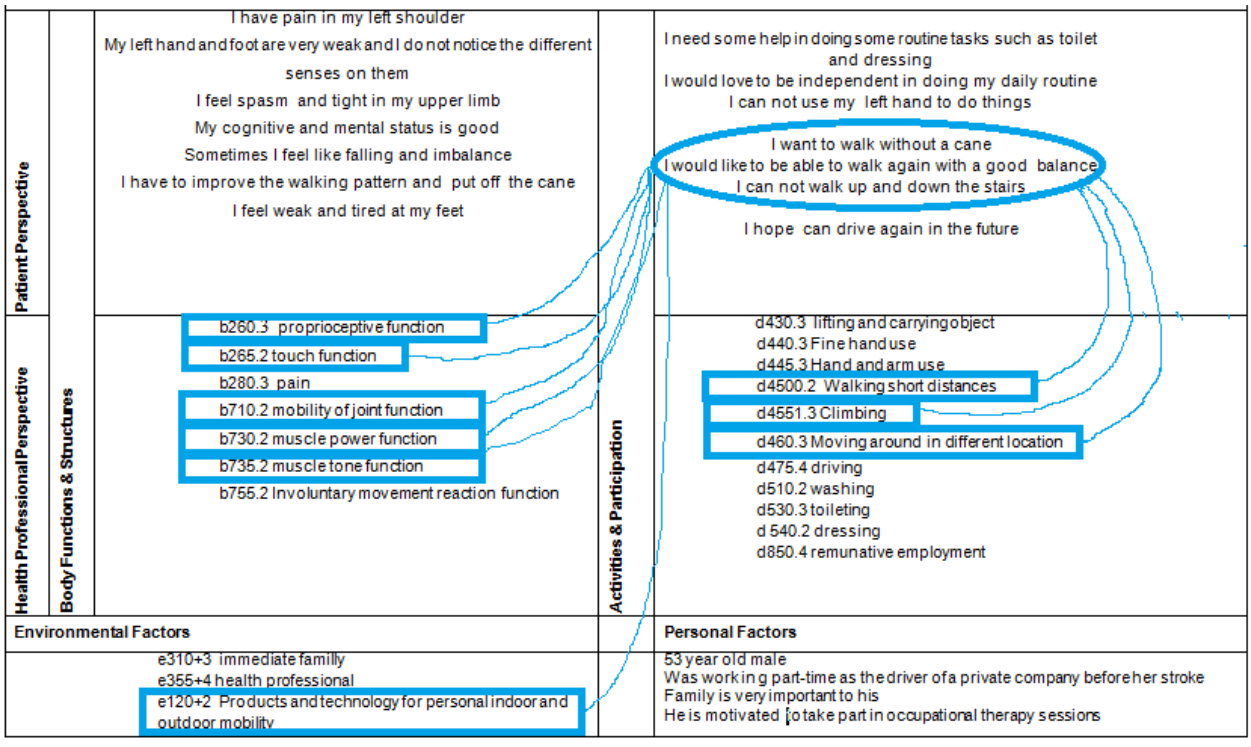


Fig. 2. ICF assessment sheet

change and maintenance of different body positions, including walking and moving under different locations, were also considered as intervention targets. In addition, to facilitate the patient's mobility, use of assistive devices, such as splint and insole, was also considered as a facilitating environmental factor. A goal value was set for each of the first and second short-term goals expected to be met by the end of the 1- month intervention.

Intervention

Some of the interventions provided by the occupational therapist are shown in the documentation template (Table 1). A set of occupational therapy interventions is provided for each ICF category. According to the set short-term goals, various interventions were used to improve mobility and ADL. The occupational therapist used occupation-based therapeutic and neurophysiological approaches towards improvement in designated goals. Accordingly, some therapeutic techniques, such as using thermal modalities, weight bearing, active, passive, and stretching movements, muscle strengthening, and different balance exercises were performed to achieve the goals. Some envi-

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ronmental adaptations were also conducted to induce more independence in the patient regarding his daily activities; for example, embedding a handhold in the bathroom to facilitate sitting and standing, using bath chair, and removing the barriers to bath entrance.

Outcome

The patient's functional conditions were reassessed by the end of the 1 month- occupational therapy program, and the results were transferred into the documentation template (Table 1). Based on the first short-term goal, t spasticity reduced in knee extensors and ankle plantar flexors, and muscle strength increased in some muscles, such as knee flexors. In addition, the balance reactions were improved in the patient. Such changes improved the patient's balance and mobility. He can now walk without a cane, but he still uses it when walking far distances and going to unfamiliar places. He can also go up and down the stairs without help. The patient can now wear upper and lower clothes independently by learning the adaptive and compensatory (one-handed technique) methods although he still has problems in some activities, such as fastening a belt, which is due to motor problems in the upper limb. His independence and balance improved following the installation of some devices, such as embedding a handhold in the toilet and using bath chair and non-slippery mats in the toilet. After the patient completed the occupational therapy program, he was reassessed for the interventional ICF categories; the results are demonstrated in the ICF evaluation display (Fig. 3).

