Functioning of persons following lower limb amputation – patients' perspective

Funkcioniranje osoba nakon amputacije donjeg uda – bolesnikova točka gledišta

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Abstract. ***Aim:*** The aim of the present study was to describe functioning of persons following lower limb amputation from their perspective by using ICF. Special emphasis was laid on detecting environmental barriers and facilitators. ***Methods:*** All subjects examined at the author's outpatient clinic within six months who met the inclusion criteria were included into study. A student of occupational therapy prepared a list of ICF categories from all the components. She also interviewed all the subjects. ***Results:*** Forty-six subjects (36 men and 10 women), 63.5 years old on average at the time of study, amputated 21.8 years before the study on average were included into the study. They had impairments of up to 4 body functions (median 3) in addition to the amputation of one body structure; problems with 0 to 22 activities and participation (median 7); from 1to 19 barriers (median 11.5) and from 6 to 26 facilitators (median 15) in their environment. ***Discussion:*** Although all the included subjects completed comprehensive rehabilitation following lower limb amputation they still experienced several impairments, limitations and restrictions. Rehabilitation team members have to know these facts and try to decrease their impact on the functioning of persons following lower limb amputation. ***Conclusions:*** Persons following lower limb amputation who completed comprehensive rehabilitation still experience several impairments, limitations and restrictions.

Key words: ICF classification, lower limb amputation, rehabilitation

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INTRODUCTION

Amputation of a lower limb is surgical removal of a whole or a part of lower limb. From the perspective of the International Classification of Functioning Disability and Health[1] it is a change in body structure. In subjects following limb amputation there are described also impairments of body functions[2-13], activity limitations and participation restrictions[14-30]. There are very few studies focusing on environmental factors.

Amputations of lower limb are frequent and have severe impact on functioning of individuals. Detecting the problems is the first phase of rehabilitation and basis for planning interventions and developing appropriate rehabilitation programs.

The most frequently described impairments of body functions are decreased muscle strength[2-6], decreased range of motion[5], balance problems[2,5,7], changed gait pattern[8-11], pain[12], and skin problems[13]. Among activity limitations are limitation of mobility[14-19] and activities of daily living[20-21]. Among participation restrictions are restrictions of intimate relationship and sexuality[20,22-24] and of reemployment after amputation[12,14,25-30].

Rehabilitation aims to reduce the impact of amputation on the person's functioning and to achieve optimal social integration[31]. First we have to identify all problems, set rehabilitation goals and then measure the outcome with appropriate outcome measures. Most outcome measures used in the rehabilitation of persons following lower limb amputation were developed before the endorsement of ICF and none of them cover the whole functioning. They measure outcome according to professionals' opinion and do not really consider a patient's view. Pihlar demonstrated that patients following lower limb amputation wish to do many more activities than walking[32].

The aim of the present study was to describe functioning of persons following lower limb amputation from their perspective by using ICF. Special emphasis was laid on detecting environmental barriers and facilitators.

Table 1 The final list of Body Functions, Body Structures, Activities and Participation and Environmental Factors (for body functions and body structures: 0 – no problems, 1 – problems; for activities and participation: 0 – no problems, 1 – problems, 2 – cannot do).

-	0	1	Code	Description
			Body functions	
			b152	Emotional functions
			b180	Experience of self and time functions
			b280	Sensation of pain
			b770	Gait pattern functions*
			Body structures	
			s810	Structure of areas of skin
			Environmental factors	
			e110	Products or substances for personal consumption
			e115	Products and technology for personal use in daily living
			e120	Products and technology for personal indoor and outdoor mobility and transportation
			e150	Design, construction and building products and technology of buildings for public use
			e155	Design, construction and building products and technology of buildings for private use
			e210	Physical geography
			e310	Immediate family
			e315	Extended family

