

Aus dem Institut für Medizinische Informationsverarbeitung, Biometrie
und Epidemiologie der Ludwig-Maximilians-Universität München

Direktor: Prof. Dr. Ulrich Mansmann

Lehrstuhl für Public Health und Versorgungsforschung

The International Classification of Functioning, Disability and Health (ICF) in nursing: Persons with spinal-cord injury as an example

Dissertation

zum Erwerb des Doktorgrades der Humanbiologie
an der Medizinischen Fakultät der
Ludwig-Maximilians-Universität zu München

vorgelegt von

Christine Boldt
aus Werneck
2013

Mit Genehmigung der Medizinischen Fakultät
der Universität München

Berichterstatlerin: Prof. Dr. Alarcos Cieza, MPH

Mitberichterstatler: Priv. Doz. Dr. Peter Reilich, MA

Mitbetreuung durch den
promovierten Mitarbeiter: -----

Dekan: Prof. Dr. med. Dr. h.c. M. Reiser, FACR, FRCR

Tag der mündlichen Prüfung: 22. Februar 2013

Abbreviations

ICF	International Classification of Functioning, Disability and Health
ICNP 2.0	International Classification for Nursing Practice - Version 2
NANDA-I	North American Nursing Diagnosis Association – International
NANDA-I Taxonomy II	Nursing Diagnoses Taxonomy II by NANDA-I
NIC	Nursing Intervention Classification
NOC	Nursing Outcome Classification
SCI	Spinal-Cord Injury
WHO	World Health Organization

Acknowledgements

I would like to thank Prof. Dr. G. Stucki and M. Brach who were excellent hosts for this project. I would like to express my deepest appreciation and gratefulness to Prof. Dr. A. Cieza supervising and supporting this doctoral thesis. Special thanks go to all researchers, nurses, persons with SCI and all the other persons who made the international Delphi survey and the comparison of both classifications possible. My deepest thankfulness goes to M. Zwicker and my family: Tausend Dank!

“The most important practical lesson that can be given to nurses is to teach them what to observe - how to observe - what symptoms indicate improvement - what the reverse - which are of importance - which are of none - which are the evidence of neglect - and of what kind of neglect.”

Florence Nightingale (1860): Notes on nursing: What it is and what it is not. p. 105.

Content

Zusammenfassung	p. 6
Executive summary	p. 9
1. Introduction	p. 11
1.1. Background	p. 11
1.2. Research objectives	p. 15
1.3. The studies	p. 15
1.4. Conclusions	p. 20
1.5. References	p. 22
2. Research article 1: Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II	p. 25
2.1. Abstract	p. 27
2.2. Summary statement	p. 28
2.3. Introduction	p. 29
2.4. Background	p. 31
2.5. Data sources	p. 33
2.6. Discussion	p. 33
2.7. Conclusions	p. 42
2.8. Acknowledgement	p. 42
2.9. References	p. 43
2.10. Figures and tables	p. 46
3. Research article 2: Nurses' intervention goal categories for persons with spinal-cord injury based on the International Classification of Functioning, Disability and Health: an international Delphi survey	p. 52
3.1. Abstract	p. 54
3.2. Summary statement	p. 55
3.3. Introduction	p. 56
3.4. Background	p. 57

3.5.	The study _____	p. 58
3.6.	Results _____	p. 62
3.7.	Discussion _____	p. 65
3.8.	Conclusions _____	p. 69
3.9.	Acknowledgement _____	p. 70
3.10.	References _____	p. 71
3.11.	Figures and tables _____	p. 75
4.	Appendices _____	p. 86
4.1.	Appendix 1	
	Study 2 - Invitation letter Delphi Survey _____	p. 87
4.2.	Appendix 2	
	Study 2 - Email and information letter	
	Delphi Survey Round 1 _____	p. 88
4.3.	Appendix 3	
	Study 2 - Questionnaire	
	Delphi Survey Round 1 (extraction) _____	p. 91
4.4.	Appendix 4	
	Study 2 - Email and information letter	
	Delphi Survey Round 2 _____	p. 92
4.5.	Appendix 5	
	Study 2 - Questionnaire Delphi Survey Round 2 _____	p. 94
4.6.	Appendix 6	
	Study 2 – Information letter Delphi Survey Round 3 _____	p. 95
4.7.	Appendix 7	
	Study 2 - Questionnaire Delphi Survey Round 3 _____	p. 97
5.	Curriculum vitae _____	p. 98

