Case study

THE CLINICAL APPLICATION OF IMPLEMENTED INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF) MODEL FOR REHABILITATION TREATMENT IN SUBACROMIAL IMPINGEMENT SYNDROME

ZASTOSOWANIE KLINICZNE MODELU MIĘDZYNARODOWEJ KLASYFIKACJI FUNKCJONOWANIA, NIEPEŁNOSPRAWNOŚCI I ZDROWIA (ICF) W LECZENIU REHABILITACYJNYM ZESPOŁU CIASNOTY PODBARKOWEJ

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ABSTRACT

Introduction

The ICF classification describes, based on categories, functioning at the body level (disability), people (activities) and people in society (participation) taking into account the environmental factors. ICF tools were developed based on ICF Core Set for the management of the rehabilitation process.

Aim

This publication, based on a case study, presents a proposal for a set of categories for functional assessment of the upper limb for patients with subacromial impingement syndrome and a proposal for intervention by individual members of the rehabilitation team.

Material and methods

We present a retrospective study (analysis of medical records) of a 55-year-old woman hospitalized in the Out Patient Ward of the Rehabilitation Clinic because of left shoulder pain not caused by injury. The rehabilitation tretament provided to this patient included 5 patient management components : examination, evaluation, prognosis, diagnosis, and intervention using the ICF-based documentation tool.

Results

After rehabilitation, resting pain in the shoulder girdle (from VAS 8 to VAS 3) decreased, muscle strength increased (from 4 to 5 on the Lovett scale) and range of movement without pain, no changes in shoulder imaging results were noted. The patient regained partial independence in self-service activities. She still had trouble performing her upper limb elevation.

Conclusions

The ICF classification enables effective global and specific goals of the rehabilitation program, as well as facilitates planning the intervention of individual members of the rehabilitation team. The presented case report was the first clinical study on the use of ICF in the shoulder-tight syndrome.

Keywords: ICF, shoulder rehabilitation, subacromial impingement syndrome

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STRESZCZENIE

Wstęp

Klasyfikacja ICF (ang. International Classification of Functioning, Disability and Health) opisuje na podstawie kategorii funkcjonowanie na poziomie ciała (upośledzenia), osoby (czynności) oraz osoby w społeczeństwie (uczestnictwo) przy uwzględnieniu czynników środowiskowych. Do zaplanowania programu rehabilitacji wykorzystano narzędzia ICF opracowane w oparciu o zestaw podstawowy ICF.

Cel

Niniejsza publikacja, na podstawie studium przypadku przedstawia propozycję zestawu kategorii oceny funkcjonalnej kończyny górnej dla chorych z zespołem ciasnoty podbarkowej oraz propozycję interwencji przez poszczególnych członków zespołu rehabilitacyjnego.

Materiał i metody

Badanie retrospektywne na podstawie analizy dokumentacji medycznej 55-letniej pacjentki hospitalizowanej w Oddziale Dziennego Pobytu Kliniki Rehabilitacji z powodu dolegliwości bólowych barku lewego, które wystąpiły nagle bez urazu. Dokumentacja medyczna leczenia rehabilitacyjnego u tej pacjentki obejmowała 5 elementów: badanie, ocenę funkcjonalną, rokowanie, diagnozę i interwencję przy zastosowaniu klasyfikacji ICF.

Wyniki

Po leczeniu rehabilitacyjnym zmniejszyły się dolegliwości bólowe obręczy barkowej z 8 na 3 według skali VAS, zwiększyła siła mięśniowa z 4 na 5 według skali Lovett i zakres ruchu bez dolegliwości bólowych, nie odnotowano zmian w wynikach obrazowych obręczy barkowej. Pacjentka odzyskała częściową niezależność w czynnościach samoobsługowych. Nadal ma problemy z wykonywaniem czynności z uniesieniem kończyny górnej.