-	0	1	Code	Description
			e320	Friends
			e325	Acquaintances. peers colleagues, neighbours and community members
			e330	People in positions of authority
			e335	People in subordinate positions
			e340	Personal care providers and personal assistants
			e355	Health professionals
			e360	Health-related professionals
			e410	Individual attitudes of immediate family members
			e415	Individual attitudes of extended family members
			e420	Individual attitudes of friends
			e425	Individual attitudes of acquaintances, peers colleagues, neighbours and community members
			e430	Individual attitudes of people in positions of authority
			e435	Individual attitudes of people in subordinate positions
			e440	Individual attitudes of personal care providers and personal assistants
			e450	Individual attitudes of health professionals
			e455	Individual attitudes of health-related professionals
			e460	Societal attitudes
			e465	Social norms, practices and ideologies
			e540	Transportation services, systems and policies
2	**1**	**0**	**Activities and participation**	
			d130	Copying
			d135	Rehearsing
			d410	Changing basic body position
			d415	Maintaining a body position
			d420	Transferring oneself
			d430	Lifting and carrying objects
			d450	Walking
			d455	Moving around
			d460	Moving around in different locations
			d465	Moving around using equipment
			d470	Using transportation
			d475	Driving
			d510	Washing oneself
			d520	Caring for body parts
			d530	Toileting
			d540	Dressing
			d570	Looking after one's health
			d630	Preparing meals
			d640	Doing housework
			d650	Caring for household objects
			d860	Basic economic transactions
			d910	Community life
			d920	Recreation and leisure
			d930	Religion and spirituality

METHODS

All subjects examined at the author's outpatient clinic within six months who met the inclusion criteria were included into study. The inclusion criteria were:

- unilateral trans-tibial or higher lower limb amputation performed at least one year before the study
- no other medical problems that may influence their functioning
- willingness to participate

A student of occupational therapy who herself has an amputation prepared a list of ICF categories from all the components (Body Functions and Structures, Activities and Participation and Environmental Factors). She then discussed the list with ten persons following lower limb amputation to get the final version. The final list had 4 codes for Body Functions, 1 for Body Structures, 26 for Activities and Participation and 27 for Environmental Factors (Table 1). All the subjects were interviewed by the same student of occupational therapy and examined by the author. Personal data were collected from medical documentation. No qualifiers were used. For body functions and body structures, it was checked whether subjects had problems or not. For activities and participation, a three-point scale was used (0 – no problems, 1 – problems, 2 – cannot do). For environmental factors, a factor was marked either as a facilitator, a barrier or neither of them.

Data were statistically analysed. Descriptive statistics, t-test and correlation coefficients were used.

The study was approved by the Ethics committee of the Institute.

RESULTS

Forty-six subjects (36 men and 10 women), 63.5 years old at the time of study (sd 13.2, from 31 to 85 years), amputated 21.8 years before the study (sd 18.3, from 1 to 68 years) were included into the study.

Thirty (65.2%) had trans-tibial and 16 (34.8%) trans-femoral amputation. Two (4.3%) had congenital lower limb deficiency, 25 (54.3%) were amputated due to injury, and 19 (41.4%) had amputation due to peripheral vascular disease. All of them were fitted and were able to walk with prostheses. They had impairments of up to 4 body functions (median 3) in addition to the amputation of one body structure; problems with 0 to 22 activities and participation (median 7); from 1to 19 barriers (median 11.5) and from 6 to 26 facilitators (median 15) in their environment (Table 2). The frequency of problems with body functions and structures are presented in table 3, activities and participation in table 4 and environmental factors in table 5.

Patients older at the time of amputation had more problems, fewer facilitators and more barriers in their environment (Table 6).

There was no significant difference between persons following trans-tibial and trans-femoral amputation in the number of impairments, activity limitations, or the number of facilitators and barriers in their environment (Figure 1).

Persons amputated due to injury were younger at the time of amputation and had fewer activity limitations and participation restrictions than persons amputated due to vascular problems (Figure 2).

DISCUSSION

Although all the included subjects completed comprehensive rehabilitation following lower limb amputation they still experienced several impairments, limitations and restrictions.

From the viewpoint of body functions, impairments were not so frequent. Most of them had problems with gait pattern which are well known and described in several studies[2,8-11]. Deviations of gait pattern may result from weak muscles, joint contractures, problems with prosthesis or challenging environment. During follow- up examinations, rehabilitation team members have to detect gait deviations, determine the causes and try to decrease them with appropriate rehabilitation methods, such as exercises, mobilisation, adjustments and corrections of prosthesis, education and others.