Table 1. Documentation template

Patient Goal:independent living in the community Long term goal(LTG): resumption of work activities Short term goal(STG): 1:Mobility 2: Self -care					Diagnosis: Chronic stroke			
Date	6 months post stroke						7 months post stroke	
	Examination					Intervention frequency	Re-examination	
ICF Categories intervention targets	Need to examine?	Test	Test value	Intervention target related to STG/LTG number?	Prognosis	Occupational therapy sessions will be provided 3 times weekly	Retest value (only fore intervention targets)	Goal achieved?
Body functions								
b7352: Tone of muscles of one side of body	Yes	Modified Ashworth scale	Biceps: 3/4 Wrist flexor: 2/4 Knee extensor: 2/4 Ankle dorsi flexor: 2/4	STG1	Related to neurological recovery	Splint & orthosis Positioning Passive AND active ROM	Biceps: 2/4 Wrist flexor: 1/4 extensor: 1/4 Ankle dorsi Ankle dorsi flexor: 1/4	Yes
b7302: Power of muscles of one side of the body	Yes	Functional muscle examination	Upper extrimity: 1/3 Lower extrimity: 1/3	STG1 STG2		Progressive Resistive exercise /elastic bands	Upper extrimity:1/3 Lower extrimity:3/3	Yes
Body structures	No							
Activities & participation								
d 4500: Walking short distances	Yes	Measurement of walking distance	Supported by a wide-based quad cane	STG1	Will walk up a few steps without support	Giat training	Able to walk up to 100 m without cane	Yes
d 540: dressing	Yes	Observation	Needs someone else's help	STG2		Instruction/ one-handed techniques	Able to dress independently	Yes
Environmental factors								
e120: product and technology for personal indoor and outdoor mobility and transportation	Yes	Inspection of used cane and his shoes	Incorrect height of the cane/Need a suitable insoles	STG1	Will be optimized	Consultation /referral to Technical orthopedic	Optimal fit	Yes
Personal factore (PF)	Influence: Positive	Influence: Negative						
Motivation	×							
Attitude toward intervention	×							

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Evaluation value(6 months following stroke)												Final value(7months following stroke)										
Patient Goal(PG) : independent living in the community											1					Not evaluated yet						
Long term goal(LTG): resumption of work activities											2											–
Short term goal(STG1):Mobility											2											√
Short term goal(STG2) : Self-care											1											√
ICF-categories	ICF Qualifier									Goal relation	Goal value	ICF Qualifier									Goal achievement	
					0	1	2	3	4							0	1	2	3	4		
b260: proprioceptive function										STG1	1											√
b265: touch function										STG1	0											–
b2801: pain in body part										STG1,STG2	1											√
b7101:Mobility of several joints										STG1,STG2	1											√
b7302: Power of muscles of one side of the body										STG1,STG2	1											√
b7352: Tone of muscles of one side of body										STG1	1											√
b755: Involuntary movement reaction function										STG1	1											√
d4101: Squatting										STG2	2											√
d 4105:Bending										STG1,STG2	0											√
d 4106:Shifting the body's center of gravity										STG1	0											√
d4151:Maintaining a squatting position										STG2	1											–
d445:Hand and arm use										STG2	1											–
d 4500: Walking short distances										STG1	0											√
d4501:Walking long distances										STG1	2											√
d4502:Walking on different surfaces										STG1	1											–
d4503:Walking around obstacles										STG1	2											√
d4551:Climbing										STG1	1											√
d460: moving around in diffrenet locations										STG1	1											√
d4751 Driving motorized vehicles										LTG	2											–
d510:washing										STG2	0											√
d530: toileting										STG2	2											√
d 540: dressing										STG2	0											√
d850: remunative employment										LTG	2											–
	Facilitator				Barrier							Facilitator				Barrier						
	+4	+3	+2	+1	0	1	2	3	4	STG1		+4	+3	+2	+1	0	1	2	3	4		
e120: Products and technology for personal indoor and outdoor mobility											+4											√
e410: individual attitude of immediate family members											+4											√

Fig. 3. ICF evaluation display

Discussion

This case report of a patient with stroke showed the application of ICF in occupational therapy practice and provided a comprehensive definition of his functional conditions and limitations. Use of ICF-Core set in clinical settings allows occupational therapists to evaluate and monitor all functional aspects of a patient with comprehensive assessments/interventions and documentations.

Using ICF Core Set and determining the severity of problems in each of the categories based on ICF qualifier, a comprehensive definition was provided from the functional status of the patient in the form of ICF categorical profile, which can be used as a basis for managing the patient in occupational therapy practice.

One of the most important principles of occupational therapy is to provide client-centered services to patients. According to this approach, patients and therapists share a set of information. For this purpose, the occupational therapist should collect a set of data about the perception of the patient about his/her problems, needs, and goals (12). The ICF assessment sheet can perfectly reflect this approach of occupational therapy. The ICF assessment sheet provides useful data to therapists about the patients' functional conditions. Hence, the therapeutic goal setting is performed by the participation of the patient and the therapist.

According to Table 1, the most suitable assessment tools and therapeutic interventions were selected and employed based on the ICF intervention table and the documentation template for each category was selected as interventional target. In fact, a useful care plan was introduced based on the assessment and therapeutic stages of the selected intervention targets, and all functional aspects and inabilities of the patient were considered.

The ICF evaluation display indicates the changes in the functional status of the patient following the interventions in which all categories used as interventional targets are reassessed using ICF qualifiers (4, 7).

Additionally, the use of ICF (considering the common language provided by 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 caregivers.

Conclusion

By the use of ICF in clinical settings and properly planning the assessment and treatment procedures, all health aspects of the patients can be planned comprehensively and completely, and a useful window can be opened to provide holistic and client-centered occupational therapy services. The current case report was the first study on the clinical application of ICF in occupational therapy practice. However, further studies should be conducted to find the best method for the implementation of ICF in occupational therapy and other rehabilitation disciplines.

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Conflict of Interests

The authors declare that they have no competing interests.

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