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Mapping of pediatric voice handicap index into ICF format for the assessment of voice disorders in children

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Abstract
VHI and pediatric VHI (pVHI) measure the impact of dysphonia on emotional, physical and functional aspects of children and not on functioning of the individual in activity and participation in daily life. Functioning is measured by WHO's International Classification of Functioning, Disability and Health and ICF-CY. The present study attempts to compare pediatric voice problems according to pVHI quantification system and pVHI mapped on ICF format. Responses of parents of 20 dysphonic children were sought on both the original and ICF-CY mapped pVHI. Percentages were calculated and compared for each question. With original pVHI - total scores obtained categorized children as mild, severe and moderate handicap. With ICF-CY mapped pVHI- it was observed that though child has mild handicap 17% of activities of daily living were affected almost always due to his voice problem. Similarly, for children with moderate and severe handicap, varying degrees of limitations in activities and participation is observed. Differences in the assessment of the children with original pVHI and ICF mapped pVHI are observed especially in domains of activity limitation and participation restriction.

Keywords: Pediatric voice handicap index, ICF, ICF-CY, activity limitation, participation restriction

Introduction

The traditional endoscopic imaging tools used to evaluate the pediatric larynx provide extensive information about vocal fold and supraglottic pathology. Although these instruments allow for physiologic evaluation of the causes of a voice disorder or dysphonia, they do not provide information regarding their impact on a child's life. Health related quality of life can be defined as the "subjective and objective impact of dysfunction associated with illness or injury, medical treatment and health care policy". Numerous health related quality of life instruments have been developed to measure the effect of the illness and disability on children's activities of daily living. These instruments focus on general concepts related to physical abilities, growth and development general health perception. Several validated voice-related quality of life measurements are used for adult population. These include voice outcome survey (VOS), voice-related quality of life and the voice handicap index (VHI) [3]. The VHI is a reliable and valid adult self-assessment and is widely used in clinical practice. The objective of the VHI is to provide a measurement of the severity of a voice disorder in three domains: emotional, physical, and functional.

One of the difficulties in determining the extent of a problem within a population is the way in which problem is defined. In the area of voice, it is recognized that voice disorders cannot be defined unequivocally [12]. A broad definition of self reported voice disorders used in a recent study [11] was "any time the voice does not work, perform or sound as it normally should, so that it interferes with communication".

A study based on the correlation between pVHI and CAPE-V revealed significant variability in the perspective and priorities of pVHI [4]. The pediatric voice outcome survey (PVOS) is the only validated voice survey for use in pediatric population. A study based on self reported Voice-related Quality of life in adolescents revealed several actors or aspects which were affected due to paradoxical vocal fold dysfunction [8, 9]. However, several key issues are not addressed in PVOS, example, specific domains that affect daily functions. Hence, the VHI was adapted to the pediatric population and called it pVHI. Pediatric Voice Handicap Index (pVHI) is a 23 item parental proxy questionnaire tool used for assessing the amount of handicap in children with voice problems from 4 to 12 years of age; it focuses on the functional, physical and emotional impacts of voice disorders on the child's daily activity along with a visual analog scale for the parental judgment of the overall severity [5].

Both, VHI and pVHI measure impact of dysphonia on emotional, physical and functional well-being of children and are based on the medical model. They do not assess the impact of the disorder on the functioning of the affected individual in terms of activity and participation in daily life. Voice disorders although not threatening, can have significant impact on the functioning of the individual [8].

One of the methods to assess impact of voice disorders on functioning is to use WHO's International Classification of Functioning, Disability and Health [14] framework. WHO's [14] International Classification of Functioning, Disability and Health (ICF) is an international classification of health and health-related domains. These domains are classified as body

functions and structure, activity and participation and environmental factors [14]. The body functions deal with the physiological functions of body systems, while the Activity Limitations deals with difficulties the individual may have in executing tasks or actions. Participation Restrictions accounts for the problems in the nature and extent of a person's involvement in life situations.

WHO (2001) [14] has acknowledge that, 'it is difficult to distinguish between "Activities" and "Participation" on the basis of the domains in the Activities and participation component". The activities domain showcases capacity in the standard environment and participation analyses the performance in the real world. The category of Activity limitation delineates the difficulties the individual may have in executing tasks or actions while the domain on participation restriction deals with the problems in the nature and extent of a person's involvement in life situations [10].

The ICF has provided a new foundation for our understanding of health, functioning and disability and serves as a platform to clarify and specify health-related concepts that are frequently used in the medical literature. It puts the notions of 'health' and 'disability' in a new light. By shifting the focus from cause to impact it places all health conditions on an equal footing allowing them to be compared using a common metric- the ruler of health and disability [2].

Furthermore, the ICF takes into account the social aspects of disability and does not see disability only as a 'medical' or 'biological' dysfunction but also considers the impact of environmental factors on the individual's functioning. ICF has great potential in rehabilitation research; however, the distinctions between Activity and participation need to be clarified. Despite this shortcoming ICF can provide a universal language and framework for function and disability outcomes and can guide future research efforts.

