Swiss Paraplegic Research

Swiss Paraplegic Centre

ICF Case Studies
Translating Interventions into Real-life Gains – a Rehab-Cycle Approach

Introduction to the ICF Case Studies

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General Introduction

Functioning is a central dimension in persons experiencing or likely to experience disability. Accordingly, concepts, classifications and measurements of functioning and health are key to clinical practice, research and teaching. Within this context, the approval of the **International Classification of Functioning, Disability and Health (ICF)** by the World Health Assembly in May 2001 is considered a landmark event. The ICF establishes a new era of patient-oriented clinical practice, research, and teaching.[1,2]

To illustrate the use of the ICF in rehabilitation practice, specifically in a chronic condition like spinal cord injury (SCI),[3,4,5] **Swiss Paraplegic Research (SPF)** initiated the project 'Case studies describing persons with SCI and their health care based on the ICF and the Rehab-Cycle®'.

The ICF-based Case Studies Project

SPF together with Swiss Paraplegic Centre (SPZ), one of Europe's leading (acute and rehabilitation) centres for paraplegia, SCI and spinal cord diseases, conducted a series of case studies. Conducting ICF-based case studies was one approach to address SPF's aim to contribute to optimal functioning, social integration, health and quality of life of persons with SCI through clinical and community-oriented research. The ICF-based case studies project began in October 2006.

In this project, persons of different age groups and gender and who are living with SCI of varying etiology and levels of severity, were accompanied during their rehabilitation at SPZ. The rehabilitation process was then described using the Rehab-Cycle® and the corresponding ICF-based documentation tools.[6] *See page 27* for detailed information on the Rehab-Cycle® and the ICF-based documentation tools.

Aims of the Case Studies

- To Illustrate the use of ICF-based documentation tools in structured rehabilitation management based on the Rehab-Cycle®
- To provide insight into the perspective of persons living with SCI
- To demonstrate problems and personal resources of persons with SCI
- To improve the reader's knowledge about using the ICF, Rehab-Cycle® and corresponding ICF-based documentation tools in rehabilitation management

Since persons with SCI are faced with a number of physical, psychological and social challenges, the case studies aimed to cover a broad spectrum of these challenges.

Architecture of the Case Studies

Each case study highlights a specific theme of SCI rehabilitation. The case studies are unique in that each case study not only presents the clinical perspective of rehabilitation management but also emphasizes the person's experience of functioning following SCI. Information from the person with SCI and the health professionals in the person's rehabilitation team is gathered through interviews in the beginning and at the end of each observation period. In each case study, the rehabilitation management process is illustrated in the context of the Rehab-Cycle® and using the ICF-based documentation tools.

Each case study begins with a general introduction of the highlighted theme. It then provides a general introduction of the person's story, including information about the onset of SCI and proceeds with the description of the person's rehabilitation management process. Also provided are boxes with more detailed information about certain topics that further highlight the specific theme or clarify the person's specific situation.

Educational Aspect of the Case Studies

Questions are given at the end of each case. These questions offer the reader the opportunity to check what he or she has learned from each case study.

A booklet is published for each case study conducted. To better understand the case studies described in these booklets, some basic information about SCI, the ICF, ICF Core Sets, the Rehab-Cycle® and the ICF-based documentation tools are provided in the following pages.

You can also find the electronic version of this booklet and all of the case studies on the website www.icf-casestudies.org.

Spinal Cord Injury (SCI)

Spinal cord injury (SCI) is an injury of the spinal cord. SCI can be traumatic such as resulting from a motor vehicle accident, fall, sports injury, acts of violence, and surgical complications. It can also be non-traumatic such as resulting from a tumor or diseases.[4]

What Is SCI?

The spinal cord is located in the spinal canal of the spine. The spine reaches from the nape of the neck to the sacral bone and forms the framework of our body. It consists of 33 single overlapping bones, the vertebrae. These are held together by disks, tendons and ligaments. The spine can be divided into five sections:

– cervical spine (cervical, abbr. C)
– thoracic spine (thoracic, abbr. T)
– lumbar spine (lumbar, abbr. L)
– sacral spine (sacral, abbr. S)
– coccyx (coccygeal)

The spinal cord, in principle, is a cord of nerves, and can be compared with a telephone cable that transports signals back and forth between the brain and the body. The spinal cord can be divided into four sections, which can be further subdivided into individual segments (neurotoms). In between the vertebrae, the nerves of the spinal cord branch off on each side to the respective body regions. There are

– 8 cervical segments (C1 to C8)
– 12 thoracic segments (T1 to T12)
– 5 lumbar segments (L1 to L5)
– 5 sacral segments (S1 to S5)

In case of a SCI, the spinal cord is damaged or even severed at a specific spot due to an accident or a health condition, resulting in a disruption in communication between the body parts below the damage and the brain. The damage of the spinal cord is called lesion. Important functions such as mobility (motor functions) or sensation (sensory functions) fail below the lesion.[4]

What Is the Difference Between Paraplegia and Tetraplegia?

Paraplegia is a paralysis starting in the thoracic (T1-T12), lumbar (L1-L5) or sacral (S1-S5) area, while tetraplegia is caused by damage in the cervical area (C1-C8). Persons with paraplegia possess good functioning of the arms and hands. The lesion occurs primarily in the trunk and legs. In comparison persons with tetraplegia additionally experience paralysis of the hands and partially of the arms.

In an initial clinical examination, the physician can locate the injury using x-rays or computer tomography (CT). While this technology makes the damage to the vertebrae visible, magnetic resonance imaging (MRI) can show the damage to the spinal marrow. The lesion height is defined by the last fully functioning segment of the spinal marrow. Tetraplegia "sub C6", for example, means that the marrow segments C1 to C6 are fully functioning whereas the segment C7 and below are affected.[4]

What Does “Complete” and “Incomplete” Mean?

Depending on the damage to the spinal cord nerves, the result is considered a complete or an incomplete lesion. Paraplegia is considered complete if no motor or sensory functions can be clinically determined below the lesion caused by the damage. As long as sensory and/or motor functions are detectable, the lesion is considered incomplete.

Neurological examinations enable the physician to locate the damage and determine its extent. The physician uses two international scales for this purpose – the American Spinal Injury Association Impairment Scale (AIS), often referred to as ASIA scale, and the "Scale for the Autonomic Nervous System". *See page 8 for details on ASIA.* The use of these scales are dependent on an exact assessment of the injury, the person's sustained sensory and motor functions, the injury level and the degree of lesion – all of which help to forecast the possible impact on the person's daily living.[4]

What Are the Most Prevalent Consequences of SCI?

When it comes to paralysis, people generally think about the inability to move the legs and/or hands. However, the consequences of damage to the spinal cord can go beyond the impact on mobility. This can be seen as impacting on three levels:

– **the motor level:** mobility is decreased
– **the sensory level:** for example sensitivity of the skin is decreased
– **and the autonomic level:** the activity and functions of the inner organs (bladder, bowel, cardiovascular activities, respiration, etc.) or sexual functions are controlled involuntarily, meaning that the person does not consciously control these functions.

If autonomic functioning of the bladder and bowel is impaired, the person affected would have to learn to manage these functions consciously. Optimal bladder and bowel management is important to avoid complications such as recurring bladder or kidney infection, or in the worst case, permanent damage.

Until 60 years ago, the life expectancy of persons with SCI was low due to such complications and for which no long-lasting treatment options were available. Thanks to the development of effective bladder and bowel management strategies including trained professional care, technological and medical aids, the life expectancy of persons with SCI has increased to almost the same level as persons without SCI. **Bladder and bowel management** is also an issue addressed early on in the treatment of SCI.

