DOI: 10.1590/1413-81232021263.03502019

Application of the refinements of ICF linking rules to the Visual Analogue Scale, Roland Morris questionnaire and SF-36

Aplicação do refinamento das regras de ligação da CIF à Escala Visual Analógica e aos questionários Roland Morris e SF-36

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Abstract *The Visual Analogue Scale (VAS), Roland Morris Disability Questionnaire (RMDQ), Short Form Health Survey (SF-36) are broadly used and had their content linked to ICF by the linking rules of 2002 and 2005. In 2016 were refined and were not applied yet. To apply the refinements of ICF linking rules to VAS, RMDQ, and SF-36. Two health professionals identified the meaningful concepts and linked to the most precise ICF categories and a third triggered in divergences. The degree of agreement was calculated by kappa statistic. There was almost perfect agreement (Kappa=0.93 p<0,001). The main concept of VAS was linked to ICF category b280, the 24 main concepts of RMDQ linked to b28013, and 27 additional linked to other categories. The SF-36 had 36 main concepts and 30 additional concepts identified which 27 were definable by the ICF and 17 do not. From the total of ICF linked concepts, 39 refer to Body Functions, 57 to Activities and Participation and 4 to Environmental Factors. The refinements of linking rules propitiated more clarity in the process to identify, to link instruments content with ICF and to expose the results. Thus, increased the number of identified and linked concepts as well as the categories in the instruments.*

Key words *ICF, Linking rules, Surveys and Questionnaires*

Resumo *A Escala Visual Analógica (EVA), o Questionário de Incapacidade de Roland Morris (RMDQ) e Questionário de Qualidade de Vida SF-36, amplamente utilizados, tiveram seu conteúdo conectado à CIF por regras propostas em 2002 e 2005. Em 2016 foram refinadas e ainda não foram aplicadas. Aplicar as regras de conexão de conteúdo refinadas para os instrumentos EVA, RMDQ e SF-36. Dois profissionais de saúde identificaram os conceitos significativos e vincularam às categorias mais específicas da CIF, um terceiro arbitrou divergências. O grau de concordância foi dado pelo coeficiente kappa. Houve alto grau de concordância (Kappa=0,93 p<0,001). O conceito principal da EVA foi conectado à categoria b280, os 24 conceitos principais do RMDQ, à categoria b28013 e os 27 adicionais a outras categorias. O SF-36 teve 36 conceitos principais e 30 adicionais identificados, do total, 17 não foram definíveis pela CIF. Dos conceitos conectados dos 3 instrumentos 39 referem-se à Funções do Corpo, 57 à Atividades e Participação e 4 à Fatores Ambientais. O refinamento das regras propiciou mais clareza no processo de identificar, relacionar o conteúdo dos instrumentos à CIF e expor os resultado e aumentou o número de conceitos identificados e categorias contempladas pelos instrumentos.*

Palavras-chave *CIF, Regras de ligação, Inquéritos e Questionários*

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Introduction

The chronic pain has been reported with high prevalence and due to multiple factors[1-3]. Thus, it is necessary to consider the physical, psychosocial, and environmental factors involved in this health condition[4].

A universally accepted framework that encompasses a biopsychosocial model is the International Classification of Functioning, Disability and Health (ICF), which was created by the World Health Organization (WHO) and standardizes the language on the health states of individuals referring to categories related to Body Functions, Body Structures, Activity and Participation, and Environmental Factors[5].

The use of the classification is recommended in conjunction with clinical practice tools to valorize and to complement the information already collected, encouraging professionals to select more appropriate instruments for their clinical proposals[6-8]. These tools, however, have been used in a perspective strongly anchored in the biomedical model of health, even when they collect data regarding social participation and environment conditions[9]. This approach results in decontextualized practices focused on specific interventions and monitoring of signs and symptoms.

The ICF content, when connected to these instruments, will contribute to the operationalization of an expanded health concept, allowing the interpretation of the data in order to attribute the same status to the physiological components and contextual factors, considering privileging their interaction and interdependence, as product and producer health and its related states.