Wnioski

Klasyfikacja ICF umożliwia skutecznie wyznaczyć cele globalne i szczegółowe programu rehabilitacyjnego, jak również zaplanować interwencje poszczególnych członków zespołu rehabilitacyjnego. Przedstawiony opis przypadku jest pierwszym badaniem klinicznym z zastosowaniem klasyfikacji ICF w zespole ciasnoty podbarkowej.

Słowa kluczowe: ICF, rehabilitacja barku, zespół ciasnoty podbarkowej

Introduction

On June 18, 2018, the World Health Organization (WHO) issued a version of the ICD-11 (International Statistical Classification of Diseases and Related Health Problems). which was presented at the 72nd World Health Assembly – May 25, 2019. All Member States are to report using this classification from l January 2022 (Editorial Lancet 2018). The ICD 11 classification currently consists of the commonly used ICD 10 health and disease assessment classification and the implemented International Classification of Functioning, Disability and Health (ICF) classification (Nishio *et al.* 2019). The ICF classification supplements the ICD-10 classification (Stucki *et al.*, 2017). The ICD-10 classification describes diseases, injuries, disorders and related health problems (Escorpizo *et al.* 2013). The ICF classification describes, based on categories, functioning at the body level (disability),

people (activities) and people in society (participation) taking into account environmental factors. (Selb *et al.* 2015). To determine the scale of the problem in ICF categories, ICF qualifiers are used, which are based on numerical scales from 0 to 4 (0: no problem (0%–4%): 1: mild problem (5%–24%); 2: moderate problem (25%–49%); 3: serious problem (50%–95%); 4: full problem (96%–100%). Environmental factors are quantified using a negative and positive scale indicating the extent to which the environmental factor acts as a barrier or facilitator (0: none 1: mild; 2: moderate 3: strong; 4: total barrier) (Rauh *et al.* 2010). ICF-based documentation tools have been developed for use at various stages of rehabilitation (so-called rehabilitation cycle) with a proposal of the direction and scope of intervention of individual members of the rehabilitation team. The documentation tools consist of the ICF categorical profile, the ICF initial assessment sheet, the ICF intervention table and the ICF evaluation sheet (Rauch *et al.*, 2008). Each of these tools can be used at various stages of the rehabilitation process.

To facilitate the use of ICF in widespread clinical practice, the WHO team developed various ICF base sets and shortened ICF (core sets) for specific disease entities (Yen *et al.*, 2014). On the website https://www.icf-core-sets.org/en/page1.php WHO proposes ICF category sets for patients with musculoskeletal injuries (Musculoskeletal ICF core sets), for patients treated with rehabilitation (rehabilitation set). However, there is no published set for assessing upper limb dysfunction depending on the cause of the disease. Previous scales modeled on the ICF classification (e.g. DASH) based on the self-assessment of the functional activity of the upper limb do not globally assess damage to the function and structure of the upper limb, which has a direct impact on the activity and participation in social life of the patient with upper limb dysfunction.

Aim
This publication, based on a case study, presents a proposal for a set of categories for functional assessment of the upper limb for patients with subacromial impingement syndrome and a proposal for intervention by individual members of the rehabilitation team.

Material and methods
Case report
We present a retrospective study (analysis of medical records) of a 55-year-old woman hospitalized in the Out Patient Ward of the Rehabilitation Clinic because of left shoulder pain not caused by injury. During the initial examination, she reported pain located in the front of the shoulder and in the upper-lateral part of the arm, preventing lying on the affected side. The described pain awakened the patient at night. In addition, the patient reported parasthesia located in the upper arm, weakness of the muscular strength of the limb and severe pain when performing activities with lifting the limb, such as hanging curtains or cleaning windows. During the treatment she was on sick leave due to the described pain. She is an accountant by profession, working on average 7 hours a day on a computer station. Before shoulder pain occurred, she participated in various physical activities such as swimming in the pool or cycling. He also has chronic hypertension. The patient had a limited range of active adduction and flexion movement, which after exceeding 90 degrees was accompanied by severe pain assessed by her on 8 on the VAS scale. In addition, weakness in shoulder girdle muscle strength (4 according to the Lovett scale) and an abnormal posture in the form of head and shoulder protraction was found, which resulted in increased kyphosis in the upper thoracic spine.

