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ICF Case Studies

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

Care in Low and Middle-Resource Countries

Case Study 11



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Preface

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.

To illustrate the use of the ICF in rehabilitation practice **Swiss Paraplegic Research (SPF)** together with **Swiss Paraplegic Centre (SPZ)**, one of Europe's leading (acute and rehabilitation) centres for paraplegia and spinal cord injury (SCI), performed 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 for 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 is then described using the Rehab-Cycle® and the corresponding ICF-based documentation tools. 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. With this in mind, each case study highlighted a specific theme of SCI rehabilitation.

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

Spinal Cord Injury (SCI)

Spinal cord injury (SCI) is an injury of the spinal cord that results in a temporary or permanent change in motor, sensory, or autonomic functions of the injured person's body. The spinal cord is divided into four sections which can be further subdivided into individual segments:

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

The damage of the spinal cord is called lesion. Important functions such as mobility (motor functions) or sensation (sensory functions) fail below the lesion. To help determine future rehabilitation and recovery needs, the extent of a SCI in terms of sensory and motor functions is described using the American Spinal Injury Association (ASIA) impairment scale.

International Classification of Functioning, Disability and Health (ICF)

The ICF is a classification of the **World Health Organization (WHO)** based on the integrative bio-psycho-social model of functioning, disability and health. Functioning and disability reflect the human experience related to the 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.

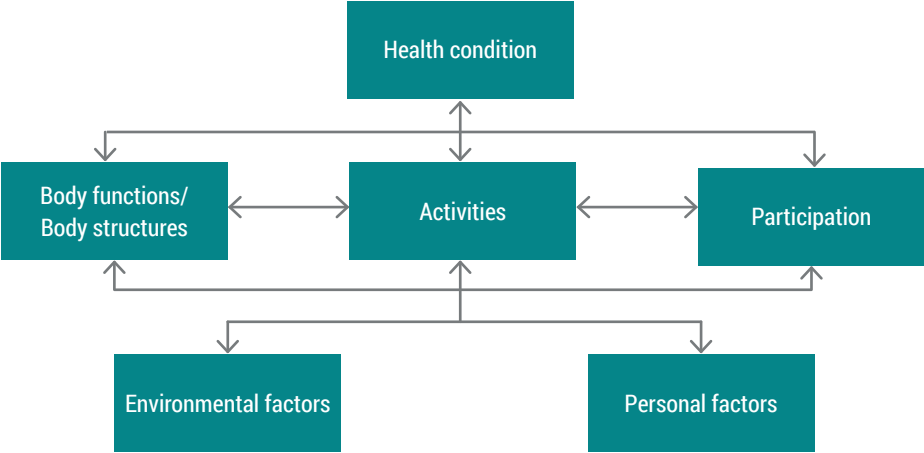


Figure 1: Bio-psycho-social model of functioning, disability and health

The ICF classification corresponds to the components of the model. Within each component, there is an exhaustive list of categories that serve as the units of the classification. ICF categories are denoted by unique alphanumeric codes and are hierarchically organised in chapter, second, third and fourth levels. When going from the chapter level to the fourth level, the category's definition becomes more detailed.

The classification also comprises so-called ICF qualifiers, which quantify the extent of a problem experienced by a person in a specific ICF category. Since environmental factors can also be facilitators, the ICF qualifier for facilitators are indicated with a plus sign.

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)

ICF Core Sets

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. The first step toward providing ICF-based tools for clinical practice was the development of ICF Core Sets. ICF Core Sets are shortlists of ICF categories that are considered to be most relevant for describing persons with a specific health condition or in a particular setting. In a rehabilitation setting an ICF Core Set can help guide the rehabilitation management process. ICF Core Sets have been developed for several health conditions e.g. for spinal cord injury, health condition groups e.g. for neurological conditions and for various settings. ICF Core Sets can serve as a basis when using the **ICF-based documentation tools** that follow the **Rehab-Cycle®**.

Rehab-Cycle® and Corresponding ICF-based Documentation Tools

The Rehab-Cycle® is one approach that reflects the structured processes inherent in multidisciplinary rehabilitation management. The Rehab-Cycle® consists of an assessment phase, assignment phase, intervention phase and evaluation phase. An ICF-based documentation tool has been developed to guide each of the Rehab-Cycle® phases: the ICF Assessment Sheet, the ICF Categorical Profile, ICF Intervention Table and ICF Evaluation Display. These tools can help a multidisciplinary rehabilitation team to better understand the role of functioning within the rehabilitation process and to more comprehensively describe a person's functioning - hence support ICF-based rehabilitation management.

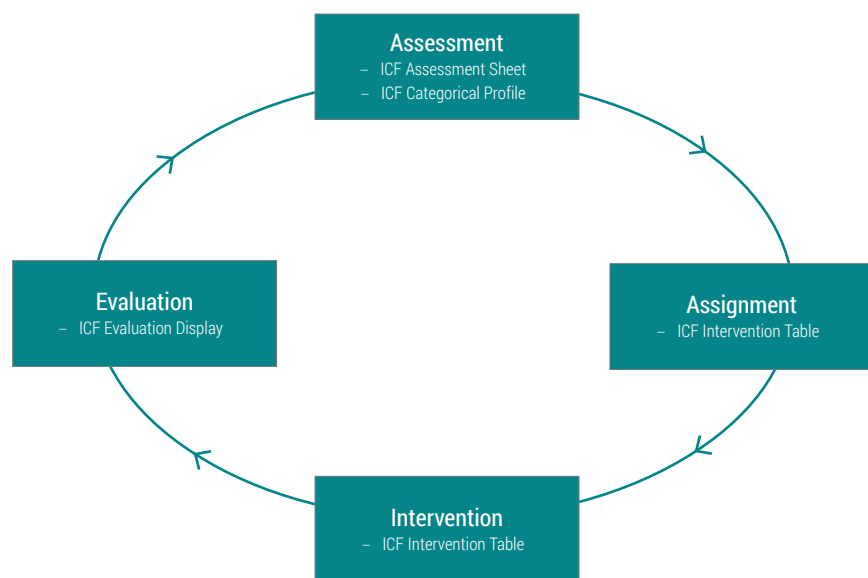


Figure 2: Rehab-Cycle®

You can find more detailed information about SCI, the ICF, ICF Core Sets, the Rehab-Cycle® and the ICF-based documentation tools on the website www.icf-casestudies.org.