For better accuracy in the process is recommended to link both instruments and ICF content, making ICF a tool capable of translating the information contained in the instruments[10]. In view of this, in 2002 the first Linking Rules[11] were proposed, in 2005 updated[6], and in 2016 refined[10].

The refinement of the linking rules aimed to increase the transparency and reliability of the instrument content linking process proposed five improvements. The first concerns the preparation of information for linking. The ICF Linking Rules from 2002 and 2005 stressed that the meaningful concept had to be identified before starting the linking process. Thus, the process presents the risk of applying the linking rules mechanically and out of its context or purpose in which the information is collected.

The refinement proposes to identify the "purpose of information" to be linked to a category before identifying the meaningful concept, answering the questions: "is this the key piece of information? What is this item about?". Thus, the refinement of the rules proposes not only the identification of significant concept but let this be separated into main concept and additional concept according to purpose and perspective of information to be linked to the ICF[10].

Another refinement is to take into account the perspective on the information collected. It proposes the documentation of the perspectives from which the information is collected, by the data collection instrument or by the collection mode. The most prominent perspectives are: descriptive, involving capacity and performance in performing a given task or activity; appraisal of individual satisfaction in relation to a given situation, asking himself to what extent personal expectations and hopes have been achieved; and, the perspective of need or dependency, which refers how many assistance devices are needed to perform certain activities or tasks.

In the 2002 and 2005 linking rules there was no information on the categorization of the response options captured in the connection process, in addition to the meaningful concepts[6,11]. The refinement proposes to identify and document the categorizations of response options, such as: intensity, frequency, duration, confirmation or agreement, and qualitative attributes. Given that this is relevant only to questionnaires, assessments, or tests that contain response options. It is worth mentioning that there are response options where the link is not possible or where the answer option also contains meaningful concepts[10].

The rules proposed in 2002 and updated in 2005 recommend that the qualifiers 8 (unspecified) and 9 (not applicable) do not be used[6,11]. The use of these qualifiers is recommended in the refinement, as experience has shown that not using this categorization leads to loss of information. If a concept is linked to a qualification 8 or 9, additional information not specified or not covered by the ICF should be documented together with the category of the ICF[10].

The last propose guides that information not contained in the ICF should be attributed to the abbreviation nc (not covered), although the linking process can be applied to any type health information, not always feasible to link information to an ICF category. This may be the case as the information to be linked is beyond the scope

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of the ICF or may be very specific to be linked to the ICF[10].

Many instruments are used in research and clinical practice to evaluate the functionality, quality of life and pain. Those that appear most in the literature are the Visual Analogue Scale (VAS)[12], Roland Morris Disability Questionnaire (RMDQ)[13] and Short Form Health Survey (SF-36)[14], used to assess patients' pain, functional capacity, and quality of life, respectively.

These instruments have already had their content linked to the ICF by studies that applied the linking rules of 2002 and 2005, such as Prodinger et al.[15], Sigl et al.[16], Fréz et al.[17], Schepers et al.[18], Geyh et al.[19] and Cieza and Stucki[7].

Cieza et al.[10] suggest that researchers in the field apply the updated ICF linking rules and comment about the experiences during the utilization process. It is in this sense that the present study aims to contribute. To date, no studies have been found in the literature conducted with the application of rules refinement.

Considering the magnitude of the qualitative changes brought by the new linking rules, and the relevance degree of the instruments adopted in this study in the clinical practice of health professionals, the authors consider it important to apply the new rules to them.

Therefore, the objective of the present study was to apply the refinements of ICF linking rules to VAS, RMDQ, and SF-36 proposed in the literature.

Method

The process of linking the content of the questionnaires occurred through the application of the refinement of the linking rules proposed by Cieza et al.[10]. Two health professionals who participated in this process undertook a course on ICF certified by the WHO collaborating center of Brazil and had experience in the linking process with the previous rules. They were also included in a study group on ICF including the classification by the tool available and recommended by the WHO, the e-learning tool. A third physiotherapist researcher with the same background was triggered in cases of divergence.