The ICF is World Health Organization's (WHO) framework which provides a medico-psycho-social perspective in viewing notions of 'health' and 'disability' and it enables holistic assessment of the adult individuals regardless of the disorder. Similarly for children there is a provision of ICF-CY (i.e. Children and Youth).

Need for the Study

A study on the application of ICF in voice disorders through a single case illustration of an adult with voice disorder. In our organization ICF has been used for the assessment and intervention of adults with voice disorders and selected studies have been presented in national and international conferences [9]. For the same, VHI has been was mapped according to the domains and codes of ICF. The pVHI has been recently introduced for assessment of pediatric voice disorders. However, it does not enable holistic assessment of impact of voice disorders on children. Hence, the need for the study.

Aim and Objectives

The present study is an attempt to view pVHI in ICF-CY framework by mapping the existing questions of pVHI to relevant core-sets, and domains of ICF-CY in terms of body functions, activity limitations and participation restrictions (AL/PR) for children with dysphonia. Also, an attempt is made to compare pediatric voice problems according to pVHI quantification system and pVHI mapped on ICF format.

Materials and Methods

The ICF-CY codes, core-sets and domains were fully mapped on to every question of the pVHI as per WHO-ICF guidelines. Responses of parents of 20 children were sought on the original and modified pVHI. The selected children had varying degrees of dysphonia. The pathologies included were vocal nodules (n-13), vocal cord palsy (n-4), vocal polyps (n-3). The responses were scored on both original pVHI format and mapped pVHI format. Percentage was calculated and compared for each question and clubbed for each domain on ICF-CY.

The subjects were divided into groups based on the degree of perceived handicap as follows

For pVHI	
Scores	**Severity of handicap**
0-23	No Handicap
24-46	Mild Handicap
47-69	Moderate Handicap
70-92	Severe Handicap

Review of Literature

Use of ICF and ICF-CY to assess the impact of voice disorders on functioning

WHO's International classification of functions (ICF) and International Classification of functions children and youth (ICF-CY) provides a framework within which impact of voice disorders on the functioning of an individual can be assessed more holistically.

WHO (2001) [14] gave a tool by revising the ICDH (International Classification of Impairments, Disability and Handicap) and this tool was called ICF (International Classification of Functions). The ICF conceives of a person's disability as a dynamic interaction among health components and personal factors and is referred to as the ICF interaction model. The ICF model highlights functioning as a component of health. ICF framework can be applied to a variety of communication disorders including voice disorders.

Application of ICF in voice disorders has been described with a single case illustration [9]. The aim of this study was to describe how ICF can be adapted to describe the consequences of voice disorders. The study first describes voice disorders under the four key components of the ICF: Body Functions, Body Structures, Activities and Participation, and Contextual (Environmental and Personal) Factors. It then describes the assessment and treatment tools for voice disorders using the ICF framework. Finally, a case example illustrating how the ICF frames the rehabilitation of an individual with voice disorders is presented.

Children are not "small adults" and the functioning in children is different from the functioning in adults. The participation areas and primary environments in which the child functions differ from those of an adult. Thus, ICF-CY was designed by WHO [14] to document the characteristics of health and functioning in children and youth from birth to 18 years of age. The ICF-CY offers a conceptual framework and a common language and terminology for recording problems manifested in infancy, childhood and adolescence involving functions and structures of the body, activity limitations and participation restrictions, and environmental factors important for children and youth.

The application of ICF-CY framework to communication disorders in children was described by [17]. In the study, the primary focus of 56 assessment tools and 22 intervention approaches for children with speech impairment was categorized using the ICF-CY. Their analysis demonstrated speech-language pathologists' current emphasis on Body Functions when working with children with speech impairment. Finally, the paper presented a discussion of role of the ICF-CY for children with communication disability. Thus, the ICF-CY framework can be used to develop assessment tools and planning intervention programs for children with communication disorders. ICF- CY framework has been used to design assessment tools or is used in combination with some assessment tools for holistic assessment of children.

An assessment tool which reflected the functional profile of preschool children with autism was developed for children with autism based on ICF-CY framework [18]. A study used the ICF-CY classification to holistically assess a 7 year old child with untelligible speech in his single case illustration [17].

Studies related to ICF and ICF-CY in India

A study which was carried out on the application of ICF to evaluate hyperfunctional voice disorders in adults. A questionnaire was developed to evaluate hyperfunctional voice disorders in adults using ICF framework [16].

A study reported that all aspects of a person's life (development, participation and environment) are incorporated into ICF instead of solely focusing on an individual's medical diagnosis. The ICF classification possesses a number of characteristics which make it an ideal framework for reviewing and assessing individual needs and strengths [10].

Very few studies using the ICF-CY framework have been reported for children with voice disorders in India. Hence the present research has been designed so as to use the ICF-CY framework in the assessment of voice parameters, activity and participation in children with voice disorders.

