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MAPPING OF NECK DISABILITY INDEX DOMAINS LINKED TO THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING AND DISABILITY[1]

MAPEAMENTO DOS DOMÍNIOS DO NECK DISABILITY INDEX VINCULADOS À CLASSIFICAÇÃO INTERNACIONAL DE FUNCIONALIDADE E INCAPACIDADE

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Abstract

Objective: This study aims to link NDI items to CIF using specific and up-to-date linking rules.

Methods: It is a measurement properties analysis study in which two evaluators performed the link between NDI and CIF, both with experience in CIF taxonomy and NDI application. Thus, ten binding rules developed and updated specifically for binding the ICF to other instruments were applied.

Results: The Kappa coefficient determined the level of agreement between the evaluators with a confidence interval of 95%. All NDI items were linked to ICF codes; there was no need to use the term “non-definable.” The degree of agreement between the evaluators about the domains and the categories of the ICF's first, second, and third levels was almost perfect.

Conclusion: Therefore, the NDI is well linked to the codes related to the ICF domains' Activity, Participation, Functions, and Structure. However, no concepts related to contextual factors were identified.

Keywords: International Classification of Functioning. Disability, and Health. Neck Pain. Surveys and Questionnaires. Reproducibility of Results.

Resumo

Objetivo: Este estudo visa vincular itens da NDI ao CIF usando regras de vinculação específicas e atualizadas.

Métodos: É um estudo de análise de propriedades de medição no qual dois avaliadores realizaram a ligação entre NDI e CIF, ambos com experiência em taxonomia CIF e aplicação de NDI. Assim, foram aplicadas dez regras de vinculação desenvolvidas e atualizadas especificamente para vincular a ICF a outros instrumentos.

Resultados: O coeficiente Kappa determinou o nível de concordância entre os avaliadores com um intervalo de confiança de 95%. Todos os itens do NDI estavam vinculados a códigos ICF; não havia necessidade de utilizar o termo "não definível". O grau de concordância entre os avaliadores em relação aos domínios e às categorias do primeiro, segundo e terceiro níveis da ICF foi caracterizado como quase perfeito.

Conclusão: Portanto, o NDI está bem ligado aos códigos relacionados à Atividade, Participação, Funções e Estrutura dos domínios da ICF. Entretanto, não foram identificados conceitos relacionados a fatores contextuais.

Descritores: Classificação Internacional de Funcionalidade. Incapacidade e Saúde. Cervicalgia. Inquéritos e Questionários. Reprodutibilidade dos Testes.

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Introduction

The International Classification of Functioning, Disability, and Health (ICF) has been consolidated as a tool capable of helping health professionals think, measure, design, collect and analyze data related to functionality and disability based on the biopsychosocial model. The ICF aims to consolidate and sustain evidence-based practices and structure standardized biopsychosocial assessments in clinical practice[1].

Recent studies used binding rules to analyze the association of assessment instruments with ICF concepts[2,3]. This methodology offers the possibility of critically analyzing assessment instruments routinely used in the clinical setting and research regarding the precepts of the biopsychosocial model[4-6].

The Neck Disability Index (NDI) tries to offer an approach not only focused on signs and symptoms. But also in attitudes and behaviors related to the cervical region[7]. However, despite having its psychometric properties widely evaluated and discussed, the content of the NDI items has not yet been related to the ICF model[8].

In this context, and mainly because we understand that problems related to the cervical region are part of a complex and multifactorial condition, it is needed to assess if one of the most used assessment instruments in research and the clinical environment is related to the ICF and the biopsychosocial model[7]. We hypothesize that the NDI items have an excellent link to the CIF. Thus, the present study aimed to link the NDI items to the ICF using specific and updated linking rules.

Methods

It is a measurement properties analysis study. The ICF is characterized as a multidirectional classification system in health based on biological, individual, and social aspects. It aims to promote a unified language based on the biopsychosocial model, were a health condition thought all the factors that impact on functionality[9]. It is divided into two parts: Part 1, Functioning and Disability, with the components of body function and structure and activity and participation. Part 2, contextual factors, with environmental and personal factors components[10]. It has an alphanumeric identification system in which letters are used to characterize the components of the classification: body functions (b), body structures (s), activities and participation (d), and environmental factors (e). “Personal factors” is the only component with no alphanumeric code[11,12].