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General Introduction



The World Health Organization (WHO) estimates that 80 percent of people with disabilities live in developing countries. In fact disability rates are proportionally higher in lower than in higher-resource countries.^{1,2}

A vicious cycle seems to exist between poverty and disability – poor people are more likely to experience disability and in turn, persons with disability have an increased risk of sliding into poverty.^{3,4} Regardless of the country or region, a relationship between poverty and poor health conditions, high costs of healthcare and a reduced capacity to earn a living can be found.^{5,6}

“Across the world, people with disabilities have poorer health outcomes, ... and higher rates of poverty than people without disabilities.”

Dr. Margaret Chan, Director-General of the World Health Organization (WHO) and Robert B. Zoellick, President of the World Bank Group⁵

A Call For Access to Quality and Comprehensive Healthcare

The eradication of poverty related to disability, access to affordable healthcare and the promotion of employment opportunities are among the many issues addressed in the United Nation's **Convention on the Rights of Persons with Disabilities** (or “the Convention” from now on).⁷ The Convention outlines a range of basic rights for people with disabilities, and promotes the establishment of national legislation and policies that strive to meet the objectives of the Convention and

to protect the rights of persons with disability.^{1,6,7} Thailand's **Persons with Disabilities Empowerment Act of 2007** is one example of national legislation that modified existing disability legislation to satisfy the objectives of the Convention better. With this legislation, Thailand took the first steps toward improving the lives of persons with disability in Thailand.⁶ To support and facilitate the efforts of countries, especially low and middle-resource countries like Thailand, toward

implementing the Convention, WHO endorsed the recommendations put forth by the **World Report on Disability⁵** and detailed in the **Global Disability Action Plan 2014-2021.²** In these documents,

WHO recognises the continued need for better access to quality and comprehensive healthcare and rehabilitation services, especially in low and middle-resource countries.

“WHO recognises the continued need for better access to quality and comprehensive healthcare and rehabilitation services, especially in low and middle-resource countries.”

Consistent with the higher disability rates in low/middle-resource, there are more barriers to accessing quality and comprehensive healthcare and rehabilitation services in low and

middle-resource countries than in high-resource countries.^{1,2,4,5} This disparity is clearly shown in the situation of persons living with spinal cord injury in low and middle-resource countries.⁸

SCI in Low and Middle-Resource Countries

Spinal cord injury (SCI) affects individuals around the world, impacting families and societies.⁸ Unfortunately, no established national SCI registry exists in low and middle-resource (developing) countries. Moreover, there is limited epidemiological data on SCI in low and middle-resource countries.^{8,9,10} However, a recent systematic literature review of 64 studies from 28 low and middle-resource countries revealed that a large majority of persons with SCI are male, paraplegia is more common than tetraplegia, complete SCI is more frequent than incomplete SCI. In addition, the leading cause of SCI in low and middle-resource countries are motor vehicle accidents and falls. Interestingly, pressure ulcers and urinary tract infections seem to be the most common secondary complications in both low and middle-resource as well as in high-resource countries. Due to the varied reporting and data

collection methods in the studies, the authors of this systematic literature review considered the results as preliminary, warranting future studies that follow a standard reporting and data collection protocol.⁹

In most low and middle-resource countries pre-hospital management i.e. first aid at the injury site and transport to the hospital is generally inadequate. While ambulatory care services are available in major cities only, transport to the next healthcare facility is often done with unsuitable means, such as auto rickshaws, carts, jeeps or animals. Moreover, first responders in rural areas are often persons with no first aid training. Thus, appropriate spinal immobilisation is normally not implemented. This may be the reason that complete SCI is more common than incomplete SCI in low and middle-resource countries.¹¹

“...[there is a] lack of healthcare facilities in low and middle-resource countries that offer specialised care for persons with SCI...”

Due to a lack of healthcare facilities in low and middle-resource countries that offer specialised care for persons with SCI, most SCI cases are managed in the neurosurgical, orthopaedic or general surgical wards. In addition, the number of health professionals with training in rehabilitation medicine or SCI management is still quite low. Consequently, rehabilitation is limited to addressing mobility issues, such as providing gait training and use of gait aids. Essentials of

comprehensive rehabilitation such as bladder and bowel management training, psychological interventions, skin care, vocational rehabilitation, etc. are often not addressed.¹¹ This has an impact on the fulfilment of rehabilitation's ultimate goal i.e. the optimisation of functioning, including community reintegration, and minimisation of a person's experience of disability. With this goal in mind, rehabilitation interventions should be comprehensive, multisectorial and multidisciplinary.^{5,12}

Rehabilitation for Persons with SCI from a Human Rights Perspective

Article 26 of the Convention underscores this comprehensive, multisectorial and multidisciplinary approach to rehabilitation by calling on countries to “take effective and appropriate measures, including through peer support, to enable persons with disabilities to attain and maintain maximum independence, full physical, mental, social and

vocational ability, and full inclusion and participation in all aspects of life...” and “...shall organize, strengthen and extend comprehensive... rehabilitation services and programmes, particularly in the areas of health, employment, education and social services...”⁷

“...take effective and appropriate measures, including through peer support,...rehabilitation services and programmes, particularly in the areas of health, employment, education and social services...”

Irrespective of the economic and socio-cultural situation in a country, healthcare and rehabilitation systems for persons with SCI should ensure the following:⁸

- Prompt access to specialised care after injury or onset of SCI
- Access to rehabilitation provided on a continuum from an inpatient to a community setting (including follow-up care after discharge from the hospital)
- Access to a range of assistive technologies
- Provision of mainstream and specialised care to address secondary complications of SCI, such as pressure ulcers and urinary tract infections
- Availability of coordinated, integrated and multidisciplinary provision of healthcare/rehabilitation including involvement of persons with SCI and their families
- Education and capacity-building of persons with SCI and their families

Given that employment is a key rehabilitation outcome and elements of successful community reintegration, rehabilitation interventions should also address work participation issues. In high-resource countries, employment rates among persons with SCI is relatively low, between 30-50%. Unfortunately, there is a lack of comparable data on employment of persons with SCI in low and middle-resource countries.^{8,11,13,14,15} In high-resource countries major barriers to employment reported were discrimination by employers, and inaccessibility to and at the workplace i.e.

inaccessible transportation especially in rural areas, and lack of workplace accommodation.^{8,13} These barriers may also be relevant in low and middle-resource countries.^{11,16}

Accessibility is among many challenges faced by persons with SCI living in low and middle-resource countries in transitioning from inpatient hospital or rehabilitation back to the community. One approach to tackle accessibility issues and other challenges is community-based rehabilitation.

