

Application of the International Classification of Functioning, Disability and Health - Children and Youth in Children With Cerebral Palsy

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The International Classification of Functioning, Disability and Health (ICF) is a framework for describing health status; however, there is a gap in literature for supporting its use as a classification tool. The purpose of this paper is to provide a perspective on its use in describing children with cerebral palsy. The interconnected concepts of the ICF are more important than the classification elements itself. Further research is required to prove its use as a classification tool in clinical practice.

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Cerebral palsy (CP) is a common childhood physical disability and describes a “group of permanent disorders of the development of movement and posture, causing activity limitation that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior, by epilepsy, and by secondary musculoskeletal problems” [1]. The World Health Organization’s (WHO) International Classification of Functioning, Disability and Health (ICF) provides a framework to describe a wide range of information about health, and is a standard language for describing health and health-related states [2]. The ICF can be used to describe the health status of children with CP [3]. However, it requires revision and augmentation for direct use with children and adolescents as the manifestations of a disorder in children and adolescents are different from those of adults [4,5].

A version of the ICF for children and youth, the ICF-CY was published in 2007 [6]. The International Classification of Diseases (ICD) and the ICF are complementary as the ICD provides codes for diagnosis, and the ICF provides codes for describing the health and health related states [2,6,7]. The ICF is well-accepted as a framework; however, its use as a classification tool is still unclear. The WHO encourages the ICF/ICF-CY and the ICD-10 classifications to be used together [2,6,7]. A health professional can diagnose a health condition using the ICD-10 and describe the health status using the ICF [5]. As the use of the ICF as a classification tool warrants

further development, the purpose of this paper is to offer perspectives on its use in describing children with CP.

ORGANIZATION AND INTERPRETATION

The ICF/ICF-CY can be divided into two parts: functioning and contextual factors. Functioning is in turn divided into three components: body structure/function, capacity, and participation. The contextual factors include two components: environmental factors and personal factors. The structure of the ICF is presented in **Table I**. The components consist of specific domains which refer to a meaningful state of physiological functions, anatomical structures, actions, tasks and so on.

The components of the ICF/ICF-CY are interpreted by means of constructs (i.e frame), which are operationalized by using qualifiers. The qualifiers indicate the severity of the health condition. In the absence of a qualifier, the codes are meaningless. For example, the code d415 (maintaining a body position) doesn’t provide any meaningful information, rather d415.2 indicates that the person is having moderate difficulty in maintaining a body position. The qualifiers convert the domains of the ICF/ICF-CY to a classification. The domains of the ICF/ICF-CY are arranged hierarchically and are expressed via coding. The primary qualifier for body structure and body function indicates the presence of impairment on a five point scale (no impairment, mild, moderate, severe and complete). For example, b1100.0 indicates that the child has no impairment in the state of consciousness. The activity and participation component is coded using ‘performance qualifier’ and ‘capacity qualifier’. The performance

TABLE I STRUCTURE OF THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING DISABILITY AND HEALTH.

	<i>Functioning and disability</i>		<i>Contextual factors</i>	
<i>Components</i>	Body structures and function	Activities and Participation	Environmental factors	Personal factors
<i>Domains</i>	Body functions Body structures	Life areas (tasks, actions)	External influences on functioning and disability	Internal influences on functioning and disability
<i>Constructs</i>	Change in body functions (Physiological) Change in body structures (Anatomical)	Capacity (Executing tasks in a standard environment) Performance (Executing tasks in a current environment)	Facilitating or hindering impact of features of the physical, social and attitudinal world	Impact of attributes of the person
<i>Positive aspects</i>	Functional and structural integrity	Activities and Participation	Facilitators	Not applicable
<i>Negative aspects</i>	Impairment	Activity limitation and participation restriction Barriers/hindrances	Not applicable	Disability

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qualifier refers to what an individual usually does in the typical environment whereas the capacity qualifier refers to what an individual can do in a standard environment. The qualifier for coding environmental factors indicates the extent to which a factor is a facilitator or a barrier [2, 6]. One disadvantage of the ICF is the use of the terms mild, moderate and severe. These terms are subjective and may mean differently for different people; therefore, less helpful [8]. Further work is needed to validate the use of descriptive terminologies.

Significant features

The ICF-CY is a universal classification system that describes and measures the health and functioning of children and youth from birth to 18 years of age. It consists of four age bands; infancy (0-2), early childhood (3-6), middle childhood (7-12) and adolescence (13-18). The ICF-CY can be widely used in administrative, clinical and research settings for children and youth. Through the documentation of child-environment interaction the ICF-CY can provide a basis for intervention planning by identifying current barriers and the required facilitators. Although the interconnected concept is more important than the classification elements itself, the classification elements can be considered as a yardstick. Another important implication of the ICF-CY is that, it can be used as a framework for selecting outcome measures, in addition to its use as an outcome measure. The ICF-CY can also serve as a standard reference for defining rights of children and adults with disabilities [9]. The ICF-CY can advance

evidence-based practice in a number of ways [6,10]. The WHO is in the process of merging the ICF-CY to the ICF in order to make it make more simple and comprehensive [11].