The NDI is a self-report instrument, translated, cross-culturally adapted, and validated for Brazilian Portuguese[13]. Created to assess activity limitations due to disability and pain in the cervical region[14,15]. Its original version comprises a domain and 10 items (pain intensity, personal care, getting up, reading, headache, concentration, work, driving, sleeping, and recreation). A possible answer is marked for each item, with a score from 0 to 5 per item. The total score is the sum of the scores for all items with a maximum score of 50 points[14,15]. The result can be represented as a percentage, where: 100% indicates maximum functional loss, and 0% indicates no functional loss with cut-off scores of <8 NDI-points (16%) for no disability or recovered and >28 NDI-points (56%) for moderate-to-severe disability[14,16].

Linking of NDI items to ICF

Two evaluators performed the linking independently and blindly. The linking steps were well documented throughout the process. Each evaluator only had access to the link of the other evaluator at the end of the process when the results were compared to determine the degree of agreement. In cases of divergence of opinion, a third evaluator was consulted to make the final decision[2]. The evaluators had an average of 10 years of training in Physical Therapy and training/clinical experience in using the NDI and the model and taxonomic bases of classification involved in applying the ICF.

Linking the NDI concepts to the ICF was carried out according to ten rules (supplementary material), which allow the linking of concepts measured by the assessment instruments to the ICF codes[17]. The evaluators identified the central concept addressed in the NDI items based on these rules. They then linked the items to the ICF domains and codes. Each concept was linked separately to identify whether each item had additional concepts related to other ICF domains[2].

Kappa coefficients (k) with a 95% confidence interval (CI) were used to determine the level of agreement between raters regarding item linkage. K values were interpreted as follows: 0.00 = no agreement; 0.01 to 0.20 = insignificant agreement; 0.21 to 0.40 = low agreement; 0.41 to 0.60 = moderate agreement; 0.61 to 0.80 = good agreement; and 0.81 to 1.00 almost perfect agreement[18]. IBM SPSS Statistics for Windows (version 22.0, IBM Corp., Armonk, NY, USA) was used for all statistical procedures, with a significance level of 5% ($p< 0.05$)[19].

Results

The ten NDI items were linked to 7 domains of the "Activities and Participation" component and 3 items of the "Body Functions" component. 7 additional codes were found. For item 10, "recreation" the unspecified term was used. All scale items were linked to the ICF codes, there was no need to use the term "non-definable".

Table 1 - Linking the concepts of the International Classification of Functioning, Disability and Health (ICF) with the Neck Disability Index (NDI)

1. Name of Instrument	2. Variable text	3. Perspective adopted in data collection	4. Answer options	5. Classification of the variable's response type	6. Main concept involved	7. Additional concepts	8. ICF category of the main concept	9. ICF category of additional concepts	10. Comments
NDI	1- Intensity of pain at that moment	Pain intensity	I have no pain; the pain is very mild, the pain is moderate, the pain is reasonably great, the pain is very great, and the pain is the worst imaginable.	Intensity	Sensory Functions and Pain	Pain	b28016-joint pain	-	Unpleasant sensation felt in one or more joints.
NDI	2-Personal care (washing, dressing, etc.)	Personal care	I can take care of myself without increasing pain; I can take care of myself normally, but it adds to the pain; It's painful to have to take care of myself, and I do it slowly and carefully; I need help, but I manage to do most of my personal care; I need help with most aspects of taking care of myself; I don't dress, wash with difficulty and stay in bed.	Capacity	Personal care	Pain	d510 - wash yourself	b2802 - pain in multiple parts of the body / d540 - dressing / d2102 - performing a single task, independently	Wash and dry the entire body, or parts of the body, using water or appropriate cleaning and drying methods, such as bathing in a bathtub or shower, washing hands and feet, face and hair, and towel drying.
NDI	3- Lift things	Capacity	I can lift objects without increasing pain; I can lift heavy objects but it adds to the pain; Pain prevents me from lifting heavy objects off the floor, but I can if they are placed in a good position, for example on a table; Pain prevents me from lifting heavy objects, but I can lift light to medium weight objects if they are placed in a good position; I can lift very light objects; I can't lift or carry anything at all.	Capacity	Mobility	Pain	d4300 - lifting objects	b28014 - upper limb pain	Lifting an object to move it from a lower level to a higher level, like lifting a glass from the table.