Box 1 | Community-Based Rehabilitation

Initially, community-based rehabilitation (CBR) was initiated by WHO to improve the access to rehabilitation services for persons with disability in low and middle-resource countries by optimising the use of local resources. The CBR concept has broadened its scope, and is now a multisectorial strategy to ensure the participation and inclusion of persons with disability in society as well as to improve their quality of life. The current CBR concept is also a concrete demonstration of how the Convention can be implemented.^{3,4,7}

With emphasis on human rights and active involvement of persons with disability, CBR is implemented through the concerted efforts of various stakeholders including persons with disability, their families, organisations at the national, regional and local level, and governmental as well as non-governmental entities that provide health, educational, vocational, social and other services.^{3,4}

WHO proposes that CBR programmes are developed and strengthened according to a four-stage management cycle and planned following a structured logical framework.⁴

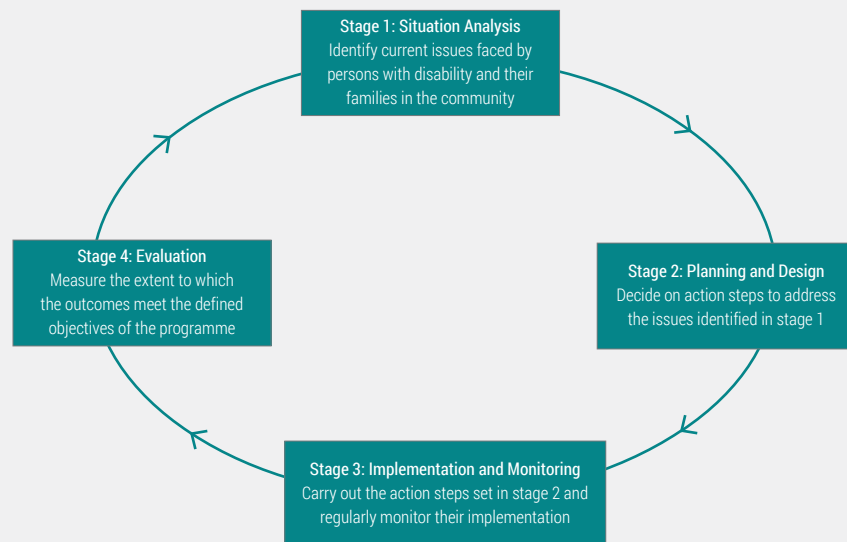


Figure 1. Management Cycle for CBR

The structured logical framework requires that CBR programmes:

- determine the goals that the programme wants to achieve
- state the purpose for which the programme is designed
- define the activities and outcomes that are expected to meet these goals
- set concrete indicators that will determine whether the goals were achieved
- determine the means for verifying goal attainment
- identify potential problems and risks that may occur in the implementation of the programme

CBR and the ICF

In WHO's International Classification of Functioning, Disability and Health (ICF) functioning and disability are presented as the human experience related to the dynamic interaction between the health condition, body functions and structures, activities and participation, personal and environmental factors.¹⁷ Of special relevance to CBR are the ICF categories related to participation in

major life activities, community, social and civic life, as well as the environmental factors. For this reason, the ICF is an ideal framework for conceptualising CBR programmes, and can be used in comprehensive rehabilitation management. The ICF also encourages the involvement of the person with disability in the rehabilitation process.¹⁸

A Case Study of SCI in Thailand

One of the first Asian countries to ratify the Convention,^{6,7} Thailand, a middle-income country,¹⁹ has made strides in improving the lived experience of persons with disability through legislation and community-based programmes. Despite this, the situation of persons with disability living in rural

areas of Thailand has not shown much improvement.⁶ This case study of Mr. Dee will illustrate some of the challenges, including the realities faced in returning to a rural community, as well as the potential of comprehensive rehabilitation for persons with SCI in Thailand.

Box 2 | Disability in Thailand

According to the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) – data derived from the 2007 national disability survey, the national census and the database of the National Office for Empowerment of Persons with Disabilities – 2.9% of the total population in Thailand or 1,900,000 persons have a disability. These numbers were based on the definition of disability that reflects the ICF.²⁰

Persons with disabilities are considered those who are limited in their ability to perform daily activities or to fully participate in society due to visual, hearing, mobility,

communication, mental, emotional, behavioural, intellectual, learning and/or other impairments. The Ministry of Social Development and Human Security has further elaborated the types of disabilities and the criteria for determining disability.²⁰

Persons with disability tend to come from rural areas, and an increasing gap between rural and urban areas with regards to poverty and social inclusion is becoming more apparent.⁶ The majority of low-income people living in rural areas in the world are dependent on agriculture.²¹

Mr. Dee's Story



Mr. Dee, a 41-year old farmer, lived and worked in a rural area of Northern Thailand. A fall resulted in a spinal cord injury (SCI) that had a drastic impact on his life and livelihood.

"Earning an income is really important for me and for my family. Being a farmer, I'm very worried about making enough money in the future to support us all. I need to regain enough ability to continue working..."

Mr. Dee

Mr. Dee had spent all his life in a small, rural village. While he had some formal education, he had never completed his studies and instead learned the farming trade as a teenager. At 41, he still farmed, growing mangos and other fruit seasonally for his main source of income. Additionally, he worked as a local manual laborer in the

dry season to supplement his income to support his wife and daughter. This extra income enabled Mr. Dee's daughter to attend university, working towards a degree in business.

As is common in Southeast Asia where heavy rains are frequent, Mr. Dee and his family lived in a small house which was elevated on bamboo stilts to accommodate rising water levels. A pit toilet was situated about 20 metres away. As this case study will show, the architectural set-up of Mr. Dee's housing posed accessibility implications for his community reintegration planning.

Mr. Dee's Accident

Walking in the local mountain range, Mr. Dee suddenly fell and roughly tumbled a short distance down an incline. The fall resulted in immediate paralysis with no sensitivity in his extremities.

"In such remote locations no emergency services are available."

In such remote locations no emergency services are available. Luckily, four friends of Mr. Dee were able to transport him down the mountain utilising a blanket as a gurney. In a friend's car Mr. Dee was driven to a regional hospital as quickly as possible. Unfortunately, the hospital was unable to treat injuries like Mr. Dee's. The nearest hospital able to surgically treat SCIs was 300 kilometres away at a university in Chiang Mai Province. Subsequently, Mr. Dee was transported by ambulance to the specialty unit at that hospital.