Other impairments detected in the study (emotional, experience of self, pain) can be decreased by appropriate psychological techniques. A psychologist is an important member of a rehabilitati-

Table 2 Number of impairments at the Body function level, limitations and restrictions of Activities and Participation and Environmental barriers and facilitators as defined by the patients

	Mean ± sd	Median	Minimum – Maximum
Body functions	2.7 ± 1.24	3	0 – 4
Activities and participation	8.8 ± 6.42	7	0 – 22
Facilitators	14.7 ± 4.10	15	6 – 26
Barriers	11.2 ± 3.81	11.5	1 – 19
Neutral environment	0.13 ± 0.50	0	0 – 3

Table 3 Impairments of body functions and structures

Body function/ structure	Problem		No problem	
	Number	Percent	Number	Percent
Emotional functions	15	32.6	31	67.4
Experience of self and time functions	7	15.2	39	84.8
Sensation of pain	12	26.1	34	73.9
Gait pattern	18	39.1	28	60.9
Structure of areas of skin	31	67.4	15	32.6

Table 4 Activity limitations and participation restrictions

Activities and participation	No problem		Problem		Cannot do	
	Number	Percent	Number	Percent	Number	Percent
Copying	36	78.3	10	21.7	0	
Rehearsing	37	80.4	9	19.6	0	
Changing basic body position	19	41.3	27	58.7	0	
Maintaining a body position	30	65.2	16	34.8	0	
Transferring oneself	30	65.2	14	30.4	2	4.3
Lifting and carrying objects	26	56.5	13	28.3	7	15.2
Walking	20	43.5	22	47.8	4	8.7
Moving around	22	47.8	20	43.5	4	8.7
Moving around in different locations	24	52.2	19	41.3	3	6.5
Moving around using equipment	29	63.0	11	24.0	6	13.0
Using transportation	25	54.3	7	15.2	14	30.5
Driving	27	58.7	2	4.3	17	37.0
Washing oneself	33	71.7	12	26.1	1	2.2
Caring for body parts	36	78.3	9	19.6	1	2.2
Toileting	39	84.8	7	15.2	0	
Dressing	38	82.6	7	15.2	1	2.2
Looking after one's health	37	80.4	8	17.4	1	2.2
Preparing meals	28	60.9	8	17.4	10	21.7
Doing housework	26	56.5	5	10.9	15	32.6
Caring for household objects	25	54.3	7	15.2	14	30.4
Basic economic transactions	36	78.3	5	10.9	5	10.9
Community life	18	39.1	6	13.0	22	47.9
Recreation and leisure	21	45.7	5	10.9	20	43.5
Religion and spirituality	14	30.4	7	15.2	25	54.3

on team[33], however patients do not always want to attend psychological sessions and do not believe that a psychologist may help them.

Two thirds of the included subjects had skin problems. The percentage is much higher than that described by Meulenbent[13]. The main reason is probably problems with prosthesis. Actually, all the included subjects visited the clinic due to prosthetic problems or worn out prostheses, which may as well cause skin problems[13]. Skin

Table 5 Facilitators and barriers in the environment P = products, S = substances, T = technology)

Environmental factor	Barrier		Neutral		Facilitator	
	Number	Percent	Number	Percent	Number	Percent
P/S for personal consumption	3	6.5	2	4.3	41	89.1
P/T for personal use in daily living	4	8.7	0		42	91.3
P/T for personal indoor and outdoor mobility and transportation	6	13.0	0		40	87.0
Design, construction and building P+T of building for public use	25	54.3	1	2.2	19	41.3
Design, construction and building P+T of building for private use	13	28.3	0		33	71.7
Physical geography	26	56.5	0		20	43.5
Immediate family	9	19.6	0		37	80.4
Extended family	16	34.8	0		30	65.2
Friends	12	26.1	0		34	73.9
People in positions of authority	41	89.2	0		5	10.9
People in subordinate positions	43	93.5	0		3	6.5
Personal care providers and personal assistants	29	63.0	0		17	37.0
Health professionals	5	10.9	0		41	89.1
Other professionals	39	84.8	0		7	15.2
Individual attitudes of immediate family members	10	21.7	0		36	78.3
Individual attitudes of extended family members	14	30.4	1	2.2	31	67.4
Individual attitudes of friends	15	32.6	0		31	67.4
Individual attitudes of acquaintances, peers, colleagues, neighbours and community members	16	34.8	0		30	65.2
Individual attitudes of people in subordinate positions	39	84.8	1	2.2	6	13.0
Individual attitudes of people in subordinate positions	40	86.9	1	2.2	5	10.9
Individual attitudes of personal care providers and personal assistants	33	71.7	0		13	28.3
Individual attitudes of health professionals	15	32.6	0		31	67.4
Individual attitudes of other professionals	44	95.7	0		3	4.3
Societal attitudes	16	34.8	0		30	65.2
Social norms, practices and ideologies	21	45.6	0		25	54.3
Transportation services, systems and policies	11	23.9	0		35	76.1