The International Classification of Functioning, Disability and Health (ICF) in nursing: Persons with spinal-cord injury as an example

Zusammenfassung

Das Wohlbefinden und die Lebensqualität eines Menschen zu verbessern oder zu erhalten ist das Kernziel der Pflegepraxis. Zu diesem Ziel kann der Einsatz von standardisierten Klassifikationen und Terminologien beitragen, indem diese die intra - und interprofessionelle Kommunikation erleichtern. Deshalb ist es sinnvoll, Ansätze zu untersuchen, die die gemeinsame Nutzung von standardisierten Klassifikationen der Gesundheitsfachberufe unterstützen.

Das übergeordnete Ziel dieser Dissertation war zu untersuchen, inwieweit die Internationale Klassifikation der Funktionsfähigkeit, Behinderung und Gesundheit (ICF) eine praktikable und nützliche Klassifikation für Pflegende darstellt - exemplarisch gezeigt anhand der Pflege von Personen mit Rückenmarksverletzung.

Diese Dissertation umfasst die Untersuchungen, Ergebnisse und Schlussfolgerungen von zwei Studien, die von der Doktorandin als Erstautorin in der Pflegefachzeitschrift "Journal of Advanced Nursing" veröffentlicht wurden.

Das Ziel der ersten Studie war die konzeptionellen und praxisrelevanten Beziehungen der interprofessionellen ICF und der pflegespezifischen NANDA-I Taxonomy II für Pflegediagnosen zu identifizieren. Die spezifischen Forschungsfragen waren: (1) Was sind die Gemeinsamkeiten und Unterschiede der ICF und der NANDA-I Taxonomy II bezüglich der konzeptionellen Rahmenwerke und Prinzipien der Erhebung? und (2) Inwieweit können beide Klassifikationen zur gemeinsamen Anwendung für die Pflege von Personen mit Rückenmarksverletzung genutzt werden? Die Diskussion über die konzeptionellen und praxisrelevanten Beziehungen zwischen der ICF und der NANDA-I Taxonomy II basiert (1) auf den zuletzt veröffentlichten Beschreibungen beider Klassifikationen und (2) auf der Darstellung einer kombinierten Verwendung beider Klassifikationen anhand eines Fallbeispiels einer Person mit Rückenmarksverletzung.

Das Ziel der zweiten Studie war zu analysieren, in welchem Ausmaß die Behandlungsziele von Pflegenden für Personen mit Rückenmarksverletzung in der standardisierten Sprache der ICF ausgedrückt werden können. Die spezifischen Forschungsfragen waren: (1) Welche Probleme, Ressourcen und Aspekte der

Umwelt von Personen mit Rückenmarksverletzung, die pflegerelevant sind, können in die Sprache der ICF übersetzt werden? und (2) Welche Probleme, Ressourcen und Aspekte der Umwelt, die pflegerelevant sind, fehlen noch in der ICF? Um diese Fragen zu beantworten, wurde als Methode eine weltweite Delphi-Befragung von Pflegenden, die mit der Pflege von Personen mit Rückenmarksverletzung Erfahrung haben, gewählt.

Die Ergebnisse dieser Dissertation geben Aufschluss über die Anwendbarkeit der ICF in der Pflege. Zuerst diskutiere ich die Gemeinsamkeiten und Unterschiede der ICF und der NANDA-I Taxonomy II, die bei der Implementierung beider Klassifikationen in die Pflegepraxis berücksichtigt werden sollten. Mit der NANDA-I Taxonomy II können wichtige praxisnahe Anforderungen, die ausschließlich für die Pflege relevant sind, erfüllt werden. Die Anwendung der ICF wiederum ist hilfreich für Pflegende um mit anderen Gesundheitsfachberufen anhand einer gemeinsamen Sprache vereinfacht über Pflegeprobleme zu sprechen. Eine kombinierte Anwendung der ICF zusammen mit der NANDA-I Taxonomy II ist nützlich, weil sie einander im klinischen Alltag ergänzen können und somit die Qualität der Teamarbeit und der Pflegepraxis bereichern.