Another major issue confronting persons with SCI is recurring **pressure sores**. Specific attention should be paid to the sensitivity of the skin, since this is decreased in persons with SCI. Furthermore, persons with SCI frequently experience respiratory difficulties, and body temperature

regulation in tetraplegics and paraplegics with high lesion levels is affected.

Despite the range of complications and difficulties that a person with SCI can experience, these can be addressed in a concerted effort by the person with SCI, his/her family or caregiver and, if engaged in a rehabilitation program, the rehabilitation team.[4]

*The above information on SCI is a re-worded version of text taken directly from the website www.paraforum.ch.

American Spinal Injury Association (ASIA) Impairment Scale

The American Spinal Injury Association (ASIA) impairment scale[5,7] or AIS describes a person's functional impairment as a result of a SCI. This scale indicates how much sensation a person feels after light touch and a pin prick at multiple points on the body and tests key motions on both sides of the body.

- **Grade A = Complete.** No sensory or motor function is preserved in the sacral segments S4-5.
- **Grade B = Sensory Incomplete.** Sensory but no motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure), and no motor function is preserved more than three levels below the motor level on either side of the body.
- **Grade C = Motor Incomplete.** Motor function is preserved below the neurological level, and more than half of key muscle functions below the neurological level of injury have a muscle grade less than 3 (Grades 0-2).
- **Grade D = Motor Incomplete.** Motor function is preserved below the neurological level, and at least half (half or more) of key muscle functions below the neurological level of injury have a muscle grade ≥ 3.
- **Grade E = Normal.** If sensation and motor functions are graded as normal in all segments, and the person has had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

Muscle Function Grading[7]	
0	Total paralysis
1	Palpable or visible contraction
2	Active movement, full range of motion (ROM) with gravity eliminated
3	Active movement, full ROM against gravity
4	Active movement, full ROM against gravity and moderate resistance in a muscle specific position
5	(normal) Active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person
5*	(normal) Active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present
NT	Not testable (i.e. due to immobilization, severe pain such that the person cannot be graded, amputation of limb, or contracture of > 50% of the normal range of motion)

Sensory Grading[7]	
0	Absent
1	Altered, either decreased/impaired sensation or hypersensitivity
2	Normal
NT	Not testable

International Classification of Functioning, Disability and Health (ICF)

The International Classification of Functioning, Disability and Health (ICF) is a classification of the **World Health Organization (WHO)**[2] based on the integrative bio-psycho-social model of functioning, disability and health.

Functioning at the Core

Functioning is the human experience related to body functions, body structures, and activities and participation. It is viewed in terms of its dynamic interaction with a health condition, personal and environmental factors. Disability, on the other hand, is the human experience of impaired body functions and structures, activity limitations and participation restrictions in interaction with a health condition, personal and environmental factors. Although distinguishing between functioning and disability is often helpful when reading medical literature, in the bio-psycho-social perspective of the ICF, functioning is implicitly addressed when disability is mentioned and vice versa.[1]

Functioning and disability according to the integrative bio-psycho-social model of the ICF corresponds to the perspective of rehabilitation medicine i.e. functioning is seen as closely interacting with the environment and the person's characteristics. Moreover, functioning represents not only an outcome, but also the starting point of the clinical assessment, intervention management, the post-intervention evaluation and quality management.[8,9,10,11,12,13]

Bio-psycho-social Model of Functioning, Disability and Health

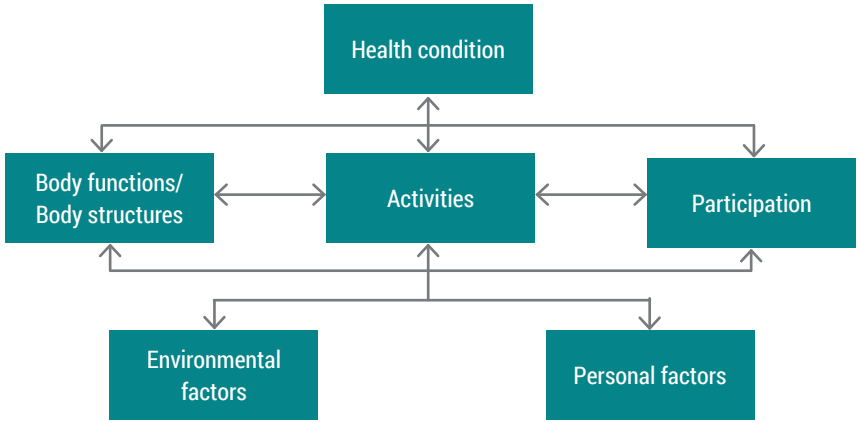


Figure 1: *Bio-psycho-social model of the International Classification of Functioning, Disability and Health (ICF)*

A **health condition** is an umbrella term for disease, disorder, injury or trauma and may also include other circumstances, such as aging, stress, congenital anomaly, or genetic predisposition. It may also include information about pathogeneses and/or etiology.[2]

Body functions are defined as the physiological functions of body systems, including psychological functions. Body structures are the anatomical parts of the body, such as organs, limbs and their components. Problems in body functions (e.g. reduced range of motion, muscle weakness, pain and fatigue) or significant deviation or loss of body structures (e.g. deformity of joints) are referred to as impairments of a body function and structure respectively.[2]

Activity is the execution of a task or action by a person. **Participation** refers to the involvement of a person in everyday situations and in society. Difficulties at the activity level are referred to as activity limitations (e.g. limitations in dressing) and problems a person may experience in being or getting involved in everyday situations and in society are denoted as participation restrictions (e.g. restrictions in recreation and leisure).[2]

Contextual factors represent the entire background of a person's life and living situation. Among the contextual factors, the **environmental factors** make up the physical, social and attitudinal environment in which people live. These factors are external to the person and can have a positive or negative influence, i.e., they can serve as a facilitator or a barrier for a person's functioning. **Personal factors** are the particular background of a person's life and living situation, and comprise features that are not part of the primary health condition. These may include but not limited to gender, age, race, fitness, lifestyle, habits, and social background. They can be considered factors which define the person as a unique individual. Like environmental factors, personal factors can have a positive or negative impact on a person's body functions and structures, and activities and participation.[2]

Structure of the ICF

This bio-psycho-social perspective guided the development of the ICF.[2] As such, the components of the classification correspond to the components of the model. *See figure 1 on page 10.* Within each component, there is an exhaustive list of ICF categories that serve as the units of the classification. ICF categories are denoted by unique **alphanumeric codes** and are hierarchically organized in **chapter, second, third and fourth levels**. When going from the chapter level to the fourth level, the category's definition becomes more detailed.

ICF categories are arranged in a stem-branch-leaf structure within each component, in which the more detailed level categories share the same attributes as the more broader level categories. Every component consists of chapters, with chapters representing the broadest level. Each chapter then consists of second-level categories, which in turn, are composed of categories at the third level. Some third level categories also include fourth-level categories. This structure can be compared to that of school books, in which the information is usually organized in chapters and sub-headings to help locate the information sought.