According to the methodological guideline[10], the purpose of the information to be linked was identified before the meaningful concept identification. Thus, the two health professionals identified the meaningful concepts contained in the instruments considering the context, statements, and response options to select any other additional concept. Then, the meaningful concepts were compared to obtain a consensus.

Another update made in the present study was to identify and describe the perspectives adopted in the questionnaires. Questions were identified and described as descriptive, appraisal, and need or dependency. The categorizations of the response options were also identified and documented as intensity, frequency, duration, confirmation or agreement, and qualitative attributes.

In sequence, each meaningful concept was linked to the most precise and specific ICF category. In cases of a relationship between the concepts by conjunctions, they were also recorded. The meaningful concepts related to physical health, mental health, health in general, disability in general, functioning, and child's development that did not provide sufficient information for selecting an ICF category were classified as not definable and assigned as nd-ph, nd-mh, nd-gh, nd-dis, nd-func, and nd-dev, respectively. When a meaningful concept was identified as a personal factor, it was assigned as pf, and, when the meaningful concept was not covered by ICF, it was assigned as nc (not covered), such as diagnosis or health condition (nc-hc) and quality of life in general (nc-qol)[10]. These situations are called special cases.

The process of linking content was organized in Microsoft Excel 2007. The degree of agreement between the two health professionals regarding the identified and linked concepts was calculated by means of the Kappa statistic[20]. All the pre-determined criteria for verifying inter-rater concordance by Cohen's Kappa coefficient were followed in this study, ie the variable was nominal in nature (ICF categories) and the comparison was made only between two examiners and there was no missing data[21-26]. In addition, it is the test recommended in the rules of connection and has been frequently reported in the literature as the chosen one to evaluate the degree of agreement between the professionals in the identification of significant concepts and in the connection of these to the categories of the ICF[6,10,16,27-29]. Kappa values generally range from 0 to 1 with 1 indicating perfect agreement and 0 indicating no additional agreement beyond what is expected by chance alone. Kappa coefficients above 0.61 are regarded as good[18]. The data analysis was performed with SPSS 22.0.

Results

For the presentation of the results, the model proposed by the methodological guideline was used. A table was generated containing the information extracted from the questionnaires together with the results of the linking process, valuing the perspective adopted in the information, the classification of the response options, and the categories from the main concepts and additional concepts. The results of the instrument content linking are described in Charts 1 and 2.

There was almost perfect agreement among the researchers who linked the items of the RMQD and SF-36 and the ICF codes (Kappa Index=0.93 p<0,001).

Table 1 shows the 10 meaningful concepts of the SF-36 and 1 of the RMDQ that were linked to the special cases.

Table 2 shows the total number of concepts identified in ICF instruments and categories linked to these concepts. Regarding the RMDQ, it was considered that all items were guided by the concept of back pain, which was considered the main concept of all items and was linked to a category (b28013). In 23 of the 24 RMDQ items, it was possible to identify 27 additional concepts, most of them linked to Activities and Participation categories followed by Body Functions and Environmental Factors (Chart 1 and Table 2).

In relation to the SF-36, it was observed that, of the 36 main concepts, 13 were not definable by the ICF, and, of the 30 additional concepts identified, 4 were not definable (Table 1). This fact shows that the ICF does not contemplate comprehensive concepts regarding general health, physical health, mental health, and health conditions.

Questions 4 and 5 of the SF-36 brought relevant information from the heading, and, from this information, a main concept and additional concepts for each question were identified. Each item of these questions allowed the identification of additional information.

These results enable a comparation between the application of ICF Linking Rules to 2002, 2005 and 2016 when applied to the same instrument which allows further discussion. Table 3 presents the numerical results of the linking to the three instruments with ICF of the current study and other previous studies. The refinements of linking rules applied in the present study propitiated an increase of identified and linked concepts to ICF to SF-36. For both SF-36 and RMDQ there was an increase in the number of categories. For VAS, the results were the same in the present study and for Scheuringer et al.[30].

In order to increase the transparency and reliability during the link process we followed the suggestion to put results in a table containing the information extracted from the questionnaires together with the results of the linking process, valuing the perspective adopted in the information, the classification of the response options, and the categories from the main concepts and additional concepts.