1. Name of Instrument	2. Variable text	3. Perspective adopted in data collection	4. Answer options	5. Classification of the variable's response type	6. Main concept involved	7. Additional concepts	8. ICF category of the main concept	9. ICF category of additional concepts	10. Comments
NDI	4- Reading	Performing tasks	I can read as much as I want without pain in my neck; I can read as much as I want with mild pain in my neck; I can read as much as I want with moderate pain in my neck; I cannot read as much as I want because of moderate pain in my neck; I can barely read because of a great pain in my neck; I can't read at all; Question does not apply for not knowing or not being able to read.	Capacity	Learning and application of knowledge	Pain	d166 - read	b28010 - head or neck pain	Carry out activities involved in understanding and interpreting written language (e.g., books, instructions or newspapers in text or Braille) with the aim of obtaining general knowledge or specific information.
NDI	5-Headaches	Pain intensity	I do not have any headaches; I have minor headaches infrequently; I have moderate headaches infrequently; I get moderate headaches very often; I get severe headaches often; I get headaches almost all the time.	Sensory Function	Sensory functions and pain	Pain	b28010 - headache	-	Unpleasant sensation felt in the head or neck that indicates potential or actual damage to some body structure.
NDI	6- Pay attention	Performing tasks	I can pay attention when I want to without difficulty; I manage to pay attention when I want with trouble takes; I have moderate difficulty paying attention when I want to; I have a very difficult time paying attention when I want to; I can't pay attention.	Sensory Function	Learning and application of knowledge	Application of knowledge	d160 - focus attention	-	Intentionally focusing on a specific stimulus, turning off distracting noises.
NDI	7-Work	Performing tasks	I can work as much as I want; I can only do the work I am used to, but nothing more; I can do most of the work I am used to, but nothing more; I can't do the work I'm used to doing; I can barely do any kind of work; I can't do any kind of work.	General tasks and demands	Main areas of life	Work and employment	d850 - paid work	-	Locate and choose a job in a business, profession or other type of employment and perform the tasks necessary to get hired, such as attending the job site or participating in a job interview.
NDI	8- Driving cars	Performing tasks	I can drive my car without any neck pain; I can drive my car as much as I want with a slight pain in my neck; I can drive my car as much as I want with moderate pain in my neck; I can barely drive because of a sharp pain in my neck; I can't drive my car at all; Question does not apply for not	General tasks and demands	Mobility	Getting around using transport	d4751- driving motor vehicles	b28010- head or neck pain	Driving a motor vehicle such as an automobile, motorcycle, motorboat, or aircraft.

1. Name of Instrument	2. Variable text	3. Perspective adopted in data collection	4. Answer options	5. Classification of the variable's response type	6. Main concept involved	7. Additional concepts	8. ICF category of the main concept	9. ICF category of additional concepts	10. Comments
			knowing how to drive or not driving many times.						
NDI	9-Sleep	Sleep	I have no problems sleeping; My sleep is slightly disturbed (less than an hour unable to sleep); My sleep is mildly disturbed (1-2 hours unable to sleep); My sleep is moderately disturbed (2-3 hours unable to sleep); My sleep is very disturbed (3-5 hours unable to sleep); My sleep is completely disturbed (5-7 hours unable to sleep);	Sensory Function	Mental Functions	Global mental functions	b134- sleep functions	-	General mental functions of physical and mental disconnection from the immediate environment, of a periodic, reversible, and selective character, accompanied by characteristic physiological changes.
NDI	10-Fun	Performing tasks	I can do all my fun activities without any neck pain; I can do all my fun activities with some neck pain; I can do most of my fun activities because of the pain in my neck; I can do few of my fun activities because of the pain in my neck; I can barely do any fun activities because of the pain in my neck; I can't do any fun activities;	General tasks and demands	Community, social and civic life	Neck pain	d9209- Recreation and leisure, unspecified	b28010- head or neck pain	-

NDI: Neck Disability Index; ICF: International Classification of Functioning, Disability and Health.