Limitations. The ICF, in spite of serving as a standard conceptual framework and covering most of the dimensions of health, has certain limitations. There is lack of significant evidence on its use as a classification tool. The description of the use of the qualifiers needs to be explained more clearly in order to be used reliably. The use of subjective terminologies to describe the severity, and the reliability and validity with which these terminologies could be used effectively also limits its application [8]. In addition, the description of the core sets are also complex. Further research in this area may clarify these questions and augment the application of the ICF as a classification tool.

ICF-CY core sets for CP

The ICF classification system contains 1685 categories. Many of these categories cannot be easily used in clinical practice and clinical research. In order to reduce the complexity and be able to apply it in practice, ICF core sets are required [10,12]. Core sets are lists of categories that serve as international standard for reporting function related to a specific health condition. There are two ICF core sets: brief core sets and comprehensive core sets. A brief core set consists of 10 to 20 categories, and can be used as a minimal standard to describe the function and health of a child with a specific health condition. The

comprehensive core set consists of 70-150 categories, offering a multidisciplinary comprehensive assessment for individuals with specific health conditions [12,13].

To date, core sets have been developed for adult populations. Recently, ICF core sets have also been developed for children with CP [12]. These core sets may serve as a reference framework and a practical tool to classify and describe functioning more efficiently in children with CP [12,14]. The overall ICF framework is robust; however, ICF-CY core sets may better characterize the functioning of children with CP.

APPLICATION OF ICF/ICF-CY IN CEREBRAL PALSY

The ICF/ICF-CY has a broad application in terms of describing developmental disabilities and is an effective framework for describing the health status of children with CP. The ICF-CY framework broadens clinical approaches, encouraging care plans for children with CP that consider body structure/functions, activity and participation, and environment [3,6,7,10]. The ICF-CY includes learning and playing as part of the developmental process [6]. The potential for describing CP using the ICF-CY is demonstrated below (**Box I**). As stated earlier, the terminologies mild, moderate, and severe are influenced by personal preferences and therefore revision of the severity terminologies in terms of levels similar to the Gross Motor Function Classification System (GMFCS), the Manual Ability Classification System (MACS) and the Communication Function Classification System (CFCS) may be more meaningful. **Table II** shows the description of each levels of the GMFCS, the MACS and the CFCS.

Box I APPLICATION OF THE ICF IN CHILDREN WITH CP

The following codes could be used to classify and describe a child with CP depending on the structure and function involved, capacity and performance and the impact of environment.

- *Change in body structure:* Structure of brain – s110, Cortical structure (s1100), Cerebellum (s1104), Basal ganglia (s1103), etc.
- *Change in body function:* Control of voluntary movement (b7600), Involuntary movement reactions (b7650) etc.
- *Capacity:* Transferring oneself, etc (d4200._0)
- *Performance:* Transferring oneself, etc. (d4200.3_).
- *Barrier/facilitator:* General products and technology for personal use in daily living (e1150.3).

Body Structure and Body Functions

In body structure component of the ICF-CY, CP is classified under the “impairments of the nervous system - Brain” which is coded as ‘S110’. Classification and interpretation of body structure component involves analysis of severity (first qualifier), location (second qualifier) and nature of impairment (third qualifier) based on the scaling of qualifiers [6,7]. For example, code ‘S110.373’ implies a severe impairment, involving accumulation of fluid at both the sides of the brain.

The movement and posture aspects of CP can be categorized under “neuromusculoskeletal and movement related functions” [6,7]. It is crucial to evaluate the

TABLE II THE FIVE LEVELS OF GROSS MOTOR FUNCTION (GMFCS), MANUAL ABILITY (MACS), AND COMMUNICATION FUNCTION (CFCS) CLASSIFICATION SYSTEMS

Levels	Classification systems		
	GMFCS	MACS	CFCS
I	Walks without limitations	Handles objects easily and successfully	Sends and receives with familiar and unfamiliar partners effectively and efficiently
II	Walks with limitations	Handles most objects but with somewhat reduced quality and/or speed of achievement	Sends and receives with familiar and unfamiliar partners but may need extra time
III	Walks using a hand-held mobility device	Handles objects with difficulty; needs help to prepare and/or modify activities	Sends and receives with familiar partners effectively, but not with unfamiliar partners
IV	Self-mobility with limitations; may use powered mobility	Handles a limited selection of easily managed objects in adapted situations	Inconsistently sends and/or receives even with familiar partners
V	Transported in a manual wheelchair	Does not handle objects and has severely limited ability to perform even simple actions	Seldom effectively sends and receives, even with familiar partners

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child's movement and posture as part of the gross motor function core features of CP. In addition children with CP may have secondary problems with behaviour, musculoskeletal function, and participation in society [15]. Coding of the body functions part is done with a single qualifier that indicates the extent or magnitude of the impairment [6,7]. For example, the moderate impairment of a child with athetoid CP can be described with code 'b7650.2'. The ICF/ICF-CY might be used to compare function before and after interventions [6-8,16]; however, this has not been investigated.