Discussion

The study aimed to report the experience of applying the linking rules refinements proposed in the literature. This proposal[10], which suggests a reflection before the identification of concepts, has guided us to the identification of a main concept related to each item of the instruments and to the identification of additional concepts and additional information relating to items.

The previous rules "a" and "e"[6] emphasized that the information should be identified before starting the linking process. However, there was a risk of information being extracted mechanically without considering the context or the proposal of information collected[10]. In such a case, information could be masked going on identification of categories without definition of the most representative of the questionnaire items. The recent rules propose the identification of the information to be linked before the meaningful and additional concepts identification[10].

After the application of rule two[10], to identify the main concept, rule three was applied to identify any additional concept to the main information. These concepts could also be identified in the answer options. The organization of the main and additional concepts will allow comparison of health information in a more specific way. An example to illustrate this occurred in item 3 of the SF-36 when linked with the ICF by Cieza et al.[11] and linked by the current study. Although the same meaningful concept (Rigorous Activities, Running, Lifting Heavy Objects and Participating in Strenuous Sports) have been identified in both studies, in the study of Cieza et al.[11], they were linked independently to the categories of the ICF, the Rigorous Activities concept was regarded as not definable, and the remaining concepts were linked to the categories from Activities and Participation. The present study identified rigorous activities as the main concept and the others as

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Chart 1. VAS, RMDQ linking extraction.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
VAS									
How much pain are you feeling	1	Appraisal	0 to 10	Intensity	Pain		b280 Pain		
RMDQ									
Back pain	1	Descriptive: Performance	Yes/Not	Confirmation	Back pain	To stay at home	b28013 pain in back	nc	Most of the time
	2				Back pain	To change position	b28013 pain in back	d410 Changing basic body position	Frequently
	3				Back pain	To walk	b28013 pain in back	d450 Walking	Slower
	4				Back pain	To do housework	b28013 pain in back	d640 Doing housework	
	5				Back pain	To go upstairs / Use a handrail	b28013 pain in back	d4551 Climbing / e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation	
	6				Back pain	To lie down	b28013 pain in back	d4100 Lying down	More often to rest
	7				Back pain	To get up/ To hold on to something to	b28013 pain in back	d4104 Standing /e1201 Assistive products and technology for personal indoor and outdoor mobility and transportation	Armchair
	8	Dependency			Back pain	To try to get other people to do things for me	b28013 pain in back	e3 Support and Relationship	

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additional concepts, considering the context and perspective of the item and the instrument as a whole. This makes it possible to link this concept to the Activities and Participation component, considering which additional concepts related to the main concept are linked to categories of the Activities and Participation.

The main concepts identified in each item of linked questionnaires may vary according to clinical contexts, and to backgrounds of the research-

Chart 1. VAS, RMDQ linking extraction.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
	9	Descriptive: Performance			Back pain	To get dress	b28013 pain in back	d540 dressing	Slower
	10				Back pain	To maintain a standing position	b28013 pain in back	d4154 Maintaining a standing position	Short periods of time
	11				Back pain	To bend/ To kneel down	b28013 pain in back	d4105 Bending / d4102 Kneeling	
	12				Back pain	To get up	b28013 pain in back	d4104 Standing	Difficulty
	13				Back pain		b28013 pain in back		Almost all the time
	14				Back pain	To turn over in bed	b28013 pain in back	d4201 Transferring oneself while lying	Difficulty
	15				Back pain	Appetite	b28013 pain in back	b1302 Appetite	Is not very good
	16				Back pain	To put on socks (or stockings)	b28013 pain in back	d5402 Putting on footwear	
	17				Back pain	To walk short distances	b28013 pain in back	d4500 Walking short distances	
	18				Back pain	To sleep	b28013 pain in back	b134 Sleep functions	Less well
	19	Dependency			Back pain	To get dress	b28013 pain in back	d540 Dressing	With help from other people
	20	Descriptive: Performance			Back pain	To sit down	b28013 pain in back	d4153 Maintaining a sitting position	Most of the day
	21				Back pain	Heavy housework	b28013 pain in back	d640 Doing housework	
	22				Back pain	Irritability / Bad tempered	b28013 pain in back	b1263 Psychic stability / e3 Support and Relationships	
	23				Back pain	To go upstairs	b28013 pain in back	d4551 Climbing	Slower
	24				Back pain	To stay in bed	b28013 pain in back	d4150 Maintaining a lying position	Most of the time

nc: corresponds to not covered by ICF.
Source: The authors.

Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
SF-36									
In general, would you say your health is:	1	Appraisal	Excellent (1); Very good (2); Good (3); Fair (4); Poor (5)	Intensity	General Health		nd-gh		
Compared to one year ago, how would you rate your health in general now	2		Much better now than one year ago (1); Somewhat better now than one year ago (2); About the same (3); Somewhat worse now than one year ago (4); Much worse now than one year ago (5).	Intensity	Health		nd-gh		
The following items are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?	3a	Descriptive: Performance	Yes, limited a lot (1); Yes, limited a little (2); No, not limited at all (3).	Intensity	Vigorous activities	Running/ lifting heavy objects/ participating in strenuous sports	d Activities and participation (vigorous activities)	d4552 Running / d4300 Lifting / d9201 Sports	Strenuous sports, vigorous
	3b				Moderate activities	moving a table/ pushing a vacuum cleaner/ bowling/ sweeping	d Activities and participation (moderate activities)	d430 Lifting and carrying objects/ d6403 Using household appliances/ d9201 Sports / d6402 Cleaning living area	Bowling, moderate

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Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
	3c				Lifting or carrying groceries		d430 Lifting and carrying objects		Groceries
	3d				Climbing		d4551 Climbing		Several flights of stairs
	3e				Climbing		d4551 Climbing		One flight of stairs
	3f				Mobility	Bending/ kneeling/ or stooping	d4 Mobility	d4101 Squatting / d4102 Kneeling/ d4105 Bending	
	3g				Walking		d4501 Walking long distances		More than a kilometer
	3h				Walking		d4501 Walking long distances		Several blocks
	3i				Walking		d4500 Walking short distances		One block
	3j				Self-care	Bathing/ dressing yourself	d5 Self-care	d510 Washing oneself / d540 Dressing	
During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of your physical health**?	4a	Appraisal	Yes or Not	Confirmation	Physical health	Work / Regular daily activity	nd-ph	d850 Remunerative employment / d230 Carrying out daily routine	**Cut down the** amount of time
	4b				Physical health	Work / Regular daily activity	nd-ph	d850 Remunerative employment / d230 Carrying out daily routine	Accomplished less
	4c	Descriptive: Performance			Physical health	Work / Regular daily activity	nd-ph	d850 Remunerative employment / d230 Carrying out daily routine	Were limited in the **kind**
	4d				Physical health	Work / Regular daily activity	nd-ph	d850 Remunerative employment / d230 Carrying out daily routine	Extra effort

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Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?	5a	Appraisal	Yes or Not	Confirmation	Emotional problem	Work / Regular daily activity	nd-mh	d850 Remunerative employment / d230 Carrying out daily routine	Depressed / anxious
	5b				Emotional problem	Work / Regular daily activity	nd-mh	d850 Remunerative employment / d230 Carrying out daily routine	Accomplished less activities
	5c	Descriptive: Performance			Emotional problem	Work / Regular daily activity	nd-mh	d850 Remunerative employment / d230 Carrying out daily routine	As **carefully** as usual
During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?	6	Descriptive: Performance	Not at all (1); Slightly (2); Moderately (3); Quite a bit (4); Extremely (5).	Intensity	Normal social activities	Physical health / Emotional problems	d750 Informal social relationships	nd-ph / nd-mh	Family, friends, neighbors, or groups
How much bodily pain have you had during the past 4 weeks?	7	Descriptive: Performance	None (1); Mild (2); Leve (3); Moderate (4); Severe (5); Very severe (6).		Body pain		b280 Pain		

it continues

Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?	8	Appraisal	Not at all (1); A little bit (2); Moderately (3); Quite a bit (4); Extremely (5).		Pain interference		b280 pain		
These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...	9a	Descriptive: Performance	All of the time (1); Most of the time (2); A good bit of the time (3); Some of the time (4); A little of the time (5); None of the time (6).		Feel full of pep		b1300 Energy level		

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ers involved. This perspective is in line with the biopsychosocial model that considers the relevance of the approaches based on contextualized findings.