Upon admission, Mr. Dee was diagnosed with a traumatic disc herniation at C5-C6 and a spinal cord contusion at C3-C4,²² American Spinal Injury Association (ASIA) Impairment Scale Grade C. This meant that he had motor function at the level of the elbow

and below, and that he was able to actively move more than 50% of key muscles in that body region with full range of motion but not against gravity.

The medical team in the specialty unit decided to perform spinal surgery where his 5th and 6th vertebrae were plated, and after the surgery Mr. Dee was fitted with a soft collar. Post-surgery treatment two weeks after the accident proceeded without complications, and he was referred to an early post-acute unit within the hospital.

Since healthcare in Thailand is provided for free by a government insurance programme, the Dee family fortunately did not have to worry about covering healthcare expenses.²³

Box 3 | Healthcare in Thailand

Thailand has universal healthcare coverage (UHC) that offers access to healthcare to its entire population, considerably reducing coverage inequalities. Given that UHC in Thailand is supported by strong political leadership and citizen demand, efforts are now focused on improving financial sustainability and quality of services.²⁴

Factors that impact on improving the quality of services include the capacity to deliver health services and the availability of a qualified health workforce. The shortage of health professionals is a global issue.²⁴ To tackle this workforce shortage Thailand employed several strategies, such as establishing mid-level training programmes (to train for example

multi-purpose or profession-specific assistants who provide services under supervision), and recruiting and training persons from the local community, especially in rural and remote areas. Another strategy employed was community-based rehabilitation group meetings that facilitated the collaboration between persons with disability, their families, and community members to manage rehabilitation problems.⁵

These and other measures employed in Thailand seem to have made a difference. In 2001 the United Nations Development Programme (UNDP) Report indicated that there were 24 physicians for every 100'000 people.²⁵ In the 2014 UNDP Report, this number increased i.e. 30 physicians for every 100'000 people.²¹

At admission in the early post-acute rehabilitation unit a six-week Rehab-Cycle® was planned. In order to establish a more accurate prognosis for rehabilitation

success, to define goals and determine the appropriate interventions, a comprehensive assessment of Mr. Dee's functioning status was required.

Assessment



Mr. Dee and the rehabilitation team began the assessment of his functioning status by identifying problems and needs as seen from his own perspective as well as from the perspective of the health professionals on his rehabilitation team. For the health professionals' perspective, a list of ICF categories was used as a guide.

The Start of the Rehab-Cycle®

At the time of the initial assessment that took place two weeks following the accident, Mr. Dee's rehabilitation team found decreased joint mobility in his ankles, severe spasticity in the lower extremities and severely reduced muscle power functions in his legs, arms and trunk. As a result, he showed reduced involuntary movement reactions. In addition, Mr. Dee's touch functions were impaired in the area below his level of injury. Besides the sensory problems, Mr. Dee was unable to control his urination and defecation at all.

With regard to activities and participation, the rehabilitation team found **severe and complete problems in changing and maintaining body positions, in transferring, fine hand use, and accordingly, in the execution of many activities**

of daily living that required some level of mobility capacity, such as self-care.

The spinal cord independence measure (SCIM)²⁶ was used to rate Mr. Dee's level of independence in specific daily activities. His overall SCIM score at admission was very low, characterised by extremely low scores for example in self-care, transferring and mobility outdoors for which Mr. Dee required total assistance. See *"Table 1: Spinal Cord Independence Measure (SCIM) 2 weeks after the accident" on page 31 at the end of this booklet.*

The team also recognised the importance of both remunerative employment and Mr. Dee's overall reintegration into his community.

Functioning Status from Mr. Dee's Perspective

The rehabilitation team's assessment results were also reflected in statements made by Mr. Dee himself.

Mr. Dee characterised aspects of his body functions as "not working like normal". He indicated a lack of control over his hands and legs, **struggling with spasticity** that increased after exercise. Mr. Dee stated that the spasticity in his hands made grasping objects difficult, and activities like washing himself and walking were also negatively impacted by spasticity. Moreover, Mr. Dee

experienced decreased sensations and sometimes numbness in his hands and legs.

The **problems he was experiencing worried him, particularly with regard to his ability to return to work.** Mr. Dee had concerns about the "strength of his spine" and whether it would support the physical demands that farming required. He foresaw the challenges that returning to his pre-injury job would present and worried about being able to earn an income after leaving the hospital.

Drawing a Picture on Contextual Factors

The interviews with Mr. Dee also revealed information about environmental and personal factors that influenced Mr. Dee's functioning. At admission, Mr. Dee was completely dependent on his wife for all aspects of care. Family support proved to be important at a later stage of rehabilitation.

In talking with Mr. Dee, a number of **barriers, primarily related to accessibility in and around his pre-injury home, came to light.** For example, Mr. Dee's house was built on stilts and was surrounded by uneven ground, and the pit toilet was located 20 metres from his house. Other barriers included his **limited financial resources, lack of assistive devices available to him, and the physical demands of his job as a farmer.**

However, there were also contextual factors that later facilitated rehabilitation and community

reintegration – **a supportive wife and family, an educated daughter, and access to healthcare.** Mr. Dee also indicated that he accepted his situation.

Mr. Dee's statements about his functioning status as well as the results of the rehabilitation team assessment findings were documented on the **ICF Assessment Sheet**, an overview of the statements and assessment results structured according to the components of the International Classification of Functioning, Disability and Health (ICF) – body functions and structures, activities and participation, environmental and personal factors. See *"Table 2: ICF Assessment Sheet" on page 32 at the end of this booklet.* The documented information served as the basis for creating an ICF Categorical Profile.

Goal-setting/Determination of Intervention Targets



In consideration of the assessment results documented on the ICF Assessment Sheet, an ICF functioning profile for Mr. Dee was developed. The ICF Categorical Profile enabled Mr. Dee and his rehabilitation team to visualise the assessment results and indicate the long-term and short-term goals.

Mr. Dee's Functioning and Rehabilitation Goals At-a-Glance

In creating Mr. Dee's **ICF Categorical Profile**, selected ICF categories were rated using ICF qualifiers. To help compare his functioning at the initial assessment and at a later time point, ICF qualifiers were also used to indicate the goal value i.e. the ICF qualifier that was intended to be reached after the intervention phase.