Activities and Participation

The Activities and Participation component in the ICF/ICF-CY characterizes the function of a person with a health condition, from both an individual and a societal perspective. Children with CP may pose an activity limitation [1]. Activity limitation in CP may include limitation in walking, running and climbing stairs [17] which may affect the ability of the child to participate in desired societal roles [1]. It has been reported that among children with CP, participation restrictions in the domains of mobility, education, and social relationships were strongly influenced by activity limitation as measured by the Gross Motor Function Classification System and by learning disability [18]. Therapists are more concerned with providing best treatments for motor functioning and participation [19]. It is important to understand the difference between activity and participation. Activity refers to what the child can do at his/her maximum under a controlled environment whereas participation refers to what the child does every day on his/her usual environment. Improvement of capacity alone may not be meaningful if it does not have any impact on the child's performance. Activities and participation are coded with two qualifiers: performance qualifier and capacity qualifier. For example, codes 'd430' 'd440' and 'd450' indicate that the child experiences difficulty in lifting and carrying objects, fine hand use and walking, respectively. The performance qualifier (first qualifier) and capacity qualifier (second qualifier) denote degrees of participation restriction and activity limitation. For example, code 'd470.3_' denotes severe restriction in using transportation, and code 'd470._3' indicates severe capacity limitation in using transportation [1]. The identification of these challenges might guide the rehabilitation goals and interventions [4,16]. For example, if the performance of hand functions of the child is restricted by the environment; assistive devices may be the intervention of choice. If the capacity of hand function is limited, interventional strategies such as hand function training is considered. The difference between the capacity and performance explains the impact of the environmental factors.

Environmental Factors

Contextual factors are a significant feature of the ICF/ICF-CY that reflects the social construction of disablement [3]. Environmental factors are an important component of the ICF/ICF-CY that facilitates identification of environmental barriers and facilitators which guide in policy and programme development [4, 16]. The environmental factors can be physical, social, and attitudinal [2,3]. Individual and environmental factors influence the health condition of children with CP [20]. For example; environmental factors may include social supports, community resources, life style, and the availability, quality and expertise of intervention programs. The qualifiers of environmental factors denote the extent to which a factor may be facilitator (+ sign) or a barrier (a point alone). For example, the ICF code 'e120 + 3' indicates substantial facilitation of mobility and transportation. Home modifications are an effective means to facilitate indoor mobility in children with CP. The social and cultural environments such as attitudes, beliefs of others, public policies, and family support may also affect their participation in daily activities [21-27]. In children with CP, the use of augmentative interventions such as mobility aids, and alternative communication devices may have a significant role in compensating for activity limitations [3].

RATIONALE FOR USING THE ICF-CY IN CP

CP is a neurodevelopmental disorder that can limit the person's optimal functioning. Such disorders are of special interest in rehabilitation, for clinical practice, conducting research, as well as for administration and assessment of services. Furthermore, data about functioning in cerebral palsy are important for determination of the efficacy and cost-effectiveness of health services. There are many interventions that could help children with CP; however, evidence of treatment on outcomes is limited. Parents, children, and medical professionals therefore struggle to choose safe and effective interventions [28]. The multi-dimensionality of the ICF and the importance of including parents in making decisions about goal-setting is supported by Wright and colleagues [29]. The ICF-CY can be used in identifying and measuring efficacy and effectiveness of the rehabilitation services by tracing the functional aspects over a period of time and comparing the effectiveness of targeted intervention [9]. The ICF-CY also reflects the interactive relationship between the health conditions and the contextual factors. The other aspects that are usually of interest for service providers in dealing with children with CP are the capacity and performance. The ICF-CY identifies these issues and

provides guidance for incorporating them to practice. For children with CP, the ICF-CY provides various points of entry for enhancing activity and participation and to prevent secondary impairments [3,8,16].

In summary, the ICF/ICF-CY provides a tool to describe the health status of an individual from a different perspective i.e. it helps us to think how a person with disability can live a full life in the community. From the rehabilitation perspective, the ICF/ICF-CY guides rehabilitation goal-setting. The ICF-CY with its components of body structure and body functions, activity and participation, and contextual factors has the potential to broadly describe the health status of children with CP and meaningful aspects of the child's functioning.

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