

ORIGINAL ARTICLE

Identification of problems in individuals with spinal cord injury from the health professional perspective using the ICF: a worldwide expert survey

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Study design: Worldwide Internet survey.

Objectives: The specific aims of the study were (1) to identify problems of individuals with SCI in the early post-acute and the long-term context, respectively, addressed by health professionals and (2) to summarize these problems using the ICF.

Setting: International.

Methods: Physicians, nurses, physical therapists, occupational therapists, social workers and psychologists were asked for problems in the functioning and contextual factors of individuals with SCI using open-ended questions. All answers were translated ('linked') to the ICF based on established rules. Absolute and relative frequencies of the linked ICF categories were reported stratified by the context.

Results: Out of 243 selected experts, 144 (59.3%) named 7.650 different themes, of which 78.8% could be linked to ICF categories. In the early post-acute context, 30.7% of the 88 categories belonged to the component Body Functions, 14.8% to Body Structures, 30.7% to Activities and Participation and 23.9% to Environmental Factors. In all, 16 ICF categories were unique for the early post-acute context. In the long-term context, 27.2% of the 92 categories belonged to the component Body Functions, 13.0% to Body Structures, 35.9% to Activities and Participation and 23.9% to Environmental Factors. A total of 20 ICF categories were unique for the long-term context.

Conclusion: Health professionals identified a large variety of functional problems reflecting the complexity of SCI. Unique aspects of functioning exist for the early post-acute and the long-term context, respectively. The ICF provided a comprehensive framework to integrate answers from different professional backgrounds and different world regions.

Spinal Cord (2010) 48, 529–536; doi:10.1038/sc.2009.176; published online 12 January 2010

Keywords: expert survey; rehabilitation; ICF; ICF Core Set

Introduction

The effect of the continuous improvement in care of people with spinal cord injury (SCI) is reflected by the increased survival in the past 20 years.¹ Ideally, people after an SCI are treated in specialized facilities providing interdisciplinary team care. Teams consisting of physicians, nurses, psychologists, social workers, physical and occupational therapists and

other health professions meet the large variety of clinical needs of acute and post-acute SCI patients, resulting in more and faster functional improvement. The provision of comprehensive follow-up care enables SCI individuals to improve and sustain their achieved level of functioning and prevent complications. Assessment tools based on a shared terminology and common definitions are needed to identify the needs of SCI individuals, and to assess the effects of interventions on their health status. However, a common language requires an etiologically neutral framework describing comprehensively the functioning and health of the individuals and one that is accepted by all health professions involved.

Since the approval of the International Classification of Functioning, Disability and Health (ICF) by the World

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Received 2 June 2009; revised 12 November 2009; accepted 14 November 2009; published online 12 January 2010

Health Assembly in May 2001, such a common framework and language for all health professionals exists.² The ICF is based on the integrative model of functioning and comprises four components—Body Functions, Body Structures, Activities and Participation, and Environmental Factors. Realizing that the significance and power of the ICF lies in its conceptualization of functioning and disability, there is an urgent call for creating ICF-based tools that are more appropriate for the clinical practice. The ICF Core Sets are corresponding to this need. ICF Core Sets are lists of categories that are relevant to persons with a specific condition or in a specific setting.³

When defining ICF Core Sets, a number of perspectives, including those of the patients and experts, should be considered and integrated in the development process.³ One method of capturing the experts' view is to perform a worldwide survey including health professionals experienced in the treatment of people with SCI to identify the problems in functioning.⁴ The overall objective of this study is to explore the expert perspective on the problems of individuals with SCI in the early post-acute and long-term context. The specific aims of the study were (1) to identify problems of individuals with SCI in the early post-acute and the long-term context, respectively, addressed by health professionals and (2) to summarize these problems using the ICF.

Materials and methods

Study design

The study was conducted as a worldwide Internet survey including physicians, nurses, physical therapists, occupational therapists, social workers and psychologists.