Table 6 Correlations between age at the time of amputation, time since amputation, impairments, disability and environment

	Age at amputation	Time since amputation	Impairments of body functions	Limitations of activities and participation	Facilitators
Age at amputation					
Time since amputation	r= -.098 p = .529				
Impairments of body functions	r= .378 p = .010	r= -.061 p = .691			
Limitations of activities and participation	r= .568 p < .001	r= -.479 p = .001	r= .413 p = .004		
Facilitators	r= -.297 p = .048	r= -.049 p = .749	r= -.054 p = .720	r= -.041 p = .789	
Barriers	r= .292 p = .052	r= -.057 p = .712	r= -.058 p = .700	r= .134 p = .375	r= -.574 p < .001

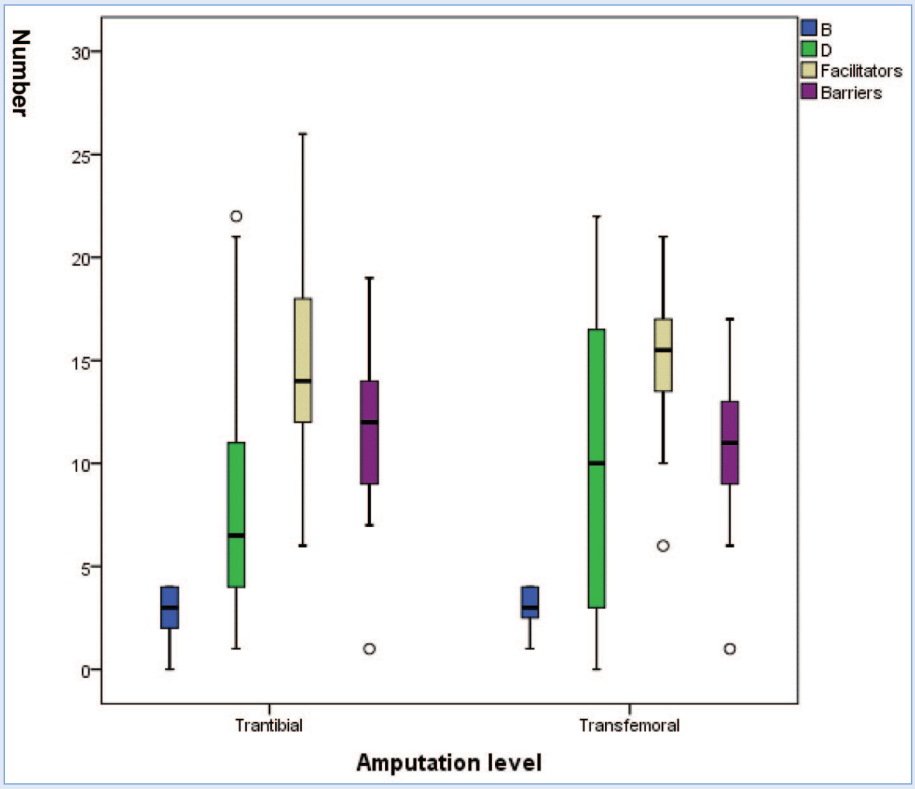

Figure 1 Influence of amputation level on impairments of body functions (B), limitations of activities and participation (D), number of facilitators and barriers in the environment