Another important point to be highlighted about the refinement concerns rule 4, which allows identifying the perspectives related to the information collection proposal. The methodological guide proposes some examples used more often like descriptive perspective, which refers to the ability or difficulty in carrying out an activity; evaluation, which refers to questions about the extent to which personal expectations have been achieved; and need or dependence,

Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
	9b				Nervous		b152 Emotional functions (nervous)		A lot
	9c				Feel so down		b152 Emotional functions (feel down)		
	9d				Calm and peaceful		b1263 Psychic stability		
	9e				Have energy		b1300 Energy level		
	9f				Feel downhearted and blue		b1265 Optimism (blue)		
	9g				Worn out		b1300 Energy level (worn out)		
	9h				Happy		b152 Emotional functions		
	9i				Tired		b1300 Energy level (tired)		
During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?	10		All of the time (1); Most of the time (2); Some of the time (3); A little of the time (4); None of the time (5).		Social activities	Physical health / Emotional Problems	d9205 Socializing	nd-ph / nd-mh	(Visiting friends, relatives)

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which refers to the type and level of need that the individual requires. In addition, it proposes that the items identified as descriptive perspective be distinguished in capacity and performance[10].

Chart 2. Linking extraction of SF-36.

Super-scripition	Item	Perspectives adopted in information	Response options	Classification of response options	Main concept	Additional concepts	ICF category of main concept	ICF category of other concept	Additional information
How TRUE or FALSE is each of the following statements for you.	11[a]	Appraisal	Definitely true (1); Mostly true (2); Don't know (3); Mostly false (4); Definitely false (5).		To get sick		nd-hc		A little easier than other people
	11b				Be healthy		nd-gh		As anybody I know
	11c				Health		nd-gh		To get worse
	11d				Health		nd-gh		Excellent

The question 2 of SF-36 has an annotation: "compared to one year ago". nc: not covered by ICF; nd: not definable by ICF; nd-gh: not definable - health in general; nd-ph: not definable - physical health; nd-mh: not definable - mental health.
Source: The authors.

Table 1. Meaningful concepts of SF-36 and RMDQ linked to special cases.

Instrument	Meaningful Concept	Other Atributions
RMDQ	Stay at home	nc
SF-36	General health	nd-gh
SF-36	Physical health	nd-ph
SF-36	Vigorous activities	nd
SF-36	Moderate activities	nd
SF-36	Emotional problems	nd-mh
SF-36	To feel	nd-mh
SF-36	My health is excellent	nd-gh
SF-36	I seem to get sick a little easier	nc
SF-36	I am as healthy as anybody I know	nc
SF-36	I expect my health to get worse	nc

nc: not covered by ICF; nd: not definable by ICF; nd-gh: not definable - health in general; nd-ph: not definable - physical health; nd-mh: not definable - mental health.
Source: The authors.

In the present study, the VAS perspective was identified as evaluation, that for the RMDQ as descriptive of performance in 22 items and dependence in the 2 others, and that for the SF-36 as descriptive of performance in 25 items and evaluation in 11.

Regarding rule five, the categorization of the instrument response options can be described as intensity, frequency, duration, confirmation or agreement, and qualitative attributes[10]. One area that may benefit from this categorization is clinical practice, which may direct the choice of an instrument, now with respect not only to its content but also to the characteristics of the answers that best suit its purposes.

In the previous linking rules[6,11], it was recommended that the results table should include significant concepts, ICF categories linked to concepts and information additional to meaningful concepts. However, the ICF linking rules refinement recommended that the table with the results should contain the name of the instrument or other identifier, verbatim health information, perspective adopted in the information, response options, classification of response options, main concept, additional concepts contained in the information, ICF category of the main concept, and ICF category of other concepts and annotation. The annotation item, proposed in the refinement, corresponds to the additional information of the 2005 rules[10].