X-ray examination showed narrowing of the subacromial space in the course of advanced osteophytosis. The ultrasound examination described features of chronic bursitis (edema and fluid) and edema of the supraspinate muscle tendon and long head biceps tendon. The patient gave her written consent to participate in this study. The current report was created after the end of the 4-week cycle of rehabilitation treatment.

Examination

For the initial assessment in this case study, a set of basic ICF categories was used, presented in the publications of Roe *et al.* 2013 to assess shoulder pain. The results of the medical examination were recoded into ICF categories. Figure 1 shows the ICF categorical profile. The results of the basic categories of the ICF set showed various limitations in upper limb dysfunction and dependence on the environment.

Diagnosis

The ICF assessment sheet (see Figure 2) containing a comprehensive definition of the patient's functional dysfunctions and consists of 2 parts: The upper part indicates the complications that the patient experiences and is supplemented by a routine interview with the patient. The bottom of the sheet reflects a clinical examination by a physician. A relationship can be found between the patient's complications and the factors that caused the functional dysfunction including the patient's motor complications (upper part of the sheet).

Plan of treatment

The goals of the rehabilitation program were determined by patient participation and consideration of the various components of ICF. The main goal of the patient (PG) was to regain independence. The patient's long-term goal (LTG) was to regain the ability to drive and return to full efficiency at work. Two short-term goals (STGs) have been identified. First, improving the range of motion of the upper limb, second, improving the patient's ability to achieve maximum independence in daily activities (ADL), such as toilet and dressing. The goals were entered into the ICF categorical profile and ICF evaluation sheet. Intervention goals were selected in accordance with the goals set by talking to the patient. The goal value was set for each of the first and second short-term goals to be achieved by the end of the rehabilitation cycle**.**

Intervention

The sample documentation template in Table 1 shows some interventions of rehabilitation team members. A set of interventions is provided for each ICF category. In line with the short-term goals set, various interventions were used to improve traffic range and ADL. During the rehabilitation cycle, the patient had a rehabilitation program planned, including physiotherapeutic exercises and techniques to improve deep sensation, range of motion, tissue elasticity, and muscular strength and endurance within the shoulder joint.

Results

The patient's functional status was re-assessed at the end of the 4-week rehabilitation cycle and the results are presented in Figure 3. After rehabilitation, resting pain in the shoulder girdle (VAS 3) decreased, muscle strength increased (5 on the Lovett scale) and range of movement without pain. Despite the fact that the structure was disturbed, the patient regained partial independence in self-service activities such as preparing meals, using the toilet, getting dressed. She still had trouble performing her upper limb elevation.

Discussion

Philbois *et al.* In 2016, by examining healthcare professionals, they proved that elements of commonly used scales in the assessment of the upper limb can be associated with elements of ICF classification. Also van de Ven-Stevens *et al.* 2015 proved that ICF classification is the best tool for organizing data on upper limb dysfunction, however, the authors only undertook the evaluation of hand function. In turn, Vincent *et al.* 2015 by examining the usefulness of the ICF category in elbow joint assessment, they proved that the ICF assessment sheet can perfectly reflect useful data on the functional conditions of patients. In the available literature only Roe *et al.*2013 undertook to assess the shoulder according to the ICF classification. These researchers focused only on the activity and participation of the patient with shoulder

ICF Categorical Profile – subacromial impingement syndrome		
Assessment		
Patient Goal: Optimal independence in daily living		3
Long term goal (LTG): Health maintenance and community reintegration		2
Short term goal (STG1): Improved use of hands and arms		1
Short term goal (STG2): Increased independence in self-care		0