Zweitens stelle ich eine Liste mit Problemen, Ressourcen und Aspekten der Umwelt von Patienten mit Rückenmarksverletzung zur Verfügung, die alles umfasst, was von Pflegenden behandelt wird. Diese Liste könnte in der Pflegepraxis zur umfassenden und standardisierten Dokumentation eingesetzt werden und für einen besseren Informationsaustausch mit anderen Gesundheitsfachberufen in einer gemeinsamen Sprache dienen.

Drittens zeige ich die Stärken und Schwächen der ICF in der Pflegepraxis für Rückenmarksverletzte auf und erbringe Evidenz für Verbesserungen und zukünftige Revisionen der ICF. Beispielsweise schlage ich vor, zur bestehenden Skala der Beurteilungsmerkmale, die beiden Beurteilungsmerkmale „Risiko für“ und „Ressource für“ hinzuzufügen.

Aus den Ergebnissen dieser Dissertation ergeben sich einige Empfehlungen für zukünftige Forschungsarbeiten. Erstens bedarf es weiterer Forschung hinsichtlich der gleichzeitigen Verwendung der ICF und der NANDA-I Taxonomy I. Eine vollständige Verknüpfung der beiden Klassifikation auf Item-Ebene (sog. „linking“) könnte ihre Gemeinsamkeiten und Unterschiede auf eine detailliertere Weise

offenbaren und somit weitere fehlende Elemente hinsichtlich der Ansprüche der Pflege an die ICF identifizieren.

Zweitens sollte die Liste mit Problemen, Ressourcen und Aspekten der Umwelt von Patienten mit Rückenmarksverletzung in verschiedenen Versorgungsformen validiert werden (z.B. in der Pflege im Akutkrankenhaus, in der Rehabilitationspflege und in der ambulanten Pflege). Diese Liste sollte zudem mit den existierenden sog. Umfassenden ICF Core Sets für Personen mit Rückenmarksverletzung in der Frührehabilitation und in der Langzeitversorgung verglichen werden.

Drittens sollten die personbezogenen Faktoren, die in dieser Dissertation identifiziert wurden bei der Entwicklung der ICF-Komponente der *Personbezogenen Faktoren* berücksichtigt werden.

Executive summary

The core aim of nursing practice is to improve or maintain the person's well-being and quality of life. The use of standardized classifications and terminologies can contribute to this aim by facilitating intra- and inter-professional communication. Therefore, it is important to explore approaches that enhance common use of the current standard classifications of all health-care professions.

The overall objective of this doctoral thesis was to investigate whether the International Classification of Functioning, Disability and Health (ICF) is a practicable and useful classification for nurses - using spinal-cord injury (SCI) nursing as an example.

This doctoral thesis comprises the research, results and conclusions of two original studies published in the nursing journal "Journal of Advanced Nursing" first authored by the doctoral candidate.

The objective of the first study was to identify the conceptual and practical relationships between the inter-professional ICF and the nursing-specific NANDA-I Taxonomy II for nursing diagnoses. The specific research questions were: (1) What are the commonalities and differences between the conceptional frameworks and assessment principles of the ICF and the NANDA-I Taxonomy II? and (2) Can the two classifications serve as a combined approach in SCI nursing practice? The discussion of the conceptual and practical relationships between the ICF and the NANDA-I Taxonomy II is based on (1) the most recently published descriptions of both classifications and (2) the illustration of a SCI-specific case example presenting the combined use of both classifications.

The objective of the second study was to analyse the extent to which the intervention goals of nurses when caring for persons with SCI can be expressed in the standardized language of the ICF. The specific research questions were: (1) Which problems, resources and aspects of the environment of persons with SCI relevant to nurses can be translated into the ICF language? and (2) Which problems, resources and aspects of the environment relevant to nurses are still missing in the ICF? The method used to answer these questions was a worldwide Delphi Survey with SCI nurses.

The results of this doctoral thesis shed light on the use of the ICF in nursing practice. First, I discuss the commonalities and differences between the ICF and the NANDA-I Taxonomy II that should be taken into account when implementing both

classifications in nursing practice. Important clinical requirements that are exclusive to nursing can be met with the NANDA-I Taxonomy II. The application of the ICF helps nurses communicate abbreviated nursing issues with other health professionals in a common language. A combined application of the ICF and the NANDA-I Taxonomy II is valuable, and they can complement each other to enhance the quality of clinical teamwork and nursing practice.