Results and Discussion

The original pVHI scoring are as follows- 1 child with vocal polyp – mild severity, 18 children (3 with vocal cord palsy, 13 with vocal nodules and 2 with vocal congestion) moderate severity and 1 child with vocal cord palsy rated as severe handicap.

When ICF-CY mapped pVHI only scores or numerical values were not obtained as per ICF-CY guidelines. But varied scores were obtained for the various domains which are as follows:

1. For the child with mild severity- 68.18% of the items under body functions were never affected and 27.27% were affected sometimes while 4.55% were almost never affected. 83.33% of activities and participation were never affected; for example, 'voice difficulties restrict personal, social and educational activities' while 16.67% were almost never affected. When the original pVHI is used without mapping just a total score of 29 is obtained which is just a number. Although physical, functional and emotional aspects get a score, such a score fails to describe the impact of the voice disorder on the activity and participation of the individual in daily situations. The results have been illustrated in the tables1 and 2 respectively.

Table 1: Scores of pVHI for mild handicap group

Score on pVHI	
Domains	**Mean Score**
Physical	10
Functional	11
Emotional	8
Total	29

Table 2: Percentage of domains of pVHI mapped on ICF-CY for mild handicap group

Domains	Percentage of frequency of experience				
	Never	**Almost never**	**Sometimes**	**Almost always**	**Always**
Body functions	68.18%	4.55%	27.27%	-	-
Activity and participation	83.33%	16.67%	-	-	-

2. For 18 children rated as moderate varied responses were observed in activity limitation and participation restriction. For example for some children the following was obtained— 27.27% of the body functions affected sometimes, 18.19% almost never; 9.09% never; 9.09% almost always. 14.28% of activities and participation affected sometimes; 42.85% almost always; 42.85% always. It can be observed from the above that although the children are rated as having moderate handicap, the degree to which the body functions or activities are limited and participation is restricted vary from children to children. The results have been illustrated in the tables 3 and 4 respectively.

Table 3: Scores of pVHI for moderate handicap group

Score on pVHI	
Domains	**Mean Score**
Physical	20
Functional	31
Emotional	8
Total	59

Table 4: Percentage of domains of pVHI mapped on ICF-CY for moderate handicap group

Domains	Percentage of frequency of experience				
	Never	**Almost never**	**Sometimes**	**Almost always**	**Always**
Body functions	9.09%	18.19%	27.27%	9.09%	-
Activity and participation	-	-	14.28%	42.85%	-

3. For the child with severe rating 72.3% of the items under body functions were affected always and 27.27% were affected sometimes; 86.66% of items under activities and participation were always affected. The results have been illustrated in the tables 5 and 6 respectively.

Table 5: Scores of pVHI for severe handicap group

Score on pVHI	
Domains	**Mean Score**
Physical	39
Functional	24
Emotional	15
Total	78

Table 6: Percentage of domains of pVHI mapped on ICF-CY for severe handicap group

Domains	Percentage of frequency of experience				
	Never	**Almost never**	**Sometimes**	**Almost always**	**Always**
Body functions	-	-	27.27%	-	72.3%
Activity and participation	-	-	-	-	86.66%

There appears to be a dearth of studies investigating the use of ICF mapped pVHI in children with voice disorders making results incomparable. In a study [9], the aim was to describe how the World Health Organization's International Classification of Functioning, Disability and Health (ICF) can be adapted to describe the consequences of voice disorders. It first describes voice disorders under the four key components of the ICF: Body Functions, Body Structures, Activities and Participation, and Contextual (Environmental and Personal) Factors. It then describes the assessment and treatment tools for voice disorders using the ICF framework. Finally, a case example illustrating how the ICF frames the rehabilitation of an individual with voice disorders is presented. However, this study was done on adults having voice disorders and not children. Hence, results cannot be compared.

In a study [1], comprehensive investigation was done to study the impact of voice problems in teachers in Hong Kong. In this study, a total of 348 participants (239 student teachers and 109 student speech therapists) were given a questionnaire to compare their knowledge of voice care, voice conditions and the impact of voice problems in the two groups. The results suggested that the student teacher group had less appropriate knowledge of voice care than the student speech therapist group. The student teacher group was also found to have greater impact of voice problems on the areas of work, communication, social life and personal emotions than the student speech therapist group. However, the questionnaire used was not ICF or ICF-CY based.

Summary and Conclusions

The aim of the present study was to use the pVHI and to map it according to the domains of ICF to serve a similar role in the evaluation of the effects of dysphonia on the pediatric population. The results reveal scores which were highly comparable.

Differences in the assessment of the children with original pVHI and ICF mapped pVHI are highlighted. Significant differences were found amongst the subjects especially in the domains of activity limitation, participation restriction and body functions, thus, acknowledging the importance of using ICF for the holistic assessment of clients.

In clinical practice it is necessary to obtain holistic picture of the child's voice problem and its impact in the real world. The questions mapped against the ICF core-sets not only helps to delineate the problems related to activity limitation and participation restrictions and body functions as a result of dysphonia but may also help in defining the therapy goals on case-to-case basis.

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