ICF categories	ICF Qualifier / problem	Goal relation	Goal value
BODY FUNCTIONS			
b134 Sleep functions		LTG	2
b265 Touch function			1
b280 Sensation of pain		SGT1	2
b710 Mobility of joint functions		SGT1	1
b715 Stability of joint functions		SGT1	1
b720 Mobility of bone functions		SGT1	1
b730 Muscle power functions		SGT1	1
b735 Muscle tone functions			
b740 Muscle endurance functions		SGT1	1
b780 Sensations related to muscles and movement functions		SGT1	1
b840 Sensation related to the skin		SGT1	
BODY STRUCTURES			
s710 Structure of head and neck region			
s720 Structure of shoulder region		SGT1	1
s730 Structure of upper extremity			
ACTICITIES & PARTICIPATION			
d170 Writing			
d415 Maintaining a body position			
d430 Lifting and carrying objects		SGT1	3
d440 Fine hand use			
d445 Hand and arm use		SGT1	3
d475 Driving		SGT1	1
d510 Washing oneself		SGT1	1
d530 Toileting		SGT1	1
d540 Dressing		SGT1	1
d550 Eating			
d630 Preparing meals		SGT1	1
d640 Doing housework		STG2	3
d850 Remunerative employment		STG2	3
d920 Recreation and leisure		STG2	3

ENVIRONMENTAL FACTORS	facilitator 4+	3+	2+	1+	0	barrier 1	2	3	4		
e1101 Drugs										1	2+
e120 Products and technology for personal indoor and outdoor mobility and transportation											

PERSONAL FACTORE (PF)	Influence		
	Positive	Neutral	Negative
Motivation			
Attitude toward intervention			

Figure 1. ICF Categorical profile

ICF Assessment Sheet

	Body Functions & Structures			Activities & Participation
Patient Perspective	I have pain in my left shoulder Pain is in the anterior part of the shoulder and upper lateral of the arm. It makes it impossible for them to lie on the affected side and disrupt the sleep Reduce muscle and range of motion and sometimes also paraesthesias in the upper section of the arm			***I don't sleep in pain at night, I'm tired during the day*** I need some help in doing routine tasks such as toilet and dressing I can not wear shopping, hanging curtains, wash windows ***I would love to be independent on doing my activity daily leaving*** I can not use my left hand I hope can drive again in the future
Health Professional Perspective	**b134 Sleep functions** b265 Touch function **b280 Sensation of pain** **b710 Mobility of joint functions** b715 Stability of joint functions b720 Mobility of bone functions **b730 Muscle power functions** **b735 Muscle tone functions** **b740 Muscle endurance functions** b780 Sensations related to muscles and movement functions b840 Sensation related to the skin s710 Structure of head and neck region **s720 Structure of shoulder region** s730 Structure of upper extremity			d170 Writing d415 Maintaining a body position d430 Lifting and carrying objects d440 Fine hand use d445 Hand and arm use d475 Driving **d510 Washing oneself** **d530 Toileting** **d540 Dressing** **d550 Eating** d630 Preparing meals **d640 Doing housework** d850 Remunerative employment d920 Recreation and leisure
Environmental Factors				**Personal Factors**
e 1101 Drugs e120 Products and technology for personal indoor and outdoor mobility and transportation				55 year old female She was working as bookkeeper Family is very important to her She has a positive outlook on life

Figure 2. ICF assesment sheet.

pain. In addition, they correlated the results of commonly used DASH and Quick DASH scales with ICF qualifiers. Examining stroke patients Faria-Fortin *et al.* 2011 proved that the use of the ICF-core in clinical settings allows members of the rehabilitation team to evaluate and monitor the effectiveness of rehabilitation treatment in all functional aspects of the patient. In the ICF evaluation sheet presented in this work (see Figure 3) one can observe the progress of the functional state and assess the effectiveness of rehabilitation interventions, in addition, the evaluation evaluation indicates further goals of the rehabilitation procedure. As Rauch *et al.* 2010 in clinical practice, the use of the ICF Category Profile dedicated to patients with shoulder girdle disorders can help improve the quality of interdisciplinary care, including communication between healthcare professionals and patients and their family members or careers.