On Mr. Dee's ICF Categorical Profile the long-term and short-term goals that he and his rehabilitation team set for this six-week Rehab-Cycle® were listed. Mr. Dee and his rehabilitation team defined as an overall long-term goal or so-called **global goal** 'economic self-sufficiency'. As a more immediate service-program goal to be achieved in this particular Rehab-Cycle® they mutually decided on 'independence in daily living'. As a "stepping stone" toward reaching the **service-program goal**, three short-term **cycle goals** were also set:

1. Prevention of secondary complications – to ensure his overall health
2. Independence in mobility – to address his limitations in walking and transferring
3. Independence in self-care – to address the limitations in washing himself and taking care of basic needs like eating and drinking

Although **Mr. Dee experienced no secondary complications at the time of the assessment**, the rehabilitation team felt that setting cycle goal 1 'prevention of secondary complications' was necessary. Since people with spinal cord injury (SCI) are at high risk for developing secondary complications, such as pressure ulcers and urinary tract infections,⁸ Mr. Dee's rehabilitation team aimed to prevent these as best as possible during rehabilitation. Thus the goal value "0" or no problem was set.

"...people with spinal cord injury (SCI) are at high risk for developing secondary complications..."

Cycle goals 2 and 3 presented greater challenges, as these were assessed as "4" or complete problem. The rehabilitation team had hoped to reduce problems in body functions e.g. muscle power in all limbs and muscle tone functions (spasticity) that contributed to limitations in mobility e.g. changing basic body positions, transferring oneself, fine

hand use, and walking. Through interventions they aimed to improve mobility from a rating of "4" on the respective ICF categories to a rating of "2" or moderate problem at the end of the Rehab-Cycle®. See *"Table 3: ICF Categorical Profile" on page 34 at the end of this booklet.*

Determination of Intervention Targets

To structure and optimise the utility of goal-setting, intervention targets can be determined. **Intervention targets** are ICF categories (and personal factors) that correspond to any of the cycle goals, the service-program goal and/or global goal and are intended to be addressed with specific interventions.

For example, Mr. Dee and rehabilitation team defined as intervention targets for cycle goal 1 'prevention of secondary complications' the following:

- b525 Defecation functions, b620 Urination functions to prevent secondary complications related to urination and defecation
- b810 Protective functions of the skin to prevent pressure ulcers and ensure skin integrity
- b710 Mobility of joint functions to prevent mobility-related secondary complications, such as joint contractures

For cycle goal 1 in general is d570 Looking after one's health also relevant. For this reason, this ICF category was also seen as contributory to meeting cycle goal 1.

To help achieve cycle goal 2 'independence in mobility', body functions e.g. b7304 Power of muscles of all limbs, b755 Involuntary movement reaction functions, and b770 Gait pattern functions, and well as activities and participation categories e.g. d410 Changing basic body positions, d420 transferring oneself, d450 Walking, and d465 Moving around using equipment, were identified as intervention targets. Environmental factors, such as diverse assistive devices including a walker, were also considered important to target with interventions.

One very important intervention target that Mr. Dee and his rehabilitation team had set was b735 Muscle tone functions; this was related to the spasticity that Mr. Dee experienced. Not only did spasticity negatively impact various aspects of mobility, it also made the execution of self-care tasks difficult.

In addition to b735 Muscle tone functions (for spasticity), intervention targets such as d510 Washing oneself, d530 Toileting, d540 Dressing, d550 Eating, etc. were also defined to address cycle goal 3 'independence in self-care'. See *"Table 3: ICF Categorical Profile" on page 34 at the end of this booklet.*

Assignment and Intervention



Every intervention target that was determined during the assessment phase was allocated to corresponding member(s) of the rehabilitation team during the assignment phase of the Rehab-Cycle®. The respective team member was responsible for addressing the intervention targets with specific interventions during the intervention phase.

Assignment

The assignment of the intervention targets to the members of Mr. Dee's rehabilitation team – physician, nurse, physical (PT) and occupational (OT) therapists, and social worker – was documented on the **ICF Intervention Table**. This table provides an overview of all the intervention targets, the interventions themselves, and the responsible

rehabilitation team members. See “Table 4: ICF Intervention Table” on page 36 at the end of this booklet. The ICF Intervention Table can be used by the team in planning and implementing the appropriate interventions for each intervention target. Having such an overview can help avoid gaps and redundancy in service provision.

Interventions

Some of Mr. Dee's intervention targets were assigned to more than one rehabilitation team member. For example, b735 Muscle tone functions was assigned not only to the physician but also to both the PT and the OT. This made sense since this intervention target related to spasticity

is ideally addressed from different perspectives. While the physician focused on the medical aspects of spasticity by prescribing medication and monitoring its effect, the PT and OT dealt predominately with the physiological and movement aspects of spasticity. In Mr. Dee's case,

both the PT and OT provided interventions with stretching and passive movement. However, the

PT attended to the lower body, while the OT to the upper body.

“While the physician focused on the medical aspects of spasticity by prescribing medication and monitoring its effect, the PT and OT dealt predominately with the physiological and movement aspects of spasticity.”

The **interventions for improving independence in self-care and for prevention of secondary complications were primarily undertaken by Mr. Dee's physician and nurse.** Regular urine analyses and occasional sterile catheterisation (to empty the bladder) were conducted to compensate for the lack of control over b620 Urination functions. As previously mentioned, medication was also administered to influence the increased muscle tone in the lower extremity. Through one-on-one training, the nurse helped Mr. Dee with improving his execution of self-care activities, such as d510 Washing oneself, d520 Caring for body parts, d540 Dressing, as well as instructed him on strategies for looking after his health (d570) including preventing complications. Moreover, the nurse involved Mr. Dee's wife during some of the self-care training sessions in order to strengthen the skills she needed to care for Mr. Dee at home.

In addition to the interventions provided by the nurse to prevent complications, all the members of the rehabilitation team took steps to educate Mr. Dee and his wife about spinal cord injury (SCI). Expanding Mr. Dee and his wife's knowledge about SCI was also intended to increase their awareness about possible implications of SCI on their lives.

Mr. Dee's PT and OT incorporated interventions primarily aimed at improving mobility. Some interventions were provided by both the PT and OT. For example, stretching, passive and active range of motion (ROM) exercises, and

strengthening exercises were implemented to improve b710 Mobility of joint functions, b7304 Power of muscles of all limbs, and b735 Muscle tone functions. Some interventions related to mobility were provided solely by the PT e.g. progressive gait training to improve b770 Gait pattern functions or walking with an assistive walker (d465 Moving around using equipment). The interventions provided solely by the OT focused on increasing independence in d430 Lifting and carrying objects, d440 Fine hand use and d445 Hand and arm use e.g. adaptation and use of assistive devices. Related to the mobility of the hands and fingers, the OT also incorporated the adaptation of assistive devices to improve Mr. Dee's writing skills (d345 Writing).