Recruitment procedure and study population

The starting point of the recruitment of participants was a list of facilities specialized in the treatment of SCI. A contact person of each facility was identified through an Internet search. These people received an e-mail including detailed information about the expert survey and the request to nominate health professionals working at their facility and who would be interested to participate in the survey. Health professionals had to meet the following criteria to be included as 'experts' in the survey: (1) the professional background had to be a nurse, social worker, physical therapist, occupational therapist, psychologist or physician with different specializations; (2) experience in the treatment of adult individuals with SCI; and (3) fluency in English language to contribute to the survey. All health professionals meeting these inclusion criteria made up the so-called 'expert pool'. In the next step, we drew a random sample out of the expert pool who were stratified by professional background and World Health Organization regions (<http://www.who.int/about/regions/en/index.html>) to assure that the different professional perspectives as well as the regional perspectives were taken into account. An exception was made for the 'African Region' and the 'Eastern

Mediterranean Region'; all nominated experts of these regions were included as the number was extremely small.

According to a power of 0.8 and a level of significance of 0.05, a sample size of 204 experts would be necessary to determine frequencies with a precision of 10%. Under the assumption that the dropout rate would be approximately 20%, the final study sample consisted of 243 experts.

Measure

The questionnaire applied in the expert survey consisted of two parts. In part I, we asked for basic information about the participant and the professional background. This minimum information was required to get a clearer picture of our study population. In part II of the questionnaire, we asked the participants to list the problems in the functioning, as well as relevant environmental and personal factors of individuals with SCI. The open-ended questions are shown in Table 1. The participants were asked to differentiate between problems experienced in the early post-acute context and in the long-term context. The borderlines for the 'early post-acute context' and for the 'long-term context' applied in the preliminary studies of the project 'ICF Core Set development for Spinal Cord Injury (SCI)' were defined as follows: The early post-acute context begins with active rehabilitation and ends with the completion of the first comprehensive rehabilitation after the acute SCI. The long-term context follows the early post-acute context. This definition was applicable throughout the world, irrespective of the different health systems.

Data collection procedure

All selected experts got an e-mail with detailed information about the expert survey and the further procedure. The second e-mail included the detailed instructions, the user name and the password to get access to the website created for the Internet survey. In case the experts experienced any technical problems when entering data on this website, we provided a word document based on the same form as used in the Internet survey. Reminders were sent after 1, 2 and 3 months. All answers were kept anonymous.

All answers retrieved from the experts were translated ('linked') to the ICF based on established linking rules.⁵ The ICF includes more than 1400 disjunctive categories, which are structured in a hierarchical manner. The letters b, s, d and

Table 1 Questions applied in the expert survey

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| <ol style="list-style-type: none"> (1) If you think about the bodies and minds of individuals with SCI, what does not work the way it is supposed to? (2) If you think about the bodies of individuals with SCI, in which parts are their problems? (3) If you think about the daily life of individuals with SCI, what are their problems? (4) If you think about the environment and the living conditions of individuals with SCI, what is helpful or supportive for them? (5) If you think about the environment and the living conditions of individuals with SCI, what barriers do they experience? (6) If you think about individuals with SCI, what is important about them and the way they handle their SCI? |
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Abbreviation: SCI, spinal cord injury.

we refer to the components Body Functions, Body Structures, Activities and Participation, and Environmental Factors, respectively. They are followed by a numeric code starting with the chapter number (one digit), for example, *b4 Function of the cardiovascular, hematological, immunological and respiratory system*, followed by the second level (two digits), for example, *b410 Heart functions*, and the third and fourth levels (one digit each), for example, *b4101 Heart rhythm*.

An answer could be linked to one or more ICF categories, depending on the number of themes contained in the answer. If an answer was too general to allow a decision on the linkage to a specific ICF category, the concept was regarded as 'not defined'. For example, concepts such as 'adapted physical environment' or 'inadequate living situation' were regarded as 'not defined'. If an answer pertained to personal factors that are not coded within the system of the ICF, the code 'personal factor' was attributed. To give an example, concepts such as 'acceptance of condition and changes to lifestyle' or 'coping strategies for being disabled' were regarded as 'personal factors'. If an answer describes an aspect of functioning and health that is not covered by the ICF, the code 'not covered' was attributed. To give an example, 'loss of privacy' was regarded as 'not covered'. If an answer pertained to health conditions that are not coded within the system of the ICF, the code 'health condition' was attributed. To give an example, concepts such as 'deep vein thrombosis' or 'fractures' were regarded as 'health conditions'.