Conclusions

The ICF classification enables effective global and specific goals of the rehabilitation program, as well as facilitates planning the intervention of individual members of the rehabilitation team. The presented case report was the first clinical study on the use of ICF in the shoulder-tight syndrome. However, further research should be carried out to find the best method of implementing ICF in the

Table 1. Documentation template

Patient Goal:	independent living in the community
Long term goal (LTG)	resumption of work activities
Short term goal (STG)	
STG1	Improved use of hands and arms
STG2	Increased independence in self-care
Date	

ICF Categories	Examination	
	Test	**Intervention**
BODY FUNCTIONS		
b134 Sleep functions	Insomnia Severity Index	rehabilitation doctor
b280 Sensation of pain	VAS	rehabilitation doctor
b710 Mobility of joint functions	ROM shoulder	physiotherapist
b730 Muscle power functions	Manual Muscule test	physiotherapist
BODY STRUCTURES		
s710 Structure of head and neck region		rehabilitation doctor
s720 Structure of shoulder region		orthopedic consultation
s730 Structure of upper extremity		rehabilitation doctor
ACTICITIES & PARTICIPATION		
d170 Writing	Observation	occupational therapist
d430 Lifting and carrying objects	Observation	physiotherapist
d440 Fine hand use	Observation	occupational therapist
d445 Hand and arm use	Observation	physiotherapist
d475 Driving	Observation	physiotherapist
d510 Washing oneself	ADL	nurse
d540 Dressing	ADL	nurse
d550 Eating	ADL	nurse
d630 Preparing meals	Observation	occupational therapist
d640 Doing housework	Observation	occupational therapist
d850 Remunerative employment	Observation	career counselor
d920 Recreation and leisure	Observation	
ENVIRONMENTAL FACTORS		
e 1101 Drugs	Leki	
e120 Products and technology for personal indoor and outdoor mobility and transportation		
PERSONAL FACTORE (PF)	**Influence**	
	Positive	Negative
Motivation	X	
Attitude toward intervention	X	

ICF Categorical Profile – subacromial impingement syndrome

Assessment — Evaluation

Assessment	Evaluation
Patient Goal: Optimal independence in daily living	3
Long term goal (LTG): Health maintenance and community reintegration	2
Short term goal (STG1): Improved use of hands and arms	1
Short term goal (STG2): Increased independence in self-care	0

Assessment — Evaluation

ICF categories	Goal relation	Goal value	Evaluation (problem 0–4)	Goal achievement
BODY FUNCTIONS				
b134 Sleep functions	LTG	2		LTG — v
b265 Touch function		1		
b280 Sensation of pain	SGT1	2		SGT1 — v
b710 Mobility of joint functions	SGT1	1		SGT1 — v
b715 Stability of joint functions	SGT1	1		SGT1 — v
b720 Mobility of bone functions	SGT1	1		SGT1 — v
b730 Muscle power functions	SGT1	1		SGT1 — v
b735 Muscle tone functions				
b740 Muscle endurance functions	SGT1	1		SGT1 — v
b780 Sensations related to muscles and movement functions	SGT1	1		SGT1 — v
b840 Sensation related to the skin	SGT1			SGT1
BODY STRUCTURES				
s710 Structure of head and neck region				
s720 Structure of shoulder region	SGT1	1		SGT1
s730 Structure of upper extremity				
ACTICITIES & PARTICIPATION				
d170 Writing				
d415 Maintaining a body position				
d430 Lifting and carrying objects	SGT1	3		SGT1 — v
d440 Fine hand use				
d445 Hand and arm use	SGT1	3		SGT1 — v
d475 Driving	SGT1	1		SGT1 — v
d510 Washing oneself	SGT1	1		SGT1 — v
d530 Toileting	SGT1	1		SGT1 — v
d540 Dressing	SGT1	1		SGT1 — v
d550 Eating				v
d630 Preparing meals	SGT1	1		SGT1 — v
d640 Doing housework	STG2	3		STG2 — v
d850 Remunerative employment	STG2	3		STG2 — v
d920 Recreation and leisure	STG2	3		STG2 — v
ENVIRONMENTAL FACTORS				
e1101 Drugs	1	2+		1 — v
e120 Products and technology for personal indoor and outdoor mobility and transportation				v

Figure 3. ICF evaluation display.

diagnosis and rehabilitation of shoulder girdle disorders. The presented assessment sheet needs to be implemented on a larger group of patients.