An example from the component body functions is presented below:

Code	Level
b2	Sensory functions and pain (chapter level)
b280	Sensation of pain (second level)
b2801	Pain in body part (third level)
b28013	Pain in back (fourth level)

Although the ICF reflects the bio-psycho-social model, there are some differences between the model and the classification. For example, the bio-psycho-social model depicts activities and participation as distinct entities. However, clearly distinguishing between them based on ICF categories is not yet possible given international variation, differing approaches of professionals and theoretical frameworks. For this reason, the ICF keeps activities and participation as one component of functioning. Moreover, although personal factors are included as a component of the bio-psycho-social model, they are not yet classified in the ICF.

ICF Qualifiers

The classification also comprises so-called ICF qualifiers,[2] which quantify the extent of a problem experienced by a person in a specific ICF category. WHO proposes that the categories in the components of body functions and structures, and activities and participation be quantified using the same generic scale:

Generic Scale of ICF Qualifiers	
0	NO problem (none, absent, negligible,...) 0-4%
1	MILD problem (slight, low,...) 5-24%
2	MODERATE problem (medium, fair,...) 25-49%
3	SEVERE problem (high, extreme,...) 50-95%
4	COMPLETE problem (total,...) 96-100%
8	not specified (used when there is insufficient information to quantify the extent of the problem)
9	not applicable (used to indicate when a category does not apply to a particular person)

The ICF qualifier is added to the category following a 'dot' e.g. b280.1 (mild sensation of pain) or b28013.3 (severe pain in the back).

Environmental factors are quantified with a negative and positive scale that denotes the extent to which an environmental factor acts as a barrier or a facilitator:

Qualifier - Barrier		Qualifier - Facilitator	
0	NO barrier	+0	NO facilitator
1	MILD barrier	+1	MILD facilitator
2	MODERATE barrier	+2	MODERATE facilitator
3	SEVERE barrier	+3	SUBSTANTIAL facilitator
4	COMPLETE barrier	+4	COMPLETE facilitator
8	barrier, not specified (the environmental factor is a barrier; however there is insufficient information to quantify the extent of the problem)	+8	facilitator, not specified (the environmental factor is a facilitator; however there is insufficient information to quantify the extent of the facilitative impact)
9	not applicable (used to indicate when a category does not apply to a particular person)		

To indicate that an environmental factor serves as a barrier, the ICF qualifier is added to the category following a 'dot' e.g. e150.2 (moderate barrier posed by the design, construction, products and technology of buildings for public use). To indicate that an environmental factor serves as a facilitator, the ICF qualifier is added to the category following a plus sign e.g. e1151+4 (Assistive products and technology for personal use in daily living serves as a complete facilitator).

An ICF qualifier of '8', not specified, is used when it is known that the environmental factor is a barrier, however there is insufficient information to quantify the extent of the problem. Likewise an ICF qualifier of '+8', also not specified, is used when it is known that the environmental factor is a facilitator, however there is insufficient information to quantify the extent of the facilitative impact. The ICF qualifier of '9', not applicable, is used in the same way as with the generic scale.

It is important to note that in addition to this generic scale, the ICF contains additional qualifiers specific to the different components. For example, the second and third qualifiers of the component body structures are used to indicate the nature of a body structure change and its location respectively.

The ICF contains more than 1400 categories, making it a highly comprehensive classification. This comprehensiveness is a major advantage and strength of the ICF. It is, however, also the biggest challenge to its practicability. To enhance the applicability of the classification, ICF-based tools must to be tailored to the needs of the users - without weakening the strengths of the ICF. One approach is the development of ICF Core Sets.

Introduction to ICF Core Sets

ICF Core Sets,[2,14,15] a selection of ICF categories from the entire classification for specific health conditions, condition groups and settings, have been developed to facilitate a systematic and comprehensive description of functioning for use for various purposes and in various settings including clinical practice and research.

In these settings an ICF Core Set can serve as a minimal standard for the assessment and documentation of functioning and health in clinical studies and comprehensive single or multi-professional clinical encounters.

There are comprehensive and brief versions of ICF Core Sets. The **Comprehensive ICF Core Set** for a specific condition contains as few ICF categories as possible to be practical, but as many as necessary to be sufficiently comprehensive in describing the typical spectrum of problems in functioning of persons with a specific health condition. The Comprehensive ICF Core Set is ideal (although not limited) for use in conducting multi- and interdisciplinary assessments. It encourages members of the multidisciplinary team to consider potentially relevant aspects of functioning even in areas of functioning outside of their respective disciplines. A **Brief ICF Core Set** is a selection of ICF categories from the Comprehensive ICF Core Set for the same health condition. Logically Brief ICF Core Sets are considerably shorter than the comprehensive version. Brief ICF Core Sets are ideal (although not limited) for use in both clinical studies and single-profession clinical encounters.

ICF Core Sets for the acute,[16,17] post-acute[18,19] and long-term context[20] have been developed.

A first version of ICF Core Sets for spinal cord injury (SCI) was finalized in 2007.[19,20] These comprise of four ICF Core Sets - a Brief and a Comprehensive ICF Core Set for the post-acute context and a Brief and a Comprehensive ICF Core Set for the long-term context. For use in the acute context ICF Core Sets for patients with neurological conditions in the acute hospital has been developed.[16,17]

Introduction to the ICF Case Studies | Introduction to ICF Core Sets

Table 1: Comprehensive and Brief ICF Core Sets for Persons with Neurological Conditions in the Acute Hospital

Body Functions	
Code	Title
*b110	*Consciousness functions*
b114	Orientation functions
b130	Energy and drive functions
b134	Sleep functions
*b140	*Attention functions*
b147	Psychomotor functions
b152	Emotional functions
b156	Perceptual functions
*b167	*Mental functions of language*
b180	Experience of self and time functions
b210	Seeing functions
*b215	*Functions of structures adjoining the eye*
b230	Hearing functions
*b235	*Vestibular functions*
*b240	*Sensations associated with hearing and vestibular functions*
b260	Proprioceptive function
b265	Touch function
*b270	*Sensory functions related to temperature and other stimuli*
b280	Sensation of pain
b310	Voice functions
b410	Heart functions
*b415	*Blood vessel functions*
b420	Blood pressure functions
*b430	*Haematological system functions*
b435	Immunological system functions
*b440	*Respiration functions*
b450	Additional respiratory functions
b455	Exercise tolerance functions
b510	Ingestion functions
*b525	*Defecation functions*
*b535	*Sensations associated with the digestive system*
b540	General metabolic functions
b545	Water, mineral and electrolyte balance functions
b620	Urination functions
*b710	*Mobility of joint functions*
b715	Stability of joint functions
b730	Muscle power functions
b735	Muscle tone functions
b755	Involuntary movement reaction functions
b760	Control of voluntary movement functions
b810	Protective functions of the skin

Body Structures	
Code	Title
*s110	*Structure of brain*
*s120	*Spinal cord and related structures*
s410	*Structure of cardiovascular system*
s430	*Structure of respiratory system*
*s710	*Structure of head and neck region*

Activities / Participation	
Code	Title
d315	Communicating with - receiving - nonverbal messages
d330	Speaking
d335	Producing nonverbal messages
*d360	*Using communication devices and techniques*
*d410	*Changing basic body position*
*d415	*Maintaining a body position*
*d420	*Transferring oneself*
d440	Fine hand use
d445	Hand and arm use
*d465	*Moving around using equipment*
*d510	*Washing oneself*
*d520	*Caring for body parts*
*d530	*Toileting*
*d540	*Dressing*
*d550	*Eating*
*d560	*Drinking*
*d760	*Family relationships*
d940	Human rights

Environmental Factors	
Code	Title
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*
e125	Products and technology for communication
e150	Design, construction and building products and technology of buildings for public use
e240	Light
e250	Sound
e310	Immediate family
*e315	*Extended family*
e320	Friends
e355	Health professionals
e360	Other professionals
e410	Individual attitudes of immediate family members
e415	Individual attitudes of extended family members
e420	Individual attitudes of friends
e450	Individual attitudes of health professionals
e455	Individual attitudes of other professionals
*e465	*Social norms, practices and ideologies*
*e550	*Legal services, systems and policies*
*e570	*Social security services, systems and policies*
e580	Health services, systems and policies

Table 1: Comprehensive and Brief ICF Core Sets for persons with neurological conditions in the acute hospital; the categories of the brief version are indicated in italic letters and with a star symbol (*). Altogether there are 85 ICF categories in the comprehensive version consisting of 41 categories in the component of body functions (b), 5 categories in body structures (s), 18 categories in activities and participation (d) and 21 categories in environmental factors (e). In the brief version there are 33 ICF categories consisting of 13 categories in the component of body functions (b), 3 categories in body structures (s), 12 categories in activities and participation (d) and 5 categories in environmental factors (e).