Quality assurance procedures

All researchers involved in the linkage were thoroughly trained in a 1-week workshop performed by team members of the ICF Research Branch Munich. During the linking exercise, MS supervised all researchers. After the linking of all answers was completed, MS checked the results regarding irregularities and implausibility. To assure and test the accuracy and rigor of the linking process, 4.2% of the answers were randomly selected and linked by a second researcher of the ICF Research Branch.

Data analysis

The absolute frequencies and relative frequencies of the linked ICF categories are reported, stratified by the context along with their 95% confidence intervals. ICF categories are presented at the second level. If a concept was linked to a third- or fourth-level ICF category, the corresponding second-level category is reported. For example, the corresponding second-level ICF category for the third-level category *b4101 Heart rhythm* is *b410 Heart functions*. This is appropriate because the lower-level categories share the attributes of the higher-level category.² If an ICF category was assigned repeatedly to the answers of one participant, it was counted only once to avoid bias. In this study, a cutoff point of 5% was chosen for the frequencies of the linked ICF categories. This means that all second-level ICF categories linked to concepts reported by at least 5% of the experts are reported. A list of ICF categories on all levels of the ICF can be retrieved from the authors.

The reliability of the linkage process was evaluated by calculating the κ -coefficient and nonparametric bootstrapped confidence intervals.⁶ The values of the κ -coefficient range from 0 to 1, in which 1 indicates perfect agreement and 0 indicates no additional agreement beyond what is expected by chance alone. The κ -analysis was performed using SAS.⁷

Results

Recruitment and participants

A total of 211 facilities that were specialized in the treatment of SCI were contacted worldwide. Totally, the expert pool comprised 467 health professionals from 63 facilities. The expert survey was conducted between August and October 2006. Out of 243 selected experts, 144 (59.3%) filled in the questionnaire. However, 22 experts could not be included in the data analysis as they had not completed the questionnaire ($n=19$) or they were specialized in the treatment of adolescents with SCI ($n=3$).

The participants were 24 to 62 years old (median 40.0 years); 75 (61.5%) participants were female. Most of the participants were physical therapists (27.9%), followed by physicians (21.3%), occupational therapists (18.9%), nurses (13.9%), social workers and psychologists (both 9.0%). Among the participants, 41.0% were from the European region, 27.0% from the region of the Americas, 14.8% from the Western Pacific region, 9.8% from the Southeast Asian region, 4.9% from the African region and 2.5% from the Eastern Mediterranean region. The main working field of the participants was 'clinical practice' (86.1%), followed by 'research', 'management' and 'education'. The mean number of years of general professional experience was 15.8 years (s.d. 9.3). The mean number of years of professional experience with SCI patients was 12.1 years (s.d. 8.8).

Expert survey

In total, 7650 different themes ('concepts') could be retrieved from the answers of the experts. Of these concepts, 78.8% could be linked to ICF categories: 114 concepts were linked to the ICF components, 601 to first-level ICF categories, 3,471 to second-level ICF categories, 1,726 to third-level ICF categories and 119 to fourth-level ICF categories. In all, 6.6% of the concepts were regarded as 'not defined', 8.5% were regarded as 'personal factors', 4.0% were regarded as 'health condition' and 2.0% were not covered by the ICF.

Tables 2–5 list the second-level ICF categories that were linked to concepts reported by at least 5% of the experts. The results are shown stratified by the health-care context. In the early post-acute context, 27 of the 88 categories (30.7%) belong to the component Body Functions, 13 (14.8%) to the component Body Structures, 27 (30.7%) to the component Activities and Participation, and 21 (23.9%) to the component Environmental Factors. A total of 16 ICF categories were unique for the early post-acute context; that is, these categories were identified as relevant for only this context. In the long-term context, 25 of the 92 categories (27.2%)

Table 2 Relative frequency of second-level categories of the ICF linked to the themes contained in the answers of the 122 participants: component Body Functions