REFERENCES

Editorial (2018) Lancet 391, pp. 2476.

Escorpizo R, Kostanjsek N, Kennedy C, Nicol MM, Stucki G, Ustün TB. (2010) *'Harmonizing WHO's ICD and ICF: importance and methods to link disease and functioning.'* BMC Public Health 13, pp. 742.

Faria-Fortini I, Michaelsen SM, Cassiano JG, Teixeira-Salmela LF. (2011) *'Upper extremity function in stroke subjects: relationships between the international classification of functioning, disability, and health domains.'* J Hand Ther. 24, pp.257–264.

Nishio A, Kimura E, Seto R, Sato Y. Mizushima H. (2019) *'The Survey for Determining Knowledge-Related Problems in the Dissemination of ICD-11.'* Stud Health Technol Inform. 264, pp.1865–1866.

Philbois SV, Martins J, Souza CS, Sampaio RF, Oliveira AS. *'Health professionals identify components of the International Classification of Functioning, Disability and Health (ICF) in questionnaires for the upper limb.'* **Braz J Phys Ther.**2016;20:15–25.

Rauch A, Cieza A, Stucki G. (2008) *'How to apply the International Classification of Functioning, Disability and Health (ICF) for rehabilitation management in clinical practice.'* Eur J Phys Rehabil Med. 44, pp.329–342.

Rauch A, Escorpizo R, Riddle DL, Eriks I, Stucki G, Cieza A. (2010) *'Using a case report of a patient with spinal cord injury to illustrate the application of international classification of functioning, disability and heaith during multidisciplinary patient management.'* J Am Phys Ther Assoc. 90; pp.1038–1052.

Roe Y, Bautz-Holter E, Juel NG, Soberg HL. (2013) *'Identification of relevant International Classification of Functioning, Disability and Health categories in patients with shoulder pain: a cross-sectional study.'* J Rehabil Med. 45, pp. 662–669.

Roe Y.,Lundegaard Soberg H., Bautz-Holter E. (2013) *'A systematic review of measures of shoulder pain and functioning using the International classification of functioning, disability and health (ICF).'* BMC Musculoskeletal Disorders 14, pp. 73.

Selb M, Kohler F, Robinson Nicol MM, Riberto M, Stucki G, Kennedy C, Üstün B. (2015) *'ICD-11: A comprehensive picture of health, an update on the ICD–ICF joint use initiative.'* J Rehabil Med.47; pp. 2–8.

Stucki G, Bickenbach J. (2017) *'Functioning: the third health indicator in the health system and the key indicator for rehabilitation.'* Eur J Phys Rehabil Med. 53, pp. 134–138.

Yen T, Liou T, Chang K, Wu N, Chou L, Chen H. (2014) *'Systematic review of ICF core set from 2001 to 2012.'* Disabil Rehabil. 36, pp.177–184.

van de Ven-Stevens LA, Graff MJ, Selles RW, Schreuders TA, van der Linde H, Spauwen PH, Geurts AC (2015) *'Instruments for assessment of impairments and activity limitations in patients with hand conditions: A European Delphi study.'* J Rehabil Med. 47, pp. 948–956.

Vincent JI, MacDermid JC, King GJ, Grewal R. (2015) *'Linking of the Patient Rated Elbow Evaluation (PREE) and the American Shoulder and Elbow Surgeons – Elbow questionnaire (pASES-e) to the International Classification of Functioning Disability and Health (ICF) and Hand Core Sets.'* J Hand Ther. 28, pp. 61–67.