A social worker complemented the rehabilitation team by counselling Mr. Dee on available health services and the healthcare policies that were relevant to his rehabilitation and subsequent community reintegration. The intervention provided by the social worker was only indicated on Mr. Dee's ICF Intervention Table, but not assessed nor indicated on the ICF Categorical Profile or the ICF Evaluation Display.

All of these interventions were performed in a rehabilitation setting with limited financial resources. For instance, expensive rehabilitation equipment such as a locomat, a therapeutic swimming pool, and gymnasium were not available. However, the professional and well-trained staff were knowledgeable and resourceful in

applying available rehabilitation approaches and techniques that compensated for the inadequacies in infrastructure and equipment. For example, the PT used a hand crank to improve muscle

power and a stationary bed for practicing how to optimally change basic body positions, and the OT employed simple, fairly inexpensive devices to train fine hand function, and hand and arm use.

“...the professional and well-trained staff were knowledgeable and resourceful in applying available rehabilitation approaches and techniques that compensated for the inadequacies in infrastructure and equipment.”

The status of Mr. Dee's functioning, as represented by the intervention targets, were evaluated again at the end of the six-week Rehab-Cycle®. The results of the second evaluation are denoted

by the final value on the ICF Intervention Table. This final value was also documented as a bar-chart on the ICF Evaluation Display.

Evaluation



After about six weeks of rehabilitative interventions, Mr. Dee's functioning was re-evaluated to see how well he had progressed.

The evaluation revealed that Mr. Dee improved greatly in both motor functions and sensitivity in the hands, arms, and legs, changing his American Spinal Injury Association (ASIA) impairment scale grade from C to D. The main change was that before the intervention phase Mr. Dee's active movement and full range of motion (ROM) was not possible against gravity; after intervention he was able to move more than 50% of key muscles below the neurological level of injury against gravity and even with moderate resistance. These improvements also translated to increased Spinal Cord Independence Measure (SCIM) scores,²⁶ going from a score of 21 (see table 1) to 72 out of 100 (see “Table 5: Spinal Cord Independence Measure (SCIM) 8 weeks after the accident” on page 39 at the end of this booklet).

Better self-care, respiration, bladder and bowel management, and overall mobility were also evident. Areas that showed only slight improvements were Mr. Dee's ability to climb stairs and

transferring skills. Spasticity also remained problematic. The spasticity negatively impacted Mr. Dee's walking ability significantly, consequently increasing his risk of falling. As a result he had to continue using an assistive walker to support him while walking. Nevertheless, **all of the cycle goals Mr. Dee and his rehabilitation team set were achieved.** In fact, his self-care abilities even exceeded expectations – considerable improvements in hand and arm functions and fine hand use enabled him to perform all of the self-care activities independently, even if time-intensive. This meant that Mr. Dee no longer needed his wife's assistance for self-care.

The results of the second evaluation were documented on the ICF Evaluation Display. The **ICF Evaluation Display** is a visual depiction of the change between Mr. Dee's functioning status before and after intervention, showing whether the goal values set for each intervention target

were reached. See “Table 6: ICF Evaluation Display” on page 40 at the end of this booklet.

Regarding Mr. Dee's prognosis, his physical therapist (PT) offered a final thought:

“Mr. Dee's strength has improved greatly, and he should be able to walk independently with an assistive walker – at least for short distances. His arm and hand functions may also still improve. A problem that will remain is that he will no longer be able to work as a farmer.”

Challenges in Reintegrating into the Community

Despite significant advances in various aspects of functioning, Mr. Dee faced significant challenges especially in reintegrating into his community.

For example, there were a number of issues related to accessibility. Mr. Dee's house was built on stilts with no stairs or any other structure to enable him to enter and exit independently. The rehabilitation team recommended that stairs be built to facilitate access. Unfortunately, Mr. Dee was responsible for covering the cost of building the stairs, since financial resources for such modifications were not available. Another accessibility issue that posed a challenge for Mr. Dee's community reintegration was related to toileting – the toilet was located 20 metres from the house. The rehabilitation team recommended constructing a portable toilet consisting of a plastic chair and pail that Mr. Dee would be able to also use at night.

Issues that were still unresolved at end of the Rehab-Cycle® were Mr. Dee's employment

situation and ability to support his family financially. Given the limitations Mr. Dee continued to experience the end of rehabilitation, returning to work as a farmer was unlikely. Unfortunately, with his level of education, his return-to-work options were also limited. The rehabilitation team had hoped that Mr. Dee would be eligible for state disability funds. However, the team social worker informed Mr. Dee that the disability resulting from his injury may not be covered by the state disability fund system. At the end of Rehab-Cycle®, Mr. Dee returned home anticipating that once his daughter completed her studies, her future income could be used to support the family.

“In general, in the rural areas of Thailand, money may not play the most important role. Family support and subsistence farming often make up for where there is a lack of financial resources.”

Mr. Dee's PT

Discussion



The case study of Mr. Dee highlights some strengths and limitations of spinal cord injury (SCI) rehabilitation in low and middle-resource countries.

Where Does Rehabilitation Start and End?

The amelioration of Mr. Dee's motor and sensory status as well as functioning after rehabilitation supports the findings of a study²⁷ that demonstrated similar neurological outcomes of persons with SCI treated in a hospital in Brazil, a low/middle-resource country, compared with patients in a hospital in the United Kingdom, a high resource country. Mr. Dee's progress was most likely a reflection of better healthcare services that resulted from the implementation of universal healthcare coverage in Thailand^{23,24} as well as Thailand's Persons with Disabilities Empowerment Act of 2007.⁶ Universal healthcare coverage and the disability legislation have facilitated the expansion of healthcare infrastructure and the efforts to improve access to quality healthcare services, and helped to build up the healthcare workforce as well as increase .

While access to quality healthcare services, the type and level of Mr. Dee's injury, and a rehabilitation team that was skilled in the treatment and rehabilitation of persons with SCI collectively contributed to his positive recovery, there were drawbacks to his rehabilitation programme, since it focused solely on the recovery of body functions, mobility and self-care rather than offering a more comprehensive strategy that also addressed community reintegration needs. Implementing a limited rather than a comprehensive rehabilitation strategy is not uncommon in low and middle-resource countries.¹¹ This discord between focused versus comprehensive rehabilitation became clear at the end of Mr. Dee's Rehab-Cycle® when unresolved issues regarding return-to-work and financial support for his and his family's livelihood were revealed. Although Mr. Dee was explicit during the assessment phase of his rehabilitation program about his concerns

regarding his options for earning an income, specific interventions toward community reintegration were not provided.