The degree of agreement between the evaluators about the domains and the categories of the ICF's first, second, and third levels was almost perfect. There were no differences between the evaluators, and a third evaluator was unnecessary for the final decision.

Table 2 - Agreement between evaluators on linking the Neck Disability Index (NDI) to the International Classification of Functioning, Disability and Health (ICF)

NDI	Kappa Coefficient (95% CI) E1 vs. E2
ICF domain	0,93 (1,0-1,0)
Category 1st level	0,91 (0,84-0,98)
2nd level category	0,88 (0,78-0,97)
Category 3rd level	1,00 (1,00-1,00)
Category 4th level	1,00 (1,00-1,00)

NDI: Neck Disability Index; ICF: International Classification of Functioning, Disability and Health; 1st: first; 2nd: second; 3rd: third; 4th: fourth; vs: versus; CI: confidence interval; E1= Evaluator 1; E2 = Evaluator 2.

Discussion

The linking process between NDI and ICF showed a degree of agreement characterized as almost perfect among the evaluators. These results gain importance because they analyze one of the most used instruments to assess activity limitations due to disability and/or pain in the cervical region[14,15]. Moreover, a linking procedure was carried out, updated, methodologically supported and already used to analyze other evaluation instruments[2,17].

It was possible to identify contents previously implicit in the ICF covered by NDI. For example, to identify domains related to pain intensity (sensory functions), ability to perform tasks involving mobility and self-care activities, learning and application of knowledge (concentration) and general tasks and demands (work, driving and recreation and entertainment activities). All these concepts were related to specific ICF codes and additional codes. Into a clinical practice this enables to standardize the language among rehabilitation professionals and facilitate the automation of health information collection for longitudinal monitoring, data comparison between health services, and epidemiological data collection.

It should be noted that the link with the ICF allowed expanding the possibility of using the NDI; for example, item 2 of the NDI is related to personal care and how much pain impacts performing tasks such as washing and dressing; after linking with the ICF, it was possible to identify four codes and concepts related to this item: “d510-washing yourself”/“b2802-pain in multiple parts of the body”/ “d540-getting dressed”/“d2102-performing a single task, independently. Another interesting perspective can be seen in item 3 - Lifting things, in which

it was possible to associate the assessment of concepts related to the ICF domains of mobility ("d4300-lifting objects") and sensory functions ("b28014-upper limb pain"). This possibility of associating the assessment of concepts related to the ability to perform tasks and pain is repeated in item 4-Reading, item 8-Driving cars, and item 10-Fun.

Few studies use this method and present the linkage results with the ICF[2,20]. Traditionally, clinical assessment instruments, especially those related to the components of the musculoskeletal system, are based on the precepts of the biomedical model[21]. The link with the ICF also made it possible to identify that no concept measured by the NDI related to environmental factors, as well implies the non-observation of facilitators or barriers to the recovery/rehabilitation process this population. Because of this, the NDI does not include all components of the biopsychosocial model, so it does not determine disability in a broad way, as guided by the World Organization for Health. Health (WHO).

Despite the limitation regarding not evaluating contextual factors, our results demonstrate that using ICF codes related to items contained in the NDI, in its short or long version, can help implement a structured musculoskeletal assessment in the care of person. But not being confirmed a sufficient foundation for analysis of biopsychosocial domains, as present in the ICF, we encourage the creation of new measures and instruments based on the biopsychosocial model[7].

Due to the limited literature exploring the relationship of items from musculoskeletal assessment instruments to ICF domains. We recognize the difficulty in comparing our results with other assessment instruments. For this reason, we recommend that future studies involving the evaluation of instruments of the musculoskeletal system add the linking procedure with the ICF in their analyses so that we can have a broader and comparative analysis of the biopsychosocial model among the available instruments.

Conclusion

The NDI is well linked to the codes related to the ICF domains' Activity and Participation, Functions, and body structure. However, no concepts related to contextual factors were identified.

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Contributions

ACBS, CAFPG, GSP, SMS: conceptualization, data curation, formal analysis, methodology, writing-original draft; JDAJ, CAFPG, DDO: conceptualization, data curation, formal analysis, methodology, writing-review & editing.

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