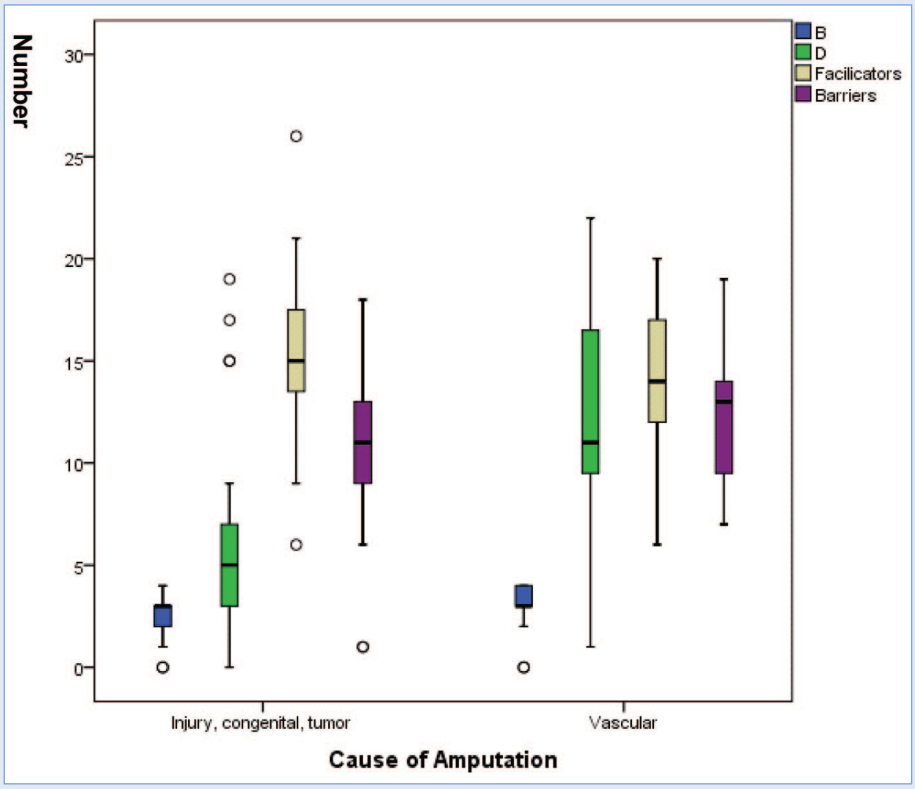

Figure 2 Influence of cause of amputation on impairments of body functions (B), limitations of activities and participation (D), number of facilitators and barriers in the environment

problems may be decreased with regular follow-ups and team checks of all new prostheses.

From the perspective of activity and participation, around one half of the included subjects could not participate in the community life. The reasons can include barriers, such as design and construction of buildings for public use and physical geography where similar percentage of barriers was observed. In spite of the law that all new public buildings have to be built without barriers there are still many old buildings in Slovenia. Some of them, such as most of the churches and buildings in old city centres, are recognised as cultural heritage and reconstruction is not allowed.

About one third of the included subjects could not drive, use transportation, do housework and carry household objects. There can be several reasons for these limitations and from the results of this study it not possible to tell exactly the most important one. Knowing this, comprehensive rehabilitation and follow-up visits need to lay more emphasis on detecting these problems and finding the most appropriate individual solutions for each person.

Different mobility limitations were frequent (changing basic body position, walking, moving around and moving in different locations). They are well described also in other studies[2,5,8,15–17,19]. Similar to others[2,5,8,19] we also found that they were more frequent in subjects amputated due to vascular problems.

A surprisingly high number of facilitators and barriers was found. Some, such as family, were found as important facilitators in persons with different disabilities, such as stroke, traumatic brain injury, Parkinson disease[34–36]. It is important that all team members are aware of these facilitators and try to find if they can be used as facilitators also for other persons. It is positive that persons with more environmental facilitators had fewer barriers. The main barriers were people in different positions and their attitudes. Attitudes towards disabilities and differences are still negative and changing too slowly in Slovenia. Health professionals have to be more active in trying to speed up changes.

Surprisingly, we did not find any differences in the number of impairments or activity limitations between persons following trans-tibial and trans-femoral amputation, which is different from the findings in other studies[2,5,8,19]. The reasons may be limitations of our study and the fact that we did not assess the severity of problems. Both groups of persons may have problems, however, they are more severe in subjects following trans-femoral amputation.

The main limitations of our study were the small number of included persons, all examined at one facility. They are not a real representative sample of subjects following lower limb amputation in Slovenia, where the main cause of lower limb amputation is vascular problems and most patients are elderly with high comorbidity[37]. However, already our sample showed that subjects amputated due to vascular problems had even more activity limitations and participation restrictions than those amputated due to injury.

CONCLUSIONS

Persons following lower limb amputation who completed comprehensive rehabilitation still experience several impairments, limitations and restrictions. Rehabilitation team members have to know these facts and try to decrease their impact on the functioning of persons following lower limb amputation.

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