Table 2: Comprehensive ICF Core Set for Spinal Cord Injury in the Post-Acute Context

Body Functions	
Code	Title
b126	Temperament and personality functions
b130	Energy and drive functions
b134	Sleep functions
b152	Emotional functions
b260	Proprioceptive function
b265	Touch function
b270	Sensory functions related to temperature and other stimuli
b2800	Generalized pain
b28010	Pain in head and neck
b28013	Pain in back
b28014	Pain in upper limb
b28015	Pain in lower limb
b28016	Pain in joints
b2803	Radiating pain in a dermatome
b2804	Radiating pain in a segment or region
b310	Voice functions
b410	Heart functions
b415	Blood vessel functions
b4200	Increased blood pressure
b4201	Decreased blood pressure
b4202	Maintenance of blood pressure
b430	Haematological system functions
b440	Respiration functions
b445	Respiratory muscle functions
b450	Additional respiratory functions
b455	Exercise tolerance functions
b510	Ingestion functions
b515	Digestive functions
b5250	Elimination functions
b5251	Faecal consistency
b5252	Frequency of defecation
b5253	Faecal continence
b5254	Flatulence
b530	Weight maintenance functions
b550	Thermoregulatory functions
b610	Urinary excretory functions
b6200	Urination
b6201	Frequency of urination
b6202	Urinary continence
b630	Sensations associated with urinary functions
b640	Sexual functions
b670	Sensations associated with genital and reproductive functions
b710	Mobility of joint functions
b715	Stability of joint functions
b7300	Power of isolated muscles and muscle groups
b7302	Power of muscles of one side of the body
b7303	Power of muscles in lower half of the body
b7304	Power of muscles of all limbs
b7305	Power of muscles of the trunk
b7353	Tone of muscles of lower half of the body
b7354	Tone of muscles of all limbs
b7355	Tone of muscles of trunk
b740	Muscle endurance functions
b750	Motor reflex functions
b755	Involuntary movement reaction functions
b760	Control of voluntary movement functions
b765	Involuntary movement functions
b770	Gait pattern functions
b780	Sensations related to muscles and movement functions
b810	Protective functions of the skin
b820	Repair functions of the skin
b830	Other functions of the skin
b840	Sensations related to the skin

Body Structures	
Code	Title
s12000	Cervical spinal cord
s12001	Thoracic spinal cord
s12002	Lumbar spinal cord
s12003	Lumbosacral spinal cord
s1201	Spinal nerves
s430	Structure of respiratory system
s610	Structure of urinary system
s710	Structure of head and neck region
s720	Structure of shoulder region
s730	Structure of upper extremity
s740	Structure of pelvic region
s750	Structure of lower extremity
s760	Structure of trunk
s810	Structure of areas of skin

Activities / Participation	
Code	Title
d230	Carrying out daily routine
d240	Handling stress and other psychological demands
d360	Using communication devices and techniques
d4100	Lying down
d4103	Sitting
d4104	Standing
d4105	Bending
d4106	Shifting the body's centre of gravity
d4153	Maintaining a sitting position
d4154	Maintaining a standing position
d420	Transferring oneself
d430	Lifting and carrying objects
d435	Moving objects with lower extremities
d4400	Picking up
d4401	Grasping
d4402	Manipulating
d4403	Releasing
d4450	Pulling
d4451	Pushing
d4452	Reaching
d4453	Turning or twisting the hands or arms
d4455	Catching
d4500	Walking short distances
d4501	Walking long distances
d4502	Walking on different surfaces
d4503	Walking around obstacles
d455	Moving around
d4600	Moving around within the home
d4601	Moving around within buildings other than home
d4602	Moving around outside the home and other buildings
d465	Moving around using equipment
d470	Using transportation
d475	Driving
d510	Washing oneself
d520	Caring for body parts
d5300	Regulating urination
d5301	Regulating defecation
d5302	Menstrual care
d540	Dressing
d550	Eating
d560	Drinking
d570	Looking after one's health
d610	Acquiring a place to live
d620	Acquisition of goods and services
d630	Preparing meals
d640	Doing housework
d660	Assisting others
d760	Family relationships
d770	Intimate relationships
d850	Remunerative employment
d870	Economic self-sufficiency
d920	Recreation and leisure
d930	Religion and spirituality

Environmental Factors	
Code	Title
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
e125	Products and technology for communication
e130	Products and technology for education
e135	Products and technology for employment
e140	Products and technology for culture, recreation and sport
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
e165	Assets
e310	Immediate family
e315	Extended family
e320	Friends
e325	Acquaintances, peers, colleagues, neighbours and community members
e330	People in position of authority
e340	Personal care providers and personal assistants
e355	Health professionals
e360	Other 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
e440	Individual attitudes of personal care providers and personal assistants
e450	Individual attitudes of health professionals
e460	Societal attitudes
e515	Architecture and construction services, systems and policies
e525	Housing services, systems and policies
e540	Transportation services, systems and policies
e555	Associations and organizational services, systems and policies
e570	Social security services, systems and policies
e575	General social support services, systems and policies
e580	Health services, systems and policies

Table 2: Comprehensive ICF Core Set for spinal cord injury in the post-acute context. Altogether there are 162 ICF categories consisting of 63 categories in the component of body functions (b), 14 categories in body structures (s), 53 categories in activities and participation (d) and 32 categories in environmental factors (e).

Table 3: Brief ICF Core Set for Spinal Cord Injury in the Post-Acute Context

Body Functions	
Code	Title
b152	Emotional functions
b280	Sensation of pain
b440	Respiration functions
b525	Defection functions
b620	Urination functions
b730	Muscle power functions
b735	Muscle tone functions
b810	Protective functions of the skin

Body Structures	
Code	Title
s120	Spinal cord and related structures
s430	Structure of respiratory system
s610	Structure of urinary system

Activities / Participation	
Code	Title
d410	Changing basic body position
d420	Transferring oneself
d445	Hand and arm use
d450	Walking
d510	Washing oneself
d530	Toileting
d540	Dressing
d550	Eating
d560	Drinking

Environmental Factors	
Code	Title
e115	Products and technology for personal use in daily living
e120	Products and technology for personal indoor and outdoor mobility and transportation
e310	Immediate family
e340	Personal care providers and personal assistants
e355	Health professionals

Table 3: Brief ICF Core Set for spinal cord injury in the post-acute context. Altogether there are 25 ICF categories consisting of 8 categories in the component of body functions (b), 3 categories in body structures (s), 9 categories in activities and participation (d) and 5 categories in environmental factors (e).

