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Associations between ICF Categories Found Amongst Participants in Vocational Rehabilitation Evaluation Due to Chronic Musculoskeletal Disorders: Turku ICF Study: A Short Communication

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Abstract

Purpose: To investigate associations between ICF-categories found amongst participants in vocational rehabilitation evaluation due to chronic musculoskeletal disorders.

Methods: The descriptions of functional limitations were retrospectively identified for 32 patients. The original vocational rehabilitation evaluation was conducted by a multi-professional team in an out-patient clinic of a university hospital. The descriptions obtained were converted to ICF second-level categories. Spearman's rank correlation coefficients were calculated for ICF-categories appearing ≥ 10 times in the study sample.

Results: In the study sample, 84 different ICF second-level categories were identified (average 18 codes/subject, range 9–25). Of them, 18 categories were observed amongst ≥10 participants, comprising 17 statistically significant correlation-pairs. Of them, positive association of moderate strength was found for energy, sleep, attention, touch functions, joint mobility, muscle power, doing housework, vocational training, remunerative employment, dressing changing and maintaining body position, and lifting and carrying objects.

Conclusions: During vocational rehabilitation evaluation, several moderate associations between different functional limitations were found. Identifying and describing such associations in uniform terms of ICF may improve the preciseness and comparability of vocational rehabilitation evaluation.

Keywords: Occupational rehabilitation; Rehabilitation assessment; Work ability; Work capacity; Correlation

Introduction

International Classification of Functioning, Disability and Health (ICF)is a comprehensive unified set of descriptions of functional limitations [1]. A structure of ICF represents a logical chain starting from impairment of body structure (s-component), leading to impaired body function (b-component),and resulting in restriction of activities and participation (d-component). The entire chain is influenced by contextual environmental and individual factors (e-component). Some quantitatively measurable associations between different parts of that chain can be expected. Such associations may occur inside each component as well as between categories belonging to different components. In developed countries, over 30% of population suffers from chronic pain, musculoskeletal conditions being the most frequent reason for that complaint [2,3]. Chronic musculoskeletal disorders are known being a common cause of disability in general, and work disability in particular. For example, in Finland, every third disability retirement and sick leave are caused by musculoskeletal disorders (the most common diagnosis being intervertebral disc degeneration) [4]. As a result, these disorders are frequent reason for vocational rehabilitation evaluation.

Correlations between ICF categories have previously been studied mostly by the ICF Research Branch investigators when selecting items for ICF core sets [5-9].There are also some reports on the associations of ICF and other functional status scales, like e.g. scales of quality of life [9]. We did not find reports on such associations in vocational rehabilitation. Vocational rehabilitation evaluation needs to be precise as it often involves assessment of work capacity and entitlement for benefits. The functional status of rehabilitants may be assessed more systematically, if the rehabilitation team is aware of known associations between different ICF categories to look for.

In our previous study on this sample, we compared ICF-categories with shortened ICF sets [10]. The objective of present study was to investigate correlations between different functional limitations, defined as ICF-categories, of patients with chronic musculoskeletal disorders who underwent vocational rehabilitation evaluation.

Materials and Methods

The study was conducted in the out-patient clinic of the Department of Rehabilitation in Turku University Hospital, Finland. The clinic is specialized in comprehensive rehabilitation evaluation with an emphasis on determining abilities, skills, and motivational factors for the employment of persons with deteriorated work ability due to substantial chronic medical conditions. In this study, we included all consecutive patients referred for this evaluation because of a chronic musculoskeletal disorder as a main reason and who entered the clinic between 1 January 2011 and 31 December 2011. Data from the electronic patient records were obtained for 32 persons (53% women). None was excluded from the study. The study was approved by the Ethics Committee of the Turku University Hospital.

Patients entering the clinic had a history of a chronic musculoskeletal disorder confirmed by a physician. Their capacity for work had started to deteriorate, and work disability was probable. The rehabilitation evaluation was conducted by a multi-professional team consisting of

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a physician, a rehabilitation planner, and a psychologist. The main goal of the evaluation was to form a comprehensive rehabilitation plan regarding a diagnostic and treatment strategy and appropriate medical and vocational rehabilitation measures with an emphasis on the vocational content. The final statement of the evaluation contained an opinion on the severity of the unemployment handicap. Patients, their earning-related pension insurance company, and the local employment agencies carried the responsibility for the practical implementation of the rehabilitation plan. The process of evaluation and definitions of demographic variables have been previously described [10].

Each participant's electronic patient record was studied retrospectively, and each phrase that could potentially be interpreted as an ICF code was extracted and converted into appropriate ICF codes. The codes were extracted with as high a precision as possible. Due to the qualitative nature of the used patient records, no attempts were made to define the ICF quantitative qualifiers. The code extraction process has been previously described [10].