Second, I provide a list of patients' problems, patients' resources or aspects of their environment treated by SCI nurses that might be introduced in nursing practice for a comprehensive standardized documentation and for a better exchange of information in a common language with other health professionals.

Third, I show the strengths and weaknesses of the ICF when used in nursing care specific to SCI and provide evidence for the update and future revisions of the ICF. For example, I propose to add two qualifiers, one for "Risk for" and one for "Resource for" to the existing qualifier scale.

Several recommendations for future research are based on the results of this doctoral thesis. First, there is a need to continue exploring the simultaneous use of the ICF and NANDA-I Taxonomy II. A complete linking of both classifications could reveal their commonalities and differences in a more detailed way and identify all missing elements in the ICF for nursing purposes.

Second, the list of patients' problems, patients' resources or aspects of their environment treated by SCI nurses should be validated in different nursing settings (e.g. acute hospital care, rehabilitative care and community care). This list should also be compared with the existing Comprehensive ICF Core Sets for SCI in the early post-acute context and long-term context.

Third, the personal factors identified should be taken into account when developing the ICF component *Personal Factors*.

1. Introduction

1.1. Background

The purpose of nursing is to promote, maintain or recover health, care for people when their health is hazarded, enable people to cope with health problems, facilitate independence, and improve and maintain well-being and quality of life while minimising distress and suffering (Royal College of Nursing (RCN) 2003).

As a professional group with its own identity based on specific knowledge, clinical and interpersonal skills, problem-solving approaches, clinical judgment and technical skills, nurses work in collaboration with other health professions (Verma et al. 2006).

Nursing persons with spinal-cord injury (SCI) requires a comprehensive approach to the intervention goals to address all of the persons' needs in the different phases of their care.

SCI results in permanent or temporary impairment or loss of motor and/or sensory function in the cervical, thoracic, lumbar and/or sacral segments of the spinal cord following damage of neural elements within the spinal canal (Marino et al. 2003) with tremendous implications for the life of those suffering it (Schoenherr et al. 1999). SCI represents a life-long challenge (Nolan & Nolan 1998) and is a devastating health condition with enormous personal, social and financial costs (Ackery et al. 2004).

The acute management of SCI will influence the patient's eventual neurological and functional outcome and, ultimately, the patient's quality of life. Common acute-care interventions aim to reestablish physiologic homeostasis, reduce the number and severity of secondary conditions and preserve neurologic function (Karlet 2001).

Rehabilitative care begins as soon as the patient is medically stable. All rehabilitation professionals in the interdisciplinary team concentrate on how to promote the highest possible quality of life within the context of the patient's social situation (Mumma 2001). Rehabilitation nurses provide a number of interventions, including direct patient care, collaborative medical care, patient and caregiver education, care management and psychosocial support for patients themselves and their families (Johnson et al. 2009). They attempt to empower patients and their families or carers to take control of and manage their own care and future (Chen & Boore 2007).

Even after discharge from clinical rehabilitation, persons with SCI are still confronted with serious problems, a wide range of which nurses address. Nurses give important input, for example, to prevent complications in the community setting (Bloemen-Vrencken & de Witte 2003). In community long-term care, persons with SCI have highly individualized needs, and skills from different disciplines are required to meet them (Cox et al. 2001).

Nurses use different documentation systems, terminologies and classifications to describe patients' problems, and consequently, for their intervention goals. The classifications widely used in nursing practice are the Nursing Diagnoses Classification (NANDA-I Taxonomy II) (NANDA International 2009), the Nursing Intervention Classification (NIC) (Bulechek et al. 2007), the Nursing Outcome Classification (NOC) (Moorhead et al. 2007), and the International Classification for Nursing Practice (ICNP - Version 2) (International Council of Nurses 2009).

Like any profession-specific terminology, these nursing classifications were neither designed nor established for use in other health-care professions. However, nurses usually do collaborate with other health-care professionals, who also have their own documentation systems and terminologies. When a common language and, accordingly, a common viewpoint is lacking, patient management may be jeopardized (Jelles et al. 1995). Multi- and interdisciplinary work could, indeed, be facilitated by the usage of a common frame of reference (Steiner et al. 2002).