ICF code	Description	Early post-acute context % (95% CI)	Long-term context % (95% CI)
<i>Chapter 1 Mental functions</i>			
b130	Energy and drive functions	16.4 (10.9–24.0)	8.2 (4.5–14.4)
b134	Sleep functions	15.6 (10.2–23.0)	6.6 (3.4–12.4)
b140	Attention functions	9.0 (5.1; 15.4)	—
b152	Emotional functions	28.7 (21.4–37.3)	18.9 (12.9–26.7)
b180	Experience of self and time functions	7.4 (3.9–13.4)	—
<i>Chapter 2 Sensory functions and pain</i>			
b260	Proprioceptive function	12.3 (7.6–19.3)	6.6 (3.4–12.4)
b265	Touch function	18.9 (12.9–26.7)	20.5 (14.3–28.5)
b270	Sensory functions related to temperature and other stimuli	18.9 (12.9–26.7)	20.5 (14.3–28.5)
b280	Sensation of pain	43.4 (35.0– 52.3)	46.7 (38.1–55.5)
<i>Chapter 4 Functions of the cardiovascular, hematological, immunological and respiratory systems</i>			
b410	Heart functions	7.4 (3.9–13.4)	6.6 (3.4–12.4)
b415	Blood vessel functions	9.0 (5.1–15.4)	5.7 (2.8–11.4)
b420	Blood pressure functions	27.0 (20.0–35.5)	13.9 (8.9–21.2)
b435	Immunological system functions	—	6.6 (3.4–12.4)
b440	Respiration functions	38.5 (30.4–47.4)	28.7 (21.4–37.3)
b450	Additional respiratory functions	8.2 (4.5–14.4)	—
<i>Chapter 5 Functions of the digestive, metabolic and endocrine systems</i>			
b510	Ingestion functions	6.6 (3.4–12.4)	—
b515	Digestive functions	9.8 (5.7–16.4)	—
b525	Defecation functions	32.0 (24.4–40.7)	40.2 (31.9– 49.0)
b530	Weight maintenance functions	—	6.6 (3.4–12.4)
b540	General metabolic functions	—	7.4 (3.9–13.4)
b550	Thermoregulatory functions	22.1 (15.7–30.3)	17.2 (11.5–24.9)
<i>Chapter 6 Genitourinary and reproductive functions</i>			
b610	Urinary excretory functions	—	5.7 (2.8–11.4)
b620	Urination functions	45.1 (36.5–53.9)	37.7 (29.6–46.6)
b640	Sexual functions	22.1 (15.7–30.3)	36.9 (28.8–45.7)
b660	Procreation functions	—	6.6 (3.4–12.4)
<i>Chapter 7 Neuromusculoskeletal and movement-related functions</i>			
b710	Mobility of joint functions	9.0 (5.1–15.4)	21.3 (15.0–29.4)
b730	Muscle power functions	29.5 (22.1–38.1)	26.2 (19.2–34.7)
b735	Muscle tone functions	27.9 (20.7–36.4)	38.5 (30.4–47.4)
b755	Involuntary movement reaction functions	9.0 (5.1–15.4)	—
b760	Control of voluntary movement functions	33.6 (25.8–42.4)	27.9 (20.7–36.4)
<i>Chapter 8 Functions of the skin and related structures</i>			
b810	Protective functions of the skin	13.9 (8.9–21.2)	25.4 (18.5–33.8)
b830	Other functions of the skin	5.7 (2.8–11.4)	—

Abbreviations: CI, confidence interval; ICF, International Classification of Functioning, Disability and Health.

— Indicates that the ICF category was identified by <5% of the participants.

belong to the component Body Functions, 12 (13.0%) to the component Body Structures, 33 (35.9%) to the component Activities and Participation and 22 (23.9%) to the component Environmental Factors. In all, 20 of these ICF categories were unique for the long-term context.

The κ -coefficient for the linking was 0.57, with a 95% bootstrapped confidence interval of 0.50–0.63.

Discussion

To our knowledge, this is the first Internet survey examining the problems of individuals with SCI from a worldwide perspective, involving six different health professions. The

ICF was used as reference as it provides a neutral framework and language. A large variety of aspects in functioning and health were identified by the experts, which are common for both the early post-acute and the long-term context. Nevertheless, unique aspects for each of the two contexts could be identified.