Mr. Dee's community reintegration could have been supported through a community-based rehabilitation (CBR) programme in his community. See box 1. CBR has shown great potential in supporting persons with SCI in low/middle-resource settings,

specifically in promoting empowerment and participation through social networks, peer groups and disabled people's organisations, in enabling access to assistive technology and social activities such as sport, etc.⁸ Unfortunately, the reach of such CBR programmes is still limited, and in Mr. Dee's rural and remote region of Thailand, CBR was neither available nor planned.

"CBR has shown great potential in supporting persons with SCI in low/middle-resource settings, specifically in promoting empowerment and participation..."

Poor Prospects for Community Reintegration?

Given Mr. Dee's specific circumstances – age, low educational level, physically demanding profession, living in rural community, etc. – the functional gains he made during rehabilitation were unlikely to improve his chances of returning to

his pre-injury job as a farmer. This left his future uncertain with many open questions – Would he be able to earn an income? Would state social services consider him eligible for disability payments to cover his family's financial needs?

"Given Mr. Dee's specific circumstances...the functional gains he made during rehabilitation were unlikely to improve his chances of returning to his pre-injury job as a farmer."

Given the importance of employment for both financial security as well as overall well-being and life satisfaction, it is recommended that comprehensive rehabilitation includes a vocational rehabilitation component, that also addresses accessibility issues, along with other psychosocial interventions targeted toward community reintegration.^{13,14,15,28}

Mr. Dee's case was not without hope. After discharge from the rehabilitation programme, his family played a major role in supporting his return home. His daughter completed her education and

was expected to support the family financially. The continued support provided by Mr. Dee's wife was also a positive factor in his community reintegration, including but not limited to promoting Mr. Dee's emotional well-being. The role of Mr. Dee's family in facilitating community reintegration is a confirmation of the results of a study that found social supports a key predictor of community participation in persons with SCI in Thailand.¹⁶ It also reflects the expectation in Thai society that family, friends and even neighbours provide assistance to persons with disability in all aspects of daily life.²⁸

An Illustration of SCI Rehabilitation in Low and Middle-Resource Countries

An example of SCI rehabilitation in low and middle-resource countries, Mr. Dee's case illustrates the potential for recovery as well as the challenges faced by persons with SCI engaged in rehabilitation, especially in returning to a rural community.

Using the framework of the International Classification of Functioning, Disability and Health (ICF)¹⁷ and the Rehab-Cycle[®] Mr. Dee's case outlined some factors that were shown to facilitate rehabilitation success e.g. access to a rehabilitation team trained and knowledgeable in

treating persons with SCI, coverage for rehabilitation services, a supportive family, etc., as well as some barriers e.g. lack of rehabilitation interventions that address community reintegration, accessibility issues especially in rural regions. It also highlighted the need for comprehensive rehabilitation that goes beyond the short-term focus on recovering body functions, and the importance of exploring avenues of sustainable, long-term community reintegration through innovative and cost-effective approaches.

Annex

- *Table 1: Spinal Cord Independence Measure (SCIM) 2 weeks after the accident*
- *Table 2: ICF Assessment Sheet*
- *Table 3: ICF Categorical Profile*
- *Table 4: ICF Intervention Table*
- *Table 5: Spinal Cord Independence Measure (SCIM) 8 weeks after the accident*
- *Table 6: ICF Evaluation Display*
- *Literature*
- *Questions*

Table 1: Spinal Cord Independence Measure (SCIM) 2 weeks after the accident

Spinal Cord Independence Measure (SCIM)		
		2 weeks after accident
Self-Care	Feeding	0
	Bathing	0
	Dressing	0
	Grooming	0
	Sub-score	0
Respiration and sphincter management	Respiration	10
	Sphincter management-bladder	3
	Sphincter management-bowel	5
	Use of toilet	0
	Sub-score	18
Mobility in room and toilet	Motion in bed and sore prevention	1
	Transfers: bed-wheelchair	0
	Transfers: wheelchair-toilet-tub	0
	Sub-score	1
Mobility indoors and outdoors	Mobility indoors	1
	Mobility for moderate distances	1
	Mobility outdoors	0
	Stair management	0
	Transfer: wheelchair-car	0
	Sub-score	2
Total score		21

Table 1: Spinal Cord Independence Measure (SCIM) scores for Mr. Dee 2 weeks after the accident

Table 2: ICF Assessment Sheet

ICF Assessment Sheet			
Patient Perspective	Body Functions & Structures	Activities & Participation	
	- My hands and legs, especially the left leg, do not work normally - I have decreased sensation in my hands and legs, sometimes even numbness - I can't control the movements of my knees - I have spasticity in my hands and legs, which increases after exercise - My bladder and bowels do not work normally - I am worried about my spine; it might not be stable enough for hard physical work	- Due to the spasticity, I can't grasp things as I would like to - I can't walk as I would like to - I have problems washing myself due to spasticity in my hands - I can't brush my teeth - I would like to return to work, but this will be difficult - I don't know how I will earn money to support my family in the future - I read and watch television when I feel stressed out	
Health Professional Perspective	- Touch functions – moderately impaired - Defecation functions – completely impaired - Urination functions – completely impaired - No problems in mobility of joint functions - Muscle power functions – severely impaired - Muscle tone functions – severely impaired - Involuntary movement reaction functions – moderately impaired - Control of voluntary movements – severely impaired - Gait pattern functions – completely impaired - No problems in protection functions of the skin	- Complete difficulty in the following items: - Walking - Changing a basic body position - Maintaining a body position - Transferring oneself - Fine hand use - Hand and arm use - Walking - Moving around using equipment - Washing oneself - Caring for body parts - Toileting - Dressing - Eating - Drinking - Remunerative employment - Economic self-sufficiency - Community life	
		Environmental Factors	Personal Factors
		- Living in a house with a high step at the entrance, flat toilet seat and uneven ground - Has no assistive devices - Has support from wife and family - Has support from health professionals - Has money problems	- Male, 41 years old - Married, has one daughter - Farmer (seasonal), temporary employee (out of season) - Somewhat accepts his situation