Introduction to the ICF Case Studies | Introduction to ICF Core Sets

Table 4: Comprehensive ICF Core Set for Spinal Cord Injury in the Long-Term Context

Body Functions	
Code	Title
b126	Temperament and personality functions
b130	Energy and drive functions
b134	Sleep functions
b152	Emotional functions
b260	Proprioceptive function
b265	Touch function
b270	Sensory functions related to temperature and other stimuli
b28010	Pain in head and neck
b28011	Pain in chest
b28012	Pain in stomach or abdomen
b28013	Pain in back
b28014	Pain in upper limb
b28015	Pain in lower limb
b28016	Pain in joints
b2803	Radiating pain in a dermatome
b2804	Radiating pain in a segment or region
b420	Blood pressure functions
b440	Respiration functions
b445	Respiratory muscle functions
b455	Exercise tolerance functions
b525	Defecation functions
b530	Weight maintenance functions
b550	Thermoregulatory functions
b610	Urinary excretory functions
b6200	Urination
b6201	Frequency of urination
b6202	Urinary continence
b640	Sexual functions
b660	Procreation functions
b670	Sensations associated with genital and reproductive functions
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
b750	Motor reflex functions
b760	Control of voluntary movement functions
b770	Gait pattern functions
b780	Sensations related to muscles and movement functions
b810	Protective functions of the skin
b820	Repair functions of the skin
b830	Other functions of the skin
b840	Sensations related to the skin

Body Structures	
Code	Title
s12000	Cervical spinal cord
s12001	Thoracic spinal cord
s12002	Lumbar spinal cord
s12003	Lumbosacral spinal cord
s1201	Spinal nerves
s430	Structure of respiratory system
s610	Structure of urinary system
s720	Structure of shoulder region
s7300	Structure of upper arm
s7301	Structure of forearm
s7302	Structure of hand
s7500	Structure of thigh
s7501	Structure of lower leg
s7502	Structure of ankle and foot
s760	Structure of trunk
s8102	Skin of upper extremity
s8103	Skin of pelvic region
s8104	Skin of lower extremity
s8105	Skin of trunk and back

Activities / Participation	
Code	Title
d155	Acquiring skills
d230	Carrying out daily routine
d240	Handling stress and other psychological demands
d345	Writing messages
d360	Using communication devices and techniques
d4100	Lying down
d4102	Kneeling
d4103	Sitting
d4104	Standing
d4105	Bending
d4106	Shifting the body's centre of gravity
d415	Maintaining a body position
d420	Transferring oneself
d430	Lifting and carrying objects
d4400	Picking up
d4401	Grasping
d4402	Manipulating
d4403	Releasing
d4450	Pulling
d4451	Pushing
d4452	Reaching
d4453	Turning or twisting the hands or arms
d4454	Throwing
d4500	Walking short distances
d4501	Walking long distances
d4502	Walking on different surfaces
d4503	Walking around obstacles
d455	Moving around
d4600	Moving around within the home
d4601	Moving around within buildings other than home
d4602	Moving around outside the home and other buildings
d465	Moving around using equipment
d470	Using transportation
d475	Driving
d510	Washing oneself
d520	Caring for body parts
d5300	Regulating urination
d5301	Regulating defecation
d5302	Menstrual care
d540	Dressing
d550	Eating
d560	Drinking
d570	Looking after one's health
d610	Acquiring a place to live
d620	Acquisition of goods and services
d630	Preparing meals
d640	Doing housework
d650	Caring for household objects
d660	Assisting others
d720	Complex interpersonal interactions
d750	Informal social relationships
d760	Family relationships
d770	Intimate relationships
d810	Informal education
d820	School education
d825	Vocational training
d830	Higher education
d840	Apprenticeship (work preparation)
d845	Acquiring, keeping and terminating a job
d850	Remunerative employment
d870	Economic self-sufficiency
d910	Community life
d920	Recreation and leisure
d940	Human rights

Environmental Factors	
Code	Title
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
e125	Products and technology for communication
e130	Products and technology for education
e135	Products and technology for employment
e140	Products and technology for culture, recreation and sport
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
e160	Products and technology of land development
e165	Assets
e310	Immediate family
e315	Extended family
e320	Friends
e325	Acquaintances, peers, colleagues, neighbours and community members
e330	People in position of authority
e340	Personal care providers and personal assistants
e355	Health professionals

e360	Other 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
e440	Individual attitudes of personal care providers and personal assistants
e450	Individual attitudes of health professionals
e455	Individual attitudes of other professionals
e460	Societal attitudes
e465	Social norms, practices and ideologies
e510	Services, systems and policies for the production of consumer goods
e515	Architecture and construction services, systems and policies
e525	Housing services, systems and policies
e530	Utilities services, systems and policies
e535	Communication services, systems and policies
e540	Transportation services, systems and policies
e550	Legal services, systems and policies
e555	Associations and organizational services, systems and policies
e570	Social security services, systems and policies
e575	General social support services, systems and policies
e580	Health services, systems and policies
e585	Education and training services, systems and policies
e590	Labour and employment services, systems and policies

Table 4: Comprehensive ICF Core Set for spinal cord injury in the long-term context. Altogether there are 168 ICF categories consisting of 44 categories in the component of body functions (b), 19 categories in body structures (s), 64 categories in activities and participation (d) and 41 categories in environmental factors (e).

Table 5: Brief ICF Core Set for Spinal Cord Injury in the Long-Term Context

Body Functions	
Code	Title
b152	Emotional functions
b280	Sensation of pain
b525	Defecation functions
b620	Urination functions
b640	Sexual functions
b710	Mobility of joint functions
b730	Muscle power functions
b735	Muscle tone functions
b810	Protective functions of the skin

Body Structures	
Code	Title
s120	Spinal cord and related structures
s430	Structure of respiratory system
s610	Structure of urinary system
s810	Structure of areas of skin

Activities / Participation	
Code	Title
d230	Carrying out daily routine
d240	Handling stress and other psychological demands
d410	Changing basic body position
d420	Transferring oneself
d445	Hand and arm use
d455	Moving around
d465	Moving around using equipment
d470	Using transportation
d520	Caring for body parts
d530	Toileting
d550	Eating

Environmental Factors	
Code	Title
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
e310	Immediate family
e340	Personal care providers and personal assistants
e355	Health professionals
e580	Health services, systems and policies

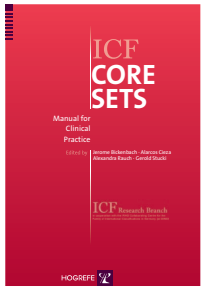
Table 5: Brief ICF Core Set for spinal cord injury in the long-term context. Altogether there are 33 ICF categories consisting of 9 categories in the component of body functions (b), 4 categories in body structures (s), 11 categories in activities and participation (d) and 9 categories in environmental factors (e).

It is important to note that the ICF Core Sets for SCI, like all other ICF Core Sets, only tell you **what to measure, and not how to measure** the respective categories. In clinical practice, ICF Core Sets together with ICF qualifiers can be employed to identify the level of impairment in body functions and structures, limitations in activities, restrictions in participation, and the extent of influence environmental factors have on the functioning of a specific person. The combined use of ICF Core Sets and ICF qualifiers are essential elements in the ICF-based documentation tools developed to accompany the Rehab-Cycle®. *See page 27 for detailed information on the Rehab-Cycle® and the ICF-based documentation tools.*

To get information on individual ICF Core Sets as well as to download a PDF of the ICF Core Sets go to www.icf-research-branch.org or www.icf-core-sets.org.