As for the structuring of the RMDQ and SF-36 instruments, it can be seen that while, in the SF-36, the intensity and frequency of the difficulties are diluted in the responses, in the RMDQ, this is contained within the items. Therefore, the additional information contained in the content link annotations of the RMDQ items refers to the intensity and frequency of the difficulties while the SF-36 additional information refers to examples and specifications of the items.

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Table 2. Number of components and categories selected.

	RMDQ (24 items)		SF-36 (36 items)	
	Main concept	**Additional concepts**	**Main concept**	**Additional concepts**
Concepts linked to ICF component				
Body function	24	3	11	0
Body structure	0	0	0	0
Activities and participation	0	19	12	26
Envirommental factors	0	4	0	0
Concepts nd-gh	0	0	5	0
Concepts nd-ph	0	0	4	2
Concepts nd-mh	0	0	3	2
Concepts nd-hc	0	0	1	0
Concepts nc	0	1	0	0
Total of concepts	24	27	36	30
Number of ICF categories per component without duplication				
Body function	1	3	5	0
Body structure	0	0	0	0
Activities and participation	0	15	9	13
Envirommental factors	0	2	0	0
Total	1	20	14	13

Source: The authors.

The proposal to link three instruments used in research and clinical practice for the assessment of chronic pain was strengthened with the application of the linking rules refinements, giving greater clarity to the results expressed in Charts 1 and 2 with the columns of main significant concepts, additional concepts, and categories linked to them.

Observing previous studies and the present study, there was a gradual increase in both the number of concepts identified and categories linked throughout the publications to SF-36 instrument[6,11,15,17-19] (Table 3) and to RMDQ[16]. It is believed that the identification of more meaningful concepts in the present study occurred due to the consideration of the information in the headings and answers of the questions. The number of categories linked in this study compared with the number found in previous studies had an increase, but it was not as expressive. This observation corroborates the refinement proposal objective to improve data capture and information nuances by improving data exposure.

In analyzing studies prior to refinement, which link the SF-36 instrument[6,11,15,17-19,30] (Table 3) and RMDQ[16], it was observed that only Cieza et al.[11] exposed the significant concepts identified in all instruments and the linking of all items with the ICF. Cieza et al[6], Geyh at al.[19], Schepers et al.[18], Prodinger et al.[15] and Sigl et al.[16] showed the selected categories but did not show which instrument item they were linked to. Scheuringer et al.[30] linked the content of 120 instruments, among them the SF-36, but the results expressed the total of categories related to all the instruments. Fréz et al.[17] linked only the SF-36 domains to the ICF categories.

It is believed that the detail in the exposure of the results is related to the purpose of the study and to the number of related instruments the higher the number of instruments connected the less the possibility of detailing.

Rat et al.[31] and Milman et al.[32] use the already established SF-36 links to compare content with other instruments. Faria et al.[33] carried out a systematic review to identify categories of the Activities and Participation component in some quality-of-life instruments already linked to the ICF. This shows the importance of linking these questionnaires using rule refinement so that it can also serve as a basis of comparison for the establishment of other instruments.

Since the objective of this work was to report the experience of applying the refinement of the linking rules, the study presents the detailed results as suggested by Cieza et al.[10], allowing

Table 3. Synthesis and comparison of current study results about linking SF-36, RMDQ and VAS to ICF from other studies.