Table 3: ICF Categorical Profile

ICF Categorical Profile												
Assessment												
Global Goal: Economic self-sufficiency												
Service-Program Goal: Independence in daily living												
Cycle goal 1: Prevention of secondary complications												
Cycle goal 2: Independence in mobility												
Cycle goal 3: Independence in self-care												
ICF categories												
				ICF Qualifier				problem				Goal Relation
												Goal value
				0	1	2	3	4				
b525	Defecation functions											1
b620	Urination functions											2
b710	Mobility of joint functions											0
b7304	Power of muscles of all limbs											2
b735	Muscle tone functions											2
b755	Involuntary movement reaction functions											1
b760	Control of voluntary movements											2
b770	Gait pattern functions											2
b810	Protective functions of the skin											0
d345	Writing											2
d410	Changing basic body positions											2
d4153	Maintaining a sitting position											1
d4154	Maintaining a standing position											2
d420	Transferring oneself											2
d430	Lifting and carrying objects											2
d440	Fine hand use											3
d445	Hand and arm use											2
d450	Walking											2
d465	Moving around using equipment											2
d510	Washing oneself											3
d520	Caring for body parts											2
d530	Toileting											2
d540	Dressing											2
d550	Eating											2
d560	Drinking											2
d570	Looking after one's health											2
e1151	Assistive products and technology for personal use in daily living											2
e1201	Assistive products and technology for personal indoor and outdoor mobility and transportation											2
e310	Immediate family											1, 3
pf	Knowledge about spinal cord injury											SP

Table 3: 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. Goal value refers to the ICF qualifier to achieve after an intervention. Note: This table only displays an excerpt of the ICF Categorical Profile, that is only the categories that are associated with a goal and for which a goal value has been identified (i.e. intervention targets).

Table 4: ICF Intervention Table

ICF Intervention Table										
	Intervention target	Intervention	Doc	Nurse	PT	OT	MS	First value	Goal value	Final value
Body functions/structures	b525	Defecation functions		x				4	0	0
	b620	Urination functions	x	x				4	0	0
		Sterilized intermittent catheterisation		x						
	b710	Stretching, Active assistive range of motion exercises			x	x		0	0	0
		Therapeutic standing			x					
	b7304	Strengthening exercises			x	x		3	2	2
	b735	Medication	x					3	2	2
		Stretching, passive movements			x	x				
	b755	Movement reaction training			x			2	1	1
	b760	Active movement training			x	x		3	2	1
	b770	Progressive gait training			x			4	2	2
	b810	Instruction of patient and possible caregiver(s)	x	x	x			0	0	0
		Daily control of skin		x						
	d345	Adaptation of devices for hand use			x			4	2	1
	d410	Training to change body positions			x	x		4	2	1
	d4153	Body balance training			x	x		4	1	1
	d4154	Body balance training			x			4	2	3
	d420	Transfer training			x	x		4	2	1
	d430	Therapeutic games				x		4	2	1

Activities / Participation	d440	Fine hand use				x		4	3	1
	d445	Hand and arm use				x		4	2	1
	d450	Walking				x		4	2	2
	d465	Moving around using equipment				x		4	2	1
	d510	Washing oneself		x				4	2	1
	d520	Caring for body parts		x				4	2	1
	d530	Toileting		x				4	2	1
	d540	Dressing		x		x		4	2	1
	d550	Eating		x				4	2	0
	d560	Drinking		x				4	2	0
Environmental factors	d570	Looking after one's health		x	x	x		3	2	2
	e1151	Assistive products and technology for personal use in daily living				x		4	2+	1+
	e1201	Assistive products and technology for personal indoor and outdoor mobility and transportation			x			4	2+	2+
	e310	Immediate Family			x	x	x	4+	4+	4+
	e580	Health services, systems and policies					x		Was not assessed	
Personal factors	pf	Knowledge of spinal cord injury (SCI)	x	x	x	x		4	4+	0

Table 4: ICF Intervention Table; Doc = Physician; PT = Physical Therapist; SW = Social Worker. The first value refers to the rating at the initial assessment, the goal value refers to the rating that should be achieved after the intervention, and the final value refers to the actual rating at the second assessment or evaluation. ICF qualifiers were used to determine these ratings (0 = no problem to 4 = complete problem) in the intervention targets. For the intervention targets representing the environmental and personal factors, the plus sign next to the value indicates a facilitator.

Table 5: Spinal Cord Independence Measure (SCIM) 8 weeks after the accident

Spinal Cord Independence Measure (SCIM)			
		2 weeks after accident	8 weeks after accident
Self-Care	Feeding	0	3
	Bathing	0	2
	Dressing	0	2
	Grooming	0	3
	Sub-score	0	10
Respiration and sphincter management	Respiration	10	10
	Sphincter management-bladder	3	15
	Sphincter management-bowel	5	10
	Use of toilet	0	4
	Sub-score	18	39
Mobility in room and toilet	Motion in bed and sore prevention	1	6
	Transfers: bed-wheelchair	0	2
	Transfers: wheelchair-toilet-tub	0	1
	Sub-score	1	9
Mobility indoors and outdoors	Mobility indoors	1	4
	Mobility for moderate distances	1	3
	Mobility outdoors	0	3
	Stair management	0	2
	Transfer: wheelchair-car	0	2
	Sub-score	2	14
Total score		21	72

Table 5: Spinal Cord Independence Measure (SCIM) scores for Mr. Dee 8 weeks after the accident (6 weeks after the start of the Rehab-Cycle®)

Table 6: ICF Evaluation Display

[illegible]

Table 6: 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; Goal value refers to the ICF qualifier to achieve after an intervention; Goal achievement: + means achieved, - means not achieved

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Questions

- Q1. What is the relationship between poverty and disability? *(Refer to page 8 for the answer.)*
- Q2. List the main challenges low and middle-resource countries have in providing healthcare to persons with spinal cord injury (SCI) from onset of injury to community reintegration. *(Refer to page 9 for the answer.)*
- Q3. What factors impact the provision of healthcare services in Thailand? *(Refer to page 15 for the answer.)*
- Q4. Name the contextual factors (facilitators and/or barriers) that influenced Mr. Dee's rehabilitation success and community reintegration. Indicate the corresponding ICF category if available. *(Refer to page 17 for the answer.)*
- Q5. At the initial assessment Mr. Dee stated that being able to earn a living was very important to him. How did he and the rehabilitation team address Mr. Dee's return-to-work needs during rehabilitation? *(Refer to page 24 for the answer.)*

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