ICF Core Set Manual

A manual on one approach of using ICF Core Sets in clinical practice has been available since 2012.[1]



The book ICF Core Sets: Manual for Clinical Practice edited by Bickenbach J, Cieza A, Rauch A, Stucki G. includes:

- An introduction to the concepts of functioning and disability
- A description of the development process of the ICF Core Sets and their purpose
- An introduction to the application of the ICF Core Sets in clinical practice based on a documentation form and use cases (or case examples)
- All ICF Core Sets that were available at the time of printing and corresponding documentation forms

The documentation form to create a functioning profile outlined in the manual is available on the open access interactive website www.icf-core-sets.org.

"A cohesive and comprehensive guide to the understanding of the International Classification of Functioning, Disability and Health (ICF) and its implementation in clinical rehabilitation settings. It is an ideal information source for those serious about implementing comprehensive, patient-centred rehabilitation clinical programs within an international context. It answers well the questions: 'What is the ICF?' and 'What can I do with it'."

John L. Melvin, MD, MMSc, Professor and Chair, Rehabilitation Medicine, Thomas Jefferson University (Philadelphia, USA)

This manual is inherently multi-professional and will be of benefit not only to practitioners in various health care settings, but also for students and teachers. It is available in several languages.

"This new perspective on assessment of functioning brings theory and practice together. The arduous challenge of discussing how ICF-based documentation can be used to describe patients' resources and possibilities is clarified by this manual in a comprehensible and precise way, enabling a conceptual and practical understanding by its reader."

Linamara Rizzo Battistella, MD, PhD, Professor, Physical and Rehabilitation Medicine, São Paulo State Secretary for the Rights of the Person with Disability (Brazil)

The manual can be ordered online on various portals. You can find more information about accessing the manual in the various languages on the ICF Research Branch website www.icf-research-branch.org.

Introduction to the Rehab-Cycle® and ICF-based Rehabilitation Tools

To facilitate the use of the ICF in clinical practice, it is essential to have ICF-based tools that could be integrated into the existing processes. In the rehabilitation setting, ICF-based tools can be employed in rehabilitation management - the multidisciplinary team can use them to comprehensively describe the functioning of persons experiencing or likely to experience disability, to guide the planning of functioning-oriented rehabilitation services and evaluate changes in the functioning status over a certain time period.

The Rehab-Cycle®

Rehabilitation management can be characterized with a problem-solving approach. One such approach based on the ICF is the rehabilitation cycle, called Rehab-Cycle®.[6,8,9,10] The Rehab-Cycle® can facilitate the structuring, organization and documentation of the rehabilitation process, as well as help the professionals involved in a person's rehabilitation with coordinating their actions. This iterative process includes four key elements: 1) assessment, 2) assignment, 3) intervention and 4) evaluation.

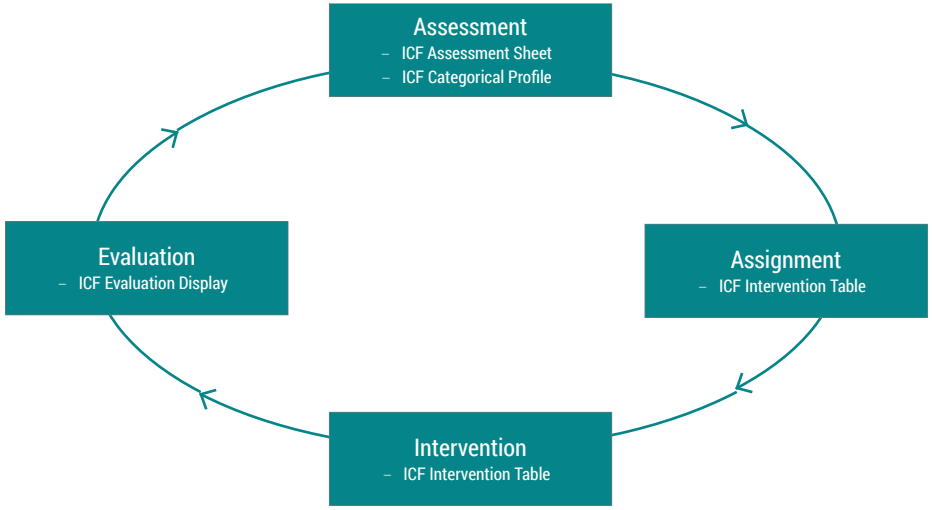


Figure 2: *Rehab-Cycle® and the corresponding ICF-based documentation tools*

Overview of the ICF-based Documentation Tools

For each element of the Rehab-Cycle®, ICF-based documentation tools have been developed that also take into account the ICF Core Sets.[6,8,9] These tools aim to facilitate the documentation and planning of rehabilitation services. The ICF-based documentation tools are the ICF Assessment Sheet, ICF Categorical Profile, ICF Intervention Table and the ICF Evaluation Display.

These tools encouraged interdisciplinary communication in that they required the rehabilitation professionals involved to discuss and determine the overall health status of a person at the beginning of rehabilitation (ICF Assessment Sheet), to decide on a mutual rating for each ICF category and set shared goals (ICF Categorical Profile), determine the appropriate interventions and allocate the respective responsibilities for conducting the interventions (ICF Intervention Sheet), and discuss and conclude goal achievement (ICF Evaluation Display). The set of ICF categories employed in the assessment, intervention planning and re-evaluation provides a common language for the various rehabilitation professionals involved.[21,22,23,24,25]

In addition, the ICF-based documentation tools facilitate transparent documentation and information exchange between the rehabilitation professionals in the team.[21,22,23,24,25]

The ICF Assessment Sheet

The ICF Assessment Sheet provides a comprehensive overview of a person's functioning state by presenting the assessment results in all the components of functioning, environmental and personal factors with input from both the health professional and the person (patient). The ICF Assessment Sheet can help the rehabilitation team to understand the person's functioning and to identify the needs to be addressed in rehabilitation.[6,8,9,21,24]

To illustrate the **patient's and health professional's perspective**, the components of functioning are divided into an upper (patient perspective) and a lower (health professional perspective) section. The environmental and personal factors reflect both the patient's as well as the health professional's perspective.

See "Table 6: ICF Assessment Sheet" on page 32.

To describe the person's experience of functioning, his or her own words are used to fill in the part called "patient perspective". To reflect the health professional's perspective, all results from the clinical assessment relevant to the description of the patient's functioning status at the time of assessment are entered in the lower part of the sheet, ideally using ICF categories. In order to use the common language of the ICF, the original technical terminology of the clinical assessment has to be translated or 'linked' to the corresponding ICF categories. Established linking rules[26] can greatly facilitate this process. Environmental factors can also be indicated using ICF categories.

If appropriate, the rehabilitation team can use a relevant ICF Core Set for documentation in the ICF Assessment Sheet, specifically for the health professional perspective and the environmental factors.[22] Each ICF Core Set category can then be rated with an ICF qualifier. This information can serve as the basis for completing the next ICF-based documentation tool - the ICF Categorical Profile.