The number of relevant ICF categories for individuals with SCI in the early post-acute context and in the long-term context was 88 and 92, respectively. The majority of the retrieved ICF categories refer to impairments in body functions and restrictions in activities and participation. These results reflect the fact that SCI is multifaceted as it may involve all body functions below the level of the neurological lesion.

Table 3 Relative frequency of second-level categories of the ICF linked to the themes contained in the answers of the 122 participants: component Body Structures

ICF code	Description	Early post-acute context % (95% CI)	Long-term context % (95% CI)
<i>Chapter 1 Structures of the nervous system</i>			
s120	Spinal cord and related structures	44.3 (35.8–53.1)	34.4 (26.6–43.2)
s140	Structure of sympathetic nervous system	5.7 (2.8–11.4)	—
<i>Chapter 4 Structures of the cardiovascular, immunological and respiratory systems</i>			
s410	Structure of cardiovascular system	10.7 (6.3–17.4)	11.5 (7.0–18.3)
s430	Structure of respiratory system	19.7 (13.6–27.6)	14.8 (9.5–22.1)
<i>Chapter 5 Structures related to the digestive, metabolic and endocrine systems</i>			
s540	Structure of intestine	35.2 (27.3–44.1)	37.7 (29.6; 46.6)
<i>Chapter 6 Structures related to the genitourinary and reproductive systems</i>			
s610	Structure of urinary system	39.3 (31.1–48.2)	43.4 (35.0–52.3)
s630	Structure of reproductive system	8.2 (4.5–14.4)	7.4 (3.9–13.4)
<i>Chapter 7 Structures related to movement</i>			
s720	Structure of shoulder region	10.7 (6.3–17.4)	18.9 (12.9–26.7)
s730	Structure of upper extremity	18.0 (12.2–25.8)	29.5 (22.1–38.1)
s750	Structure of lower extremity	19.7 (13.6–27.6)	27.0 (20.0–35.5)
s760	Structure of trunk	23.8 (17.1–32.1)	24.6 (17.8–32.9)
s770	Additional musculoskeletal structures related to movement	33.6 (25.8; 42.4)	45.1 (36.5–53.9)
<i>Chapter 8 Skin and related structures</i>			
s810	Structure of areas of skin	28.7 (21.4–37.3)	37.7 (29.6–46.6)

Abbreviations: CI, confidence interval; ICF, International Classification of Functioning, Disability and Health.

— Indicates that the ICF category was identified by <5% of the participants.

All chapters of the ICF component Body Functions were represented in the answers of the health professionals, with the exception of Chapter 3, Voice and speech functions. The most frequently named body function was *b280 Sensation of pain*. The relevance of this finding is supported by several studies showing that most people with SCI experience chronic pain with high pain intensity over multiple body locations.⁸ Other frequently named categories refer to functions of respiration, defecation and urination, which are well-known problems associated with SCI.^{9–11} Regarding neuromusculoskeletal functions, the most frequently linked ICF categories, *b735 Muscle tone functions*, *b730 Muscle power functions* and *b760 Control of voluntary movement functions*, address problems such as spasticity and coordination of movements.¹² Although the categories *b152 Emotional functions* and *b420 Blood pressure functions* were more prominent in the early post-acute context, the category *b640 Sexual functions* was more frequently identified for long-term SCI people. It is reported that many newly injured people who met the diagnostic criteria for depression remit within 3 months of onset,¹³ as well as that orthostatic hypotension is particularly evident in the early phase.¹⁴ The relevance of sexual functions is in line with a survey examining the determinants of quality of life in people with SCI, showing that paraplegics assigned the highest priority to the regain of sexual function.¹⁵

It is not surprising that the most frequently named body structures correspond to the body functions listed above, such as structures related to movement, structure of intestine and structure of urinary system. The ICF category, *s810*

Structure of areas of skin, addresses the consequences of impaired protective functions of the skin and reflects the relevance of pressure sores in these patients.¹²

Clear differences between the early post-acute and the long-term context came up regarding the ICF component Activities and Participation. ICF categories assigned to Chapter 6 Domestic Life, as well as categories addressing intimate relationships, employment and recreation/leisure were more frequently named for the long-term context. Nevertheless, a variety of elements of Chapter 5 Self Care, were frequently identified for individuals in both contexts, reflecting the fact that their restrictions in daily life are permanent. This result is supported by the study of Liem¹⁶ reporting a 42% increased odds of needing more help with activities of daily living per decade after SCI.