Instrument	SF36						RMDQ		VAS	
Study	Cieza et al., 2002[11]	Schepers et al., 2007[18]	Cieza and Stucki 2005[7]	Geyh et al., 2007[19]	Prodinger et al., 2008[15]	Present study	Sigl et al., 2006[16]	Present study	Scheuringer et al., 2005[30]	Present study
Linking Rule used	2002	2002	2005	2005	2005	2016	2002	2016	2002	2016
n of questions/items	11/36	11/36	11/36	11/36	11/36	11/36	24	24	1	1
n of concepts identified	52	60	50	54	57	67	51	51	1	1
n of concepts linked to ICF categories	40	44	38	44	44	49	50	50	1	1
n of ICF categories linked	20	15	21	23	26	27	19	21	1	1
n of concepts linked/categories of each ICF component	40/20	44/15	38/21	44/23	44/26	49/27	50/19	50/21	1/1	1/1
Body function (b)	14/4	15/3	14/4	-/3	16/6	11/5	27/4	27/4	1/1	1/1
Body structure (s)	0	0	0	0	0	0	0	0	0	0
Activities and participation (d)	26/16	29/12	24/17	-/20	28/20	38/22	19/13	19/15	0	0
Environmental factors (e)	0	0	0	0	0	0	4/2	4/2	0	0
Personal factors (ps)	0	0	0	0	3	0	0	0	0	0
Concept not covered (nc)	0	0	3	10	0	0	1	1	0	0
Concept not defined (nd)	12	16	9		10	17	0	0	0	0

users to access information on the content of these measuring instruments, which can assist clinicians and researchers in choosing the instruments that best suit their interests. This situation can be explained with the VAS. In the present study the category b280 was choose but depending on the context of the research a more specific category can be chosen related to pain, such as low back pain, the category b28013.

Some possible limitations of the present study should be considered, even if important information has been obtained to the operationalization of the refinement of the linking rules and its dissemination. Differences were observed in the general findings of studies that used the same instruments using the same rules. This situation shows that the experience and clinical context should be considered when selecting the version that best meets your needs. It is also necessary that other professionals use the new linking rules in different clinical contexts to identify your contribution to the production of records of functionality and monitoring of health status.

A limitation for the discussion of these results was the lack of clear identification in the studies of which concepts were identified and their respective items in the instruments investigated. In such cases, those interested in using the studies as a reference must go the other way to identify what has been linked.

Among the studies included in this study, only Cieza et al.[11] presented clarity in the presentation of the findings, so it is believed that the recent insertion of a table for exposure of the results will help future works as well as the registration of the constructs capacity and performance recently considered. In this way, the professional/researcher that will use the instruments may know the items with association to the categories of the ICF, its specification or content.

It is known that international efforts have been applied to associate instruments validated with ICF categories. Cieza et al.[10] suggest that the continued use of the updated rules for linking instruments to the ICF may assist in the creation of a database containing sets of items linked to each ICF category, aiming at both the development of new instruments and the operationalization of certain ICF categories and instruments according to the perspective that best suits the clinical purpose. This exercise will also provide information to better specify the categories relevant to a future classification review.

The ICF use equips professionals in clinical practice as well as programs and public policies'

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professionals, responsible for evaluations and classifications of functioning and disability[8]. Its use could also help to select and to build instruments more precise in content and in a quantitative source of information[10].

Thus, it is important that more studies like this are carried out to expand the databases and evaluate the influence of the refined linking rules on the process of linking instruments with different perspectives and different categories of responses.

Conclusion

The refinements of linking rules propitiated more clarity in the process to identify, to link instruments content with ICF and to expose the results. Thus, increased the number of identified and linked concepts as well as the categories in the instruments.

The refinement of the linking rules allows the standardization of the concepts of assessment instruments and the ICF with different levels of precision, with specification/indication of the perspective and the categorization of the response. The results expressed in a table with the main information about the linking process will help to increase the transparency and reliability as well as the comparison within studies.

The content linking of diverse instruments, such as the VAS, RMDQ, and SF-36 based on the refinement of the linking rules, will contribute to the alignment of the existing instruments with the ICF and with the selection of instruments that cover relevant parameters of interest to researchers and clinicians.

Collaborations

All authors contributed fundamentally to this study. BC Santos worked on the research, design, methodology, ICF linking process. KO Scharan, KP Corrêa and RS Bernardelli worked on the research, design, methodology, ICF linking process, data analysis and writing of the present study. MIB Silveira worked on the research, methodology, ICF linking process. ADL Moser worked on conception and design, guided the linking process and the writing of the article and did the final revision.

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Article submitted 19/09/2017
Approved 07/06/2019
Final version submitted 09/06/2019

Chief Editors: Romeu Gomes, Antônio Augusto Moura da Silva