Introduction to the ICF Case Studies | Introduction to the Rehab-Cycle® and ICF-based Rehabilitation Tools

The ICF Categorical Profile

The ICF Categorical Profile is a visual depiction of a person's functioning status at the time of assessment showing the qualifier values for selected ICF categories considered relevant to a individual person's case. It can facilitate the identification of intervention targets that are related to shared goals, serving as the central source of information for the rehabilitation team for intervention planning.[6,21,22,23,24,25]

Completing the ICF Categorical Profile requires the rehabilitation team, with input from the person, to state long and short-term goals, link these goals with the ICF categories that should be targeted for intervention, and identify for each category the qualifier value that should be achieved after intervention. The ICF Categorical Profile is generally set-up using a suitable ICF Core Set. If no ICF Core Set exists for the respective health condition, the ICF Categorical Profile should include the ICF categories that are essential for comprehensively describing the health status of the person at the time of assessment.

See "Table 7: ICF Categorical Profile" on page 34.

An ICF category is considered an **intervention target** if a goal is identified for it, and is intended to be addressed in the intervention phase of the Rehab-Cycle®. A category is marked as an intervention target using the following codes to illustrate its relation to the respective goals. These codes are seen in the column marked 'Goal relation':

- **G = Global Goal;** is the highest level goal a person aims to achieve, and refers to the intended outcome after successful completion of rehabilitation.
- **SP = Service-Program Goal;** is an intermediate goal a person aims to achieve, and refers to an endpoint of a specific program of rehabilitation.
- **'1', '2' and '3' refer to cycle goals 1, 2 and 3 respectively;** a cycle goal is a short term goal that a person aims to achieve. Several cycle goals are the "stepping stones" toward achieving the corresponding service-program goal.

In order to evaluate if a goal has been achieved, a **goal value** for each targeted ICF category has to be set using ICF qualifiers. Goal values are generally set only for those ICF categories which are considered intervention targets and have a goal relation.

The information found in the ICF Categorical Profile can serve as the basis for completing the next ICF-based documentation tool - the ICF Intervention Table.

The ICF Intervention Table

Information from the ICF Categorical Profile can be used to complete the ICF Intervention Table.

The ICF Intervention Table can facilitate the coordination of interventions, roles and resources within a multidisciplinary team.[6,21,23,24] It provides a **comprehensive overview of all the intervention targets** (as represented by ICF categories), **the interventions themselves and the corresponding rehabilitation professional(s)** who is (are) assigned to address each intervention target. It also shows the initial ICF qualifier rating of the intervention targets, the goal value i.e. the ICF qualifier expected to be achieved after interven-

tion, and the end or final value i.e. the ICF qualifier rating at a second assessment or evaluation. Logically, the end value is entered in the table after completion of intervention.

More than one rehabilitation professional may be assigned to a specific intervention target. The discipline of each rehabilitation profession is abbreviated on the table.

See "Table 8: ICF Intervention Table" on page 36.

The ICF Evaluation Display

The ICF Evaluation Display is based on the ICF Categorical Profile. In comparison to the ICF Categorical Profile, the ICF Evaluation Display includes only the ICF categories that were defined as intervention targets i.e. those categories that were related to a specific goal (global goal, service-program goal and/or cycle goal). The ICF Evaluation Display is also enlarged to include a visual depiction of the person's functioning status at the time of the second assessment or 'evaluation' and a column indicating goal achievement. It provides a picture of the change between functioning status before and after intervention.[6,21,23,24,25] It is important to note however that this **"before-after" picture** of change does not necessarily signify that the change is due to the intervention itself, but only that there was a change.

See "Table 9: ICF Evaluation Display" on page 38.

Regardless the ICF Evaluation Display can be useful for the rehabilitation team in their discussions about the course of rehabilitation and further intervention planning, including deciding on additional cycles (if the desired result was not achieved during the evaluated cycle), continuing rehabilitation with an additional service program or to end the rehabilitation.

Table 6: ICF Assessment Sheet

ICF Assessment Sheet

Patient Perspective

Body Functions & Structures

- From time to time I have pain in my back
- My bladder and bowel are impaired
- Exercises do not exhaust me
- I have problems with my body balance
- I can't control my abdominals
- I haven't been allowed to prop on my right hand (fracture of radius)
- I once had a pressure sore
- I can't sit up from a lying position
- I have problems while sitting because of little body balance

Activities & Participation

- I need support in transferring myself (esp. into a car) but I
- can turn from back to side position
- Handling barriers with the wheelchair is difficult
- I want to drive a car
- I need support in washing myself
- I need support in caring for my skin
- I can't use the toilet by myself
- I can't dress myself because of my broken arm
- I teach my parents and friends how to help me
- I spend a lot of time with my friends
- I talk to other wheelchair drivers
- I spend time with my visitors in the rehab-centre
- I will finish my general qualification for university entrance
- I organize and participate in our youth club
- In my free time I read more than before the accident
- I used to do sports and I want to do sports again

Health Professional Perspective

Body Functions & Structures

- No touch functions below T3
- Low blood pressure
- Blood vessel functions - at risk
- Fecal incontinence
- Reduced mobility of knee joints (extension)
- No muscle power functions below T3
- Constant spasticity below T3
- No reflex functions below in lower extremity
- Reduced body balance
- No voluntary movement functions below T3
- Above average movements functions below T3
- Above average movement functions above T3
- Muscle stiffness of hamstring muscles
- Structure of the skin - at risk

Activities & Participation

- Above average in acquiring skills
- Partial limitations in changing body positions
- Instability in sitting position
- Partial limitations in transferring (support by one person)
- Complete limitation in overcoming barriers with the wheelchair
- Partial limitations in washing oneself
- Partial limitations in caring for body parts
- Complete limitations in bowel management
- Complete limitations in bladder management
- Partial limitations in dressing
- Restricted sport activities

Environmental Factors

- Medication (when in pain)
- Need for an adapted car
- Living in a farmer's house
- No barriers in the centre
- Ramps and stairs disable in moving the wheelchair
- Large circle of friends
- Parents support him
- Friends support him
- Health professionals support him
- Insurance should support him
- Manual wheelchair
- Rubbing plate and chair cushion

Personal Factors

- Male, 19 years old
- Apprenticeship as a cabinet-maker
- Has a girlfriend
- Living with his family
- Sportive person
- Wants to accept his situation
- Is excited to discover his physical limits

Table 6: *ICF Assessment Sheet*

Table 7: ICF Categorical Profile

ICF Categorical Profile												
Assessment												
Global Goal: University entrance, complete independence												0
Service-Program-Goal: Independence in ADLs												0
Cycle goal 1: Independence in mobility												1
Cycle goal 2: Independence in self-care												0
Cycle goal 3: Sport												2
ICF categories		**ICF Qualifier**									**Goal Relation**	**Goal value**
						problem						
						0	1	2	3	4		
b265	Touch functions										-	-
b28013	Pain in back										1	0
b525	Defecation functions										-	-
b620	Urination functions										-	-
b7101	Mobility of several joints										1, 2	0
b7303	Muscle power functions in lower half of the body										-	-
b735	Muscle tone functions										1, 2	1
b750	Motor reflex functions										-	-
b755	Involuntary movement reaction functions										1, 2, 3	0
b7800	Sensation of muscle stiffness										1, 2	0
s810	Structure of areas of the skin										G	0
d155	Acquiring skills										-	-
d410	Changing basic body positions										1	0
d4153	Maintaining a sitting positions										1, 2	0
d4200	Transferring oneself while sitting										1	1
d465	Moving around using equipment										1	1
d510	Washing oneself										2	0
d520	Caring for body parts										2	0
d5300	Regulating urination										2	0
d5301	Regulating defecation										2	0
d540	Dressing										2	0
d9201	Sport										3	2
		facilitator					barrier					
		4+	3+	2+	1+	0	1	2	3	4		
e1101	Drugs										-	-
e1151	Assistive products…for personal use in daily living										1	0
e1201	Assistive products…for personal mobility										1	2+
e155	Design, construction…of buildings for private use										G	2
e1602	Products…of urban land development										-	-
e310	Immediate family										-	-
e320	Friends										-	-
e355	Health professionals										-	-
e575	General social support services, systems…										G	4+
e580	Health services, systems and policies										G	3+
pf	Knowledge of disease										SP	2+
pf	Sportive person										-	-
pf	Acceptance of disease										SP	0
pf	Purposefulness										-	-
pf	Coping strategies										SP	2+