Accordingly, the experts considered the support provided by family members, friends and health professionals as a relevant aspect throughout the continuum of SCI care. When planning the transition from the facility to the community, this environmental factor might become a key element.¹⁷ Some environmental factors that are related to community participation and labor, such as *e150 Design, construction and building products and technology of building for public use* and *e590 Labor and employment services, systems and policies*, were more frequently named as being facilitators and/or hindrances for people with SCI in the long-term context. Health services, systems and policies proved to be the most frequently named environmental factor for both contexts. This finding is supported by Whiteneck *et al.*,¹⁸ who analyzed the importance of environmental factors from

Table 4 Relative frequency of second-level categories of the ICF linked to the themes contained in the answers of the 122 participants: component Activities and Participation

ICF code	Description	Early post-acute context % (95% CI)	Long-term context % (95% CI)
<i>Chapter 1 Learning and applying knowledge</i>			
d155	Acquiring skills	5.7 (2.8–11.4)	—
d170	Writing	7.4 (3.9–13.4)	—
<i>Chapter 2 General tasks and demands</i>			
d220	Undertaking multiple tasks	—	6.6 (3.4–12.4)
d240	Handling stress and other psychological demands	15.6 (10.2–23.0)	8.2 (4.5–14.4)
<i>Chapter 3 Communication</i>			
d330	Speaking	5.7 (2.8–11.4)	—
d345	Writing messages	5.7 (2.8–11.4)	—
d360	Using communication devices and techniques	8.2 (4.5–14.4)	—
<i>Chapter 4 Mobility</i>			
d410	Changing basic body position	14.8 (9.5–22.1)	9.8 (5.7–16.4)
d415	Maintaining a body position	—	5.7 (2.8–11.4)
d420	Transferring oneself	23.8 (17.1–32.1)	18.0 (12.2–25.8)
d440	Fine hand use	—	6.6 (3.4–12.4)
d445	Hand and arm use	—	7.4 (3.9–13.4)
d450	Walking	13.1 (8.2–20.2)	14.8 (9.5–22.1)
d455	Moving around	—	7.4 (3.9–13.4)
d460	Moving around in different locations	9.0 (5.1–15.4)	9.8 (5.7–16.4)
d465	Moving around using equipment	5.7 (2.8–11.4)	7.4 (3.9–13.4)
d470	Using transportation	—	7.4 (3.9–13.4)
d475	Driving	5.7 (2.8–11.4)	9.8 (5.7–16.4)
<i>Chapter 5 Self Care</i>			
d510	Washing oneself	40.2 (31.9–49.0)	26.2 (19.2–34.7)
d520	Caring for body parts	15.6 (10.2–23.0)	11.5 (7.0–18.3)
d530	Toileting	26.2 (19.2–34.7)	25.4 (18.5–33.8)
d540	Dressing	25.4 (18.5–33.8)	14.8 (9.5–22.1)
d550	Eating	24.6 (17.8–32.9)	13.1 (8.2–20.2)
d560	Drinking	7.4 (3.9–13.4)	—
d570	Looking after one's health	15.6 (10.2–23.0)	17.2 (11.5–24.9)
<i>Chapter 6 Domestic life</i>			
d620	Acquisition of goods and services	—	8.2 (4.5–14.4)
d630	Preparing meals	—	10.7 (6.3–17.4)
d640	Doing housework	7.4 (3.9–13.4)	21.3 (15.0–29.4)
d650	Caring for household objects	—	9.8 (5.7–16.4)
d660	Assisting others	—	6.6 (3.4–12.4)
<i>Chapter 7 Interpersonal interactions and relationships</i>			
d720	Complex interpersonal interactions	5.7 (2.8–11.4)	7.4 (3.9–13.4)
d750	Informal social relationships	10.7 (6.3–17.4)	19.7 (13.6–27.6)
d760	Family relationships	11.5 (7.0–18.3)	14.8 (9.5–22.1)
d770	Intimate relationships	12.3 (7.6–19.3)	32.0 (24.4–40.7)
<i>Chapter 8 Major life areas</i>			
d845	Acquiring, keeping and terminating a job	8.2 (4.5–14.4)	34.4 (26.6–43.2)
d850	Remunerative employment	13.9 (8.9–21.2)	27.9 (20.7–36.4)
d870	Economic self-sufficiency	—	6.6 (3.4–12.4)
<i>Chapter 9 Community, social and civic life</i>			
d910	Community life	—	10.7 (6.3–17.4)
d920	Recreation and leisure	9.8 (5.7–16.4)	25.4 (18.5–33.8)

Abbreviations: CI, confidence interval; ICF, International Classification of Functioning, Disability and Health.

— Indicates that the ICF category was identified by <5% of the participants.

the patient's and reported that the provision of health care was one of the main environmental barriers.

It stands out that in general a relatively low proportion of the health professionals named the same problems. It remains an open question whether this proportion would

have been higher when providing them with a list of problems requesting to mark the important ones for SCI.

In general, the Internet-based survey proved to be an appropriate method for this study objective. The response rate of 59% was comparable with other studies.⁴ Experts

Table 5 Relative frequency of second-level categories of the ICF linked to the themes contained in the answers of the 122 participants: component Environmental Factors

ICF code	Description	Early post-acute context % (95% CI)	Long-term context % (95% CI)
<i>Chapter 1 Products and technology</i>			
e110	Products or substances for personal consumption	14.8 (9.5–22.1)	11.5 (7.0–18.3)
e115	Products and technology for personal use in daily living	35.2 (27.3–44.1)	35.2 (27.3–44.1)
e120	Products and technology for personal indoor and outdoor mobility and transportation	16.4 (10.9–24.0)	29.5 (22.1–38.1)
e150	Design, construction and building products and technology of buildings for public use	39.3 (31.1–48.2)	57.4 (48.5–65.8)
e155	Design, construction and building products and technology of buildings for private use	33.6 (25.8–42.4)	58.2 (49.3–66.6)
e160	Products and technology of land development	13.1 (8.2–20.2)	35.2 (27.3–44.1)
e165	Assets	17.2 (11.5–24.9)	32.0 (24.4–40.7)
<i>Chapter 3 Support and relationships</i>			
e310	Immediate family	36.1 (28.1–44.9)	33.6 (25.8–42.4)
e315	Extended family	8.2 (4.5–14.4)	7.4 (3.9–13.4)
e320	Friends	16.4 (10.9–24.0)	15.6 (10.2–23.0)
e325	Acquaintances, peers, colleagues, neighbors and community members	9.8 (5.7–16.4)	10.7 (6.3–17.4)
e340	Personal care providers and personal assistants	8.2 (4.5–14.4)	15.6 (10.2–23.0)
e355	Health professionals	40.2 (31.9–49.0)	25.4 (18.5–33.8)
<i>Chapter 4 Attitudes</i>			
e410	Individual attitudes of immediate family members	6.6 (3.4–12.4)	—
e450	Individual attitudes of health professionals	7.4 (3.9–13.4)	—
e460	Societal attitudes	6.6 (3.4–12.4)	25.4 (18.5–33.8)
<i>Chapter 5 Services, systems and policies</i>			
e525	Housing services, systems and policies	6.6 (3.4–12.4)	11.5 (7.0–18.3)
e540	Transportation services, systems and policies	8.2 (4.5–14.4)	32.0 (24.4–40.7)
e555	Associations and organizational services, systems and policies	—	9.0 (5.1–15.4)
e570	Social security services, systems and policies	8.2 (4.5–14.4)	13.9 (8.9–21.2)
e575	General social support services, systems and policies	—	8.2 (4.5–14.4)
e580	Health services, systems and policies	65.6 (56.8–73.4)	58.2 (49.3–66.6)
e585	Education and training services, systems and policies	—	9.8 (5.7–16.4)
e590	Labor and employment services, systems and policies	5.7 (2.8–11.4)	23.0 (16.4–31.2)

Abbreviations: CI, confidence interval; ICF, International Classification of Functioning, Disability and Health.