Statistical analysis

The identified ICF categories were truncated to a form of second-level ICF category (letter with three digits). To evaluate correlations between ICF codes which were found to appear most frequently in the study sample and also for practical reasons, further analysis included only categories which appeared amongst > 10 participants. Due to the retrospective nature of the study and the impreciseness o descriptions of s- and e-components (s=body structures and e=environmental factors), we agreed to include only b- and d-components (b=body functions, d=activities and participation) for further analysis. Spearman's rank correlation and Pearson's method have previously been used in studies validating ICF Core Sets [5,7,9]. Spearman's rank correlation coefficient (r_s) was calculated for each frequent code along with a two-tailed test of statistical significance set at ≤ 0.05. Correlation strength of 0–0.19 was regarded as very weak, 0.2–0.39 as weak, 0.40–0.59 as moderate, 0.6–0.79 as strong, and 0.8–1 as very strong[11].All of the statistical analyses were performed using IBM® SPSS® Statistics version 21.

Results

The mean age of participants (53% women) was 46.4 (range 29–60, standard deviation [SD] 8.9) years. The general educational level was low, and only four persons (13%) had a high school education. Most of the patients (78%) had some vocational education, mostly comparable to vocational school. Half of patients still had a valid job contract. Of the participants, 20 (62%) had a work history >20 years, and 18 (56%) were manual workers. The most frequent reasons for vocational rehabilitation evaluation were, low back pain with and without degenerative changes of spine (14 [44%]), joint problems caused by complicated joint replacement or osteoarthritis without surgery (8 [25%]), and widespread pain with or without confirmed rheumatic inflammation (6 [19%]).

In the study sample, 84 ICF second-level categories were identified (average 18 codes/subject, range 9–25). Of them, 18 categories were observed for ≥ 10 times, comprising 17 statistically significant correlation-pairs (Table 1). Of them, positive association of moderate strength was found for b130–b134, b134–b265, b710–b730, b130–d850, b140–d540, d410–d430, d415–d450, and d540–d540 (Table 2).Weak positive associations were found for b130–b140, b134–b152, b130–d640, b130–d825, b134–d540, b134–d850, d415–d640, and d450–d640 (Table 2). There were no strong or negative significant associations found.

Discussion

In this retrospective study of 32 participants in a vocational rehabilitation evaluation due to chronic musculoskeletal disorders, we found some statistically significant associations between different functional limitations described in terms of ICF. The strongest correlations were observed between dressing vs. doing housework, changing basic body position vs. lifting and carrying objects, attention functions vs. dressing, energy and drive functions vs. remunerative employment, mobility of joint functions vs. muscle power functions, sleep vs. touch function, and sleep vs. energy and drive functions. Of the 17 detected significant associations, 11 (65%) were observed for

ICF code†	b130	b134	b140	b152	b265	b280	b710	b730	d410	d415	d240	d430	d450	d540	d640	d825	d850
b134	**,411***																
b140	**,383***	0.01															
b152	0.07	**,378***	0.03														
b265	0.26	**,573****	0.13	0.26													
b280	-0.20	-0.21	-0.10	-0.33	-0.26												
b710	-0.02	0.04	-0.15	-0.12	-0.32	0.21											
b730	-0.12	0.20	-0.06	0.12	-0.07	-0.08	**,473****										
d410	-0.05	0.14	0.18	-0.21	-0.06	0.24	0.12	-0.02									
d415	0.07	0.15	0.24	0.07	0.00	0.07	-0.28	-0.25	0.08								
d240	-0.17	0.01	-0.02	0.17	0.27	0.17	-0.01	0.08	0.04	-0.31							
d430	-0.16	-0.01	0.10	-0.20	0.09	0.24	0.18	0.13	**,404***	0.20	-0.08						
d450	0.20	0.28	0.24	-0.07	-0.13	-0.20	-0.15	-0.25	0.21	**,467****	-0.31	-0.16					
d540	0.33	**,378***	**,453****	0.20	0.13	-0.33	0.02	0.12	-0.08	0.07	-0.10	-0.20	0.33				
d640	**,371***	0.33	**,357***	0.25	0.23	-0.14	-0.33	-0.09	-0.11	**,371***	-0.30	-0.02	**,371***	**,410***			
d825	**,383***	0.28	-0.02	-0.10	0.00	0.17	0.13	-0.20	0.04	0.24	-0.16	-0.08	0.10	0.17	0.19		
d850	**,415***	**,389***	0.22	0.25	0.32	-0.08	0.05	0.01	0.09	-0.03	-0.01	0.16	0.19	0.25	0.09	-0.01	
d920	0.28	0.09	0.28	-0.02	0.32	0.05	-0.22	-0.21	0.14	0.28	-0.13	0.17	0.02	0.12	0.33	0.15	0.17

*Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed)
†Descriptions of ICF categories shown in the table: b130 Energy and drive functions, b134 Sleep functions, b140 Attention functions, b152 Emotional functions, b265 Touch function, b280 Sensation of pain, b710 Mobility of joint functions, b730 Muscle power functions, d410 Changing basic body position, d415 Maintaining a body position, d240 Handling stress and other psychological demands, d430 Lifting and carrying objects, d450 Walking, d540 Dressing, d640 Doing housework, d825 Vocational training, d850 Remunerative employment, d920 Recreation and leisure

Table 1: Correlations between observed ICF-codes (Spearman's rank correlation coefficient).

		r_s^c	p-value
Correlations between b[a] and b[a]			
b130 Energy and drive functions	b134 Sleep functions	0.41	0.020
b130 Energy and drive functions	b140 Attention functions	0.38	0.031
b134 Sleep functions	b152 Emotional functions	0.38	0.033
b134 Sleep functions	b265 Touch function	0.57	0.001
b710 Mobility of joint functions	b730 Muscle power functions	0.47	0.006
Correlations between b[a] and d[b]			
b130 Energy and drive functions	d640 Doing housework	0.37	0.037
b130 Energy and drive functions	d825 Vocational training	0.38	0.031
b130 Energy and drive functions	d850 Remunerative employment	0.42	0.018
b134 Sleep functions	d540 Dressing	0.38	0.033
b134 Sleep functions	d850 Remunerative employment	0.39	0.280
b140 Attention functions	d540 Dressing	0.45	0.009
b140 Attention functions	d640 Doing housework	0.36	0.045
Correlations between d [b]and d [b]			
d410 Changing basic body position	d430 Lifting and carrying objects	0.40	0.022
d415 Maintaining a body position	d450 Walking	0.47	0.007
d415 Maintaining a body position	d640 Doing housework	0.37	0.037
d450 Walking	d640 Doing housework	0.37	0.037
d540 Dressing	d640 Doing housework	0.41	0.020

[a]Body Functions; [b] Activities and Participation; [c]Spearman's rank correlation coefficient

Table 2: Statistically significant correlations between observed ICF-codes grouped by ICF-components (Spearman's rank correlation coefficientr_s and 2-tailed p-value).

the same ICF-component 'b1 mental functions' which includes sleep, attention, and energy and drive functions among others. The finding suggests that this ICF-chapter is of special interest for teams involved in vocational rehabilitation evaluation. Of found correlation pairs, all except 3 categories (b265 touch function, d710 mobility of joint functions, and d640 doing housework) have also been items the ICF Comprehensive Core Set for vocational rehabilitation [3].

Associations between different functional limitations in terms of ICF have previously been studied when identifying appropriate collections of categories for ICF core sets [5,7,9]. Our results confirmed that such associations between different ICF-categories may exist and can be quantified. We used strength of 0.4–0.6 as a cutoff-point for amoderate association between two variables [11]. Using less rigorous condition for strong correlation as ≥ 0.5, proposed in several previous studies on ICF [5,7], one association, observed in this study, would be considered as strong – namely the association between sleep and touch functions.

Amongst patients with musculoskeletal disorders, pain, numbness, or hyperalgesia are common cause of sleeping difficulties. Also the correlations observed between dressing vs. doing housework, changing basic body position vs. lifting and carrying objects, attention functions vs. dressing, and mobility of joint functions vs. muscle power functions are self-evident and barely need to be explained. The observed associations between mental functions and other different functional limitations were expected as psychological factors have previously been found being strong correlates of work ability of people with musculoskeletal disorders, inducing even more substantial impact on work ability than biomedical or biomechanical factors [12].

The obtained data on environmental factors (e-component) were not considered sufficient to be included into correlation analysis. The present study was retrospective and conducted on a relatively small study sample of 32 patients with wide spectrum of musculoskeletal conditions. Due to these limitations, in our opinion, the fact, that associations between different ICF-categories do exist and can be quantitatively assessed, is more valuable for a wider audience than the exact associations themselves. As far as we know, such associations among participants in vocational rehabilitation evaluation have not been studied yet.

Further studies, conducted on larger samples and in prospective settings, on associations between functional limitations of patients with need for vocational rehabilitation are needed. Even though correlation matrix analysis is reliable and relatively easy to perform, more advanced methods, like e.g. factor analysis used in larger study samples, are possible in further studies.

Conclusions

During vocational rehabilitation evaluation of patients with chronic musculoskeletal disorders, several moderate associations between different functional limitations were found. The functional status of rehabilitants may be assessed more systematically, if the rehabilitation team is aware of known associations between different ICF categories to look for. Further research may reveal if identifying such associations and describing them in uniform terms of ICF can improve the preciseness and comparability of vocational rehabilitation evaluation.

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