Table 7: ICF Categorical Profile; ICF Qualifier: rate the extent of problems (0 = no problem to 4 = complete problem) in the components of body functions (b), body structures (s), activities and participation (d) and the extent of positive (+) or negative impact of environmental (e) and personal factors (pf); Goal Relation: 1, 2, 3 refers to Cycle goal 1, 2, 3; SP refers to Service-Program Goal; G refers to the Global Goal; Goal value refers to the ICF qualifier to achieve after an intervention.

Table 8: ICF Intervention Table

ICF Intervention Table														
	Intervention target		Intervention	Doc	Nurse	PT	OT	Psych	SW	Arch	First value	Goal value	Final value
Body function/-structure	b28013	Pain in back	Body posture training			x					3	0	1
			Adaptation of wheelchair				x						
	b415	Blood vessel functions	Compression hosiery		x								
			Medication	x									
	b7101	Mobility of several joints	Passive movement			x					1	0	1
	b735	Muscle tone functions	Medication	x							2	1	1
	b755	Involuntary movement reaction functions	Body balance training			x					2	0	0
	b7603	Supportive functions of the arms	Prop-up training			x							
	b7800	Sensation of muscle stiffness	Tension relief exercises, Stretching			x					1	0	0
	s810	Structure of areas of the skin	Daily inspection		x						0	0	0
Activities/Participation	d410	Changing basic body positions	Sit-up-training			x					1	0	0
	d4153	Maintaining a sitting position	Training of stability while sitting			x					1	0	0
	d4200	Transferring oneself while sitting	Transfer-training			x					2	1	1
	d465	Moving around using equipment	Wheelchair-training outdoor			x					3	1	2
	d510	Washing oneself	Assistance/Instruction		x						2	0	0
	d520	Caring for body parts	Assistance/Instruction		x						2	0	1
	d5300	Regulating urination	Assistance/Instruction		x						2	0	0
	d5301	Regulating defecation	Assistance/Instruction		x						2	0	0
	d540	Dressing	Assistance/Instruction		x		x				2	0	0
	d9201	Sport	Exercising wheelchair sports			x					4	2	2
Environmental Factors	e1151	Assistive products...for personal use	Control of wheelchair cushion				x				2 (-)	0	0
	e1201	Assistive products...for personal mobility	Testing of different wheelchairs, reconstruction of the car				x				1 (+)	2 (+)	2 (+)
	e155	Design...of buildings for private use	Planning and reconstruction of private building				x			x	3 (-)	2 (-)	2 (-)
	e575	General social support services...	Clarification and organization of payments						x		0	4 (+)	2 (+)
	e580	Health services, systems and...	Clarification and organization of payments						x		2 (+)	3 (+)	2 (+)
Personal factors	pf	Knowledge of disease	Lectures and individual education	x	x	x	x	x	x		2 (-)	2 (+)	2 (+)
	pf	Acceptance of disease	Behavioural approach					x			2 (-)	0	1 (-)
	pf	Coping strategies	Behavioural approach					x			1 (+)	2 (+)	2 (+)

__Table 8:__ ICF Intervention Table; Doc = Physician; PT = Physical Therapist; OT = Occupational Therapist; Psych = Psychologist, SW = Social Worker, Arch = Architectural expert. The values are rated using ICF qualifiers; ICF Qualifier rate the extent of problems (0 = no problem to 4 = complete problem) in the components of body functions (b), body structures (s), activities and participation (d) and the extent of positive (+) or negative impact (-) of environmental (e) and personal factors (pf); First value refers to the rating at the initial assessment; Goal value refers to the rating to achieve after an intervention; Final value refers to the actual rating at the second assessment or evaluation. In table 2 ICF Categorical Profile b415 Blood vessel functions and b7603 Supportive functions of the arms were not depicted. However, since an intervention was provided addressing these aspects of functioning, they are included here.

Table 9: ICF Evaluation Display

ICF Evaluation Display																						
Assessment													Evaluation									
Global Goal: University entrance, complete independence											0						not evaluated yet					
Service-Program-Goal: Independence in ADLs											0						not evaluated yet					
Cycle goal 1: Independence in mobility											1											+
Cycle goal 2: Independence in self-care											0											+
Cycle goal 3: Sport											2											+
ICF categories		ICF Qualifier									Goal Relation	Goal value	ICF Qualifier									Goal achievement
						problem											problem					
						0	1	2	3	4							0	1	2	3	4	
b28013	Pain in back										1	0										-
b7101	Mobility of several joints										1,2	0										-
b735	Muscle tone functions										1,2	1										+
b755	Involuntary movement reaction functions										1,2,3	0										+
b7800	Sensation of muscle stiffness										1,2	0										+
s810	Structure of areas of skin										G	0										+
d410	Changing basic body positions										1	0										+
d4153	Maintaining a body position										1,2	0										+
d4200	Transferring oneself while sitting										1	1										+
d465	Moving around using equipment										1	1										-
d510	Washing oneself										2	0										+
d520	Caring for body parts										2	0										-
d5300	Regulating urination										2	0										+
d5301	Regulating defecation										2	0										+
d540	Dressing										2	0										+
d9201	Sport										3	2										+
		facilitator					barrier						facilitator					barrier				
		4+	3+	2+	1+	0	1	2	3	4			4+	3+	2+	1+	0	1	2	3	4	
e1151	Assistive products...for personal use in daily living										1	0										+
e1201	Assistive products...for personal mobility										1	2+										+
e155	Design, construction ...of buildings for private use										G	2										+
e575	General social support services. systems...										G	4+										-
e580	Health services, systems and policies										G	3+										-
pf	Knowledge of disease										SP	2+										+
pf	Acceptance of disease										SP	0										-
pf	Coping strategies										SP	2+										+

Table 9: ICF Evaluation Display; ICF Qualifier: rate the extent of problems (0 = no problem to 4 = complete problem) in the components of body functions (b), body structures (s), activities and participation (d) and the extent of positive (+) or negative impact of environmental (e) and personal factors (pf); Goal Relation: 1, 2, 3 refers to Cycle goal 1, 2, 3; SP refers to Service-Program goal; G refers to Global goal; Goal value refers to the ICF qualifier to achieve after an intervention; Goal achievement: + means achieved, - means not achieved.

Conclusion

People of all ages and health status, from extraordinary fitness to severe illness, can be struck by spinal cord injury (SCI). Persons living with SCI have limitations in many areas of functioning depending on the level and severity of the health condition but also personal resources that can be fostered and optimized to facilitate the rehabilitation process. Thus, having a broad understanding of functioning in SCI is essential for comprehensive and multidisciplinary rehabilitation.

The project 'Case studies describing persons with SCI and their health care based on the ICF and the Rehab-Cycle®' has contributed to gaining this understanding with the hope of improving the lives of persons living with SCI.

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