— Indicates that the ICF category was identified by <5% of the participants.

from all of the six world regions as defined by the World Health Organization could be recruited, guaranteeing a wide range of expert opinions. However, specifically the African and the Eastern Mediterranean region seem to be under-represented. This may be associated with a restricted access to e-mail and Internet technology for health professionals and the limited knowledge of English in these countries on the one hand. On the other hand, this may also reflect a potential lack of SCI experts within a specific health profession in this region. The procedure of linking the patients' problems reported by health professionals to the appropriate ICF categories proved to be complex and not at all simple. The κ -coefficient of 0.59 reached in this study reflects a 'moderate' agreement between the two people who performed the linking. It is slightly lower than in other studies that used the same linking method.^{19,20} It is essential to mention that the exploration of the view of health professionals is insufficient when studying the functional problems of people with SCI. To identify all relevant ICF categories for SCI, the expert perspective reported in this

paper was complemented by studies exploring the perspectives of the patients, the clinics and the researchers.³ The results will be published elsewhere.

Conclusion

Health professionals address a large variety of functional problems related to SCI that reflect the complexity of this condition. Unique aspects of functioning exist for the early post-acute context and the long-term context, respectively. The ICF proved to be a neutral framework and language, allowing the comparison of answers collected from different professional backgrounds and from different world regions.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

This project was funded by Swiss Paraplegic Research, Nottwil, Switzerland. We thank the participants of the Delphi exercise for their invaluable contribution and the time they have devoted to respond to the demanding questionnaire (in alphabetical order): Rhonda Abbott, Mousa Abu Mostafa, Leena Alajoki-Nyholm, Hannu Alaranta, Aurelian Anghelescu, Jesús Benito, Lisa Boggs, Douglas Brown, Lester Butt, Grace Campbell, Rob Campbell, Franki Cassaday, Darryl Caves, Melissa Ceeley, Lih-Maan Chang, Susan Conner, Lisa Curran, Dr Das, Kristy Davidson, Patricia Dorsett, Diana Dorstyn, Craig Drury, Marinella Flemma, Sara Galek, Frank Goditiabo, Gita Handa, Eppu Hokkinen, Luu Thi Hong, Chantal Huguenot, Guido Hundt, Nicky Hunter, Asiah Ibrahim, Ms Jones, Owen Katalinic, Chitra Kataria, Waltraud Kemper, Anne Kenkenberg, Paul Kennedy, Yesim Kirazli, Sara Klaas, Loleta Krige, Wendy Lewis, Cam Hong Linh, Rita Mabrucco, Malahat Fahimi, Mihaela Manescu, Karen Marshall, Lisa Merenda, Anca Sanda Mihaescu, Mette Molin Nefling, Dominick Michael Mshanga, Peter New, Agnete F. Nielsen, Zita Palmquist, Nathalie Pattaroni, Steven Ranson, Megan Raslevich, Mary Ann Reilly, Scott Richards, Gianna Rodriguez, Lone Rose, Megan Saul, Nathan Schomburg, Shohreh Noorizadeh, Bernie Silver, Dr Singh, Dolores Soler, Marie Stevens, Irma Stierle, Katarina Stigzelius, Rodney Sturt, Jeffery Sybert, Luminita Teoaca, Dinh Quang Thanh, Heli Tiainen, Dot Tussler, Reny Vaughan, Joan Vidal, Yen-Ho Wang, Eric Weerts, Daniel Welraeds, Shannon Wilkinson, Markus Wirz and Manuel Zwecker. Our special thanks also go to the following research assistants involved in the data analysis for their extraordinary commitment and invaluable support: Edda Amann, Tanja Bossmann, Karin Forberger, Szilvia Geyh, Catherine Glocker, Barbara Kollerits, Sandra Landa, Christian Müller, Silvia Müller, Sara Mai Nyguen, Sybille Schwarz and Annette Stach.

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