Therefore, the International Classification of Functioning, Disability and Health (ICF) (World Health Organization (WHO) 2001), is now a globally recognized framework and classification for health professionals in all disciplines. It was designed to organize a wide range of information about health and health-related domains to be used in any health-care context (e.g., acute, post-acute and community) and setting (e.g., acute or specialized hospital and nursing home) and especially in interdisciplinary teams.

Based on the integrative bio-psycho-social model, *Functioning* and *Disability*, with its components of *Body Functions* and *Body Structures*, *Activities and Participation* are viewed in relation to the health condition under consideration, as well as to *Personal* and *Environmental Factors*. *Functioning* denotes the positive aspects of integrity. *Disability* describes the negative aspects of the interaction between an individual with a health condition and the *Contextual Factors* (*Environmental* and *Personal Factors*) for that individual. Thus, *Disability* is an

umbrella term denoting impairments of *Body Functions* and *Body Structures*, limitation of *Activities*, or restriction in *Participation*.

The ICF classification contains lists of so-called ICF categories organized into the different components of *Functioning* and *Disability*, and into *Environmental Factors*. *Personal Factors*, which also constitute a component of the integrative bio-psycho-social model, have not been classified yet. The ICF categories represent the units of the ICF classification. Within the hierarchical code system of the ICF classification, the ICF categories are designated by the letters b (*Body Functions*), s (*Body Structures*), d (*Activities and Participation*) and e (*Environmental Factors*), followed by a numeric code starting with the chapter number (e.g. b1 *Mental functions*), followed by the second level (e.g. b114 *Orientation functions*), the third level (e.g. b1142 *Orientation to person*) and the fourth level (e.g. b11420 *Orientation to self*). Thus, within each chapter there are two-, three- or four-level categories.

The ICF provides the so-called qualifier scale, which ranges from 0 (*no problem*) to 4 (*complete problem*) to quantify functioning and disability by rating the severity of the problem in the different ICF categories. *Environmental Factors* may be coded as a barrier and/or a facilitator (World Health Organization (WHO) 2001).

The strengths of the ICF are its etiological neutrality and its comprehensiveness. The latter, however, also constitutes a hindrance in clinical practice. The ICF is very exhaustive and becomes highly complex in daily use.

In the current nursing literature, the link among the different nursing terminologies and the ICF has been addressed emphasizing that the ICF contains the areas of functioning and disability that nurses care for in different settings (Boldt et al. 2005a, Boldt et al. 2005b, Heinen et al. 2005, Kim & Coenen 2011, Mueller et al. 2008, Pryor et al. 2004, Rauch et al. 2009, Van Achterberg et al. 2002, Van Achterberg et al. 2005, Van Grunsven et al. 2006)

However, concrete approaches that facilitate the use of the ICF in nursing practice have not been developed so far. Thus, there is a need for research of both conceptual and practical considerations regarding the practicability and usefulness of the ICF in nursing.

Two different approaches have been investigated in this doctoral thesis. The first refers to the link between the nursing classification NANDA-I Taxonomy II and the ICF. The second answers the question whether the ICF contains nurses' intervention goals when caring for persons with SCI.

The NANDA-I Taxonomy II was selected among the nursing classifications because both it and the ICF contain functional health patterns offering a taxonomy that can be applied to persons with a health condition or in a specific life process, such as aging.

The purpose of NANDA-I Taxonomy II is to provide a recognized and clinically useful classification to achieve a standardized description of nursing diagnoses. A NANDA-I nursing diagnosis is defined as “A clinical judgment about individual, family or community responses to actual or potential health problems/life processes. A nursing diagnosis provides the basis for selecting nursing interventions to achieve outcomes for which the nurse is accountable.” (NANDA International 2009, p. 419).

The classification has three levels. Thirteen Domains constitute the highest level (e.g. Domain 4: Activity/Rest), followed by 47 Classes (e.g. Class 2: Activity/Exercise) and followed by 206 currently approved Nursing Diagnoses (e.g. 00085 Impaired Physical Mobility).

Each approved NANDA-I nursing diagnosis is intrinsically structured and consists of different parts, including a Diagnostic Code and a Diagnosis Label (e.g. 00085 Impaired Physical Mobility) and a Definition (Limitation in independent, purposeful physical movement of the body or of one or more extremities) and Defining Characteristics (e.g., postural instability, limited ability to perform fine motor skills, difficulty turning) and Related Factors (e.g., pain, sensoriperceptual impairments, decreased muscle strength, control and/or mass). The diagnostic process should start with the Defining Characteristics, the data from which are collected during the initial personal assessment.

NANDA-I Taxonomy II is structured in a multiaxial system to show all dimensions of a human response that should be considered in the diagnostic process. The seven Axes are Diagnostic Concept (e.g. bed mobility or pain), Subject of the Diagnosis (e.g. individual or family), Judgment (e.g. impaired or readiness for), Location (e.g. bladder or oral), Age (e.g. fetus or old adult), Time (e.g. acute or chronic), and Status of the Diagnosis (e.g. wellness, risk, actual). The construction of reasonable nursing diagnoses in multiple combinations is made possible using the values of the Axes where needed (NANDA International 2009).

1.2. Research objectives

The overall objective of this doctoral thesis was to investigate whether the ICF is a practicable and useful classification for nurses - using SCI as an example.

The research objectives were:

- (1) to identify the conceptual and practical relationships between the inter-professional ICF and the nursing-specific NANDA-I Taxonomy II for nursing diagnoses.

The specific research questions were: (1) What are the commonalities and differences between the conceptional framework and assessment principles of the ICF and the NANDA-I Taxonomy II? and (2) Can both classifications serve as a combined approach in SCI nursing practice?

- (2) to study the extent to which nurses' intervention goals when caring for persons with SCI can be expressed in the standardized language of the ICF.

The specific research questions were: (1) Which problems, resources and aspects of the environment of persons with SCI relevant to nurses can be translated into the ICF language? and (2) Which problems, resources and aspects of the environment relevant to nurses are still missing in the ICF?

1.3. The studies

Two studies using different methodologies were carried out to address these objectives:

- (1) The results of the first study were published as:

Boldt C, Grill E, Bartholomeyczik S, Brach M, Rauch A, Eriks-Hoogland I, Stucki G. (2010). Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II. *J Adv Nurs*. 66(8): 1885-1898.

The objective of this first study corresponds with the first objective of this doctoral thesis, namely, to identify the conceptual and practical relationships between the inter-professional ICF and the nursing-specific NANDA-I Taxonomy II for nursing diagnoses. The key questions were: (1) What are the the commonalities and differences between the conceptional framework and assessment principles of the ICF and the NANDA-I Taxonomy II? and (2) Can both classifications serve as a combined approach in SCI nursing practice?

The discussion of the conceptual and practical relationships between the ICF and the NANDA-I Taxonomy II is based on (1) the most recently published descriptions of both classifications (World Health Organization (WHO) 2001, NANDA International 2009) and (2) the illustration of a SCI-specific case example presenting the combined use of both classifications.

The in-depth comparison of both classifications showed that the ICF and the NANDA-I Taxonomy II both have a comprehensive view of the person's situation, regardless of the underlying health condition, including interactions with related factors and taking into account the person's resources.

The differences found between the ICF and the NANDA-I Taxonomy II were that the latter is more complex, including risks and period surveyed without providing an additional domain of related factors, but rather including them in the approved diagnoses.

The comparative documentation of the situation of a SCI-specific case example using ICF categories and NANDA-I nursing diagnoses showed that a corresponding NANDA-I nursing diagnosis could be linked to 21 identified ICF categories. This overlap reflects the fact that the ICF, focusing on functioning and disability, and the NANDA-I Taxonomy II, with its functional health patterns, are similar in their approaches.

In the component *Body Functions*, no corresponding NANDA-I Taxonomy II expressions were found for eight ICF categories (*Impairment of Touch functions, Sensory functions related to temperature and other stimuli, Power of isolated muscles and muscle groups, Involuntary movement reaction functions, Sensation of muscle stiffness, Repair functions of the skin, respectively Integrity of Blood vessel functions and Mobility of joint functions*). Equally, for one ICF category in the component *Activities and Participation*, no NANDA-I Taxonomy II expression could be found (*Limitation of Maintaining a body position*).

Vice versa, no corresponding ICF categories were found for five identified NANDA-I nursing diagnoses (*Readiness for enhanced coping, Readiness for enhanced knowledge, Ineffective role performance, Impaired tissue integrity, Risk for infection*).

The described commonalities and differences between the ICF and the NANDA-I Taxonomy II should be taken into account when implementing these classifications in nursing practice. Important clinical requirements that are exclusive

to nursing are covered by the NANDA-I Taxonomy II, such as the coding of risk. The ICF is a promising new framework for classifying patient functioning and disability appropriate in a multiprofessional setting.

The application of the ICF helps nurses communicate abbreviated nursing issues with other health professionals in a common language. For nurses, knowledge shared with other health professionals can contribute to a broader understanding of a patient's situation.

A combined application of both classifications is valuable, as shown in a SCI-specific case example. The ICF and the NANDA-I Taxonomy II should both be used by nurses and can complement each other to enhance the quality of clinical teamwork and nursing practice.

The doctoral candidate developed the study idea, was responsible for the study conception and study design and led the discussion of the conceptual and practical relationships of both classifications. She was also the first author of the publication.

(2) The results of the second study are being published as:

Boldt C, Velstra IM, Brach M, Linseisen E, Cieza A. (2013).

Nurses' intervention goal categories for persons with spinal cord injury based on the International Classification of Functioning, Disability and Health: an international Delphi survey. J Adv Nurs. 69(5): 1109-1124.

The objective of the second study corresponds with the second objective of this doctoral thesis, namely, to examine the extent to which the intervention goals of nurses when caring for persons with SCI can be expressed in the standardized language of the ICF. The key questions to be answered were: (1) Which problems, resources and aspects of the environment of persons with SCI relevant to nurses can be translated into the ICF language? and (2) Which problems, resources and aspects of the environment relevant to nurses are still missing in the ICF?

A three-round, consensus-building electronic-mail survey with nurses experienced in caring for patients with SCI was conducted using the Delphi technique (Duffield 1993, Goodman 1987, Linstone & Turoff 1975, Williams & Webb 1994). In nursing research, the Delphi technique has proved to be a valuable method for investigating a number of themes and achieving consensus on issues where no consensus previously existed (Hasson et al. 2000, Kennedy 2004).

Nurses were recruited worldwide in 2007. Three strategies were used to identify experts: First, nurse associations worldwide were contacted by email and asked to provide names of appropriate participants; second, a literature search to identify authors with a nursing background in SCI was performed; and third, a selection of the cooperating partners of the ICF Research Branch of the World Health Organization Collaborating Centre for the Family of International Classifications in German with a background in nursing was performed (Biering-Sorensen et al. 2006).

In the first round of the Delphi survey, an information letter and an open-ended, health-professional-specific questionnaire were sent by email (Appendix 2 and 3). The questionnaire requested the participants to name the problems, resources and aspects of the environment which nurses take care of when treating patients with SCI. All participants' responses to the open-ended questionnaire were assembled. The concepts contained in each of the responses were identified and consequently linked to the categories of the ICF according to established linking rules (Cieza et al. 2002, Cieza et al. 2005). Information on demographic characteristics and professional experience was also collected (Appendix 3). Problems, resources and environmental factors not found in the ICF were listed as "Not-covered in the ICF". We thereby differentiated a subgroup of concepts "Not-covered in the ICF" which referred to risks the person with SCI may have. Aspects related to the characteristics of a person were listed as *Personal Factors*.

In the second Delphi round, the participants were asked to agree or disagree whether the respective elements in the lists were a problem, a resource or an aspect of the environment which nurses take care of when treating patients with SCI (Appendix 5). In the third round, the questionnaire included the same list that was sent in the second round. For each element in the list, the participant could see whether s/he had agreed or disagreed in the second round, as well as the percentage of participants who had agreed. They were asked to take into account their own answers and the answers of the group from the second round (Appendix 7).

Descriptive statistics were used to characterize the sample of participants and the frequencies of their answers in the second and third round. Kappa statistics with bootstrapped confidence intervals were used to describe the agreement between the two health professionals during the linking process on the first, second and third level of the ICF hierarchy (Cohen 1968, Vierkant 1996).

35 nurses from 17 countries named 823 patient problems, patient resources or aspects of the environment as intervention goals in SCI nursing.

Most of these aspects could be expressed in the language of the ICF and were linked to 143 different ICF categories. They were assigned to 56 (39.2%) categories of the ICF component *Activities and Participation*, followed by 52 (36.4%) categories of *Body Functions*, 27 (18.9%) categories of *Environmental Factors*, and eight (5.6%) categories of *Body Structures*.

Participants' responses were linked to 24 *Personal Factors*. The main *Personal Factors* identified were the acceptance and adjustment of, as well as the coping with the new life situation after SCI. In addition, the level of the person's knowledge about how to handle and manage their situation was highly agreed on by the participants.

However, this survey also found different intervention goals which could not be translated into the ICF language. 51 concepts were categorized as "*Not-covered in the ICF*", of which 32 concepts were summarized under the concept of "*Risk for*". This especially applies to areas that are fundamental for nurses, namely the detection of the risk for secondary conditions or the risk for future impairments or limitations in self-care. Highly supported intervention goals which also could not be linked to the ICF referred to domains of life in general, such as autonomy, dependency and privacy.

This study emphasizes the strengths and weaknesses of the ICF for nursing practice and provides a basis for the further development of the ICF, especially with regard to its completion in relevant aspects of SCI nursing.

This study advocates an ICF-based list of nursing-intervention goals in SCI which could be introduced into nursing practice for comprehensive, standardized documentation and for a better exchange of information in a common language with other health professionals.

The doctoral candidate was responsible for the project organization of the Delphi survey, including the recruitment of participants, the linking, and the analysis of results. She was also the first author of the publication. Inge-Marie Velstra was the second researcher for the linking process.

1.4. Conclusions

The results of this doctoral thesis shed light on the use of the ICF in nursing practice using SCI nursing as an example. First, this doctoral thesis discusses the commonalities and differences between the ICF and the NANDA-I Taxonomy II that should be taken into account when implementing both classifications in nursing practice. Important clinical requirements exclusive to nursing are covered by the NANDA-I Taxonomy II. The application of the ICF is useful for nurses to communicate abbreviated nursing issues with other health professionals in a common language. A combined application of the ICF and the NANDA-I Taxonomy II is valuable, and they can complement each other to enhance the quality of clinical teamwork and nursing practice.

Second, this doctoral thesis provides a list of patients' problems, patients' resources or aspects of their environment treated by SCI nurses that could be introduced into nursing practice for comprehensive, standardized documentation and for a better exchange of information in a common language with other health professionals.

Third, this doctoral thesis accentuates the strengths and weaknesses of the ICF for its use in nursing care specific to SCI and provides evidence for the update and future revisions of the ICF. For example it suggests adding two qualifiers, one for "Risk for" and one for "Resource for" to the existing qualifier scale.

This doctoral thesis also provides several recommendations for future research. First, there is a need to continue exploring the simultaneous use of the ICF and NANDA-I Taxonomy II. A complete linking of both classifications may reveal their commonalities and differences in a more detailed way and might identify all missing aspects in the ICF for nursing purposes.

Second, the list of patients' problems, patients' resources or aspects of their environment treated by SCI nurses should be validated in different nursing settings (e.g., acute hospital care, rehabilitative care, and community care). This list should also be compared with the existing Comprehensive ICF Core Sets for SCI in the early post-acute context (Kirchberger et al. 2010) and long-term context (Cieza et al. 2010).

Third, the personal factors identified should be taken into account when developing the ICF component *Personal Factors* (Geyh et al. 2011).

The core aim of nursing practice is to improve and maintain the person's well-being and quality of life. The use of standardized classifications and terminologies can contribute to this aim by facilitating intra- and inter-professional communication. Therefore, it is worthwhile to explore approaches that enhance the common use of the current standard classifications of all health-care professions.

1.5. References

- Ackery, A., Tator, C. & Krassioukov, A. (2004). A global perspective on spinal cord injury epidemiology. *J Neurotrauma*, **21**(10), 1355-70.
- Biering-Sorensen, F., Scheuringer, M., Baumberger, M., Charlifue, S.W., Post, M.W., Montero, F., Kostanjsek, N. & Stucki, G. (2006). Developing core sets for persons with spinal cord injuries based on the International Classification of Functioning, Disability and Health as a way to specify functioning. *Spinal Cord*, **44**(9), 541-6.
- Bloemen-Vrencken, J.H. & de Witte, L.P. (2003). Post-discharge nursing problems of spinal cord injured patients: on which fields can nurses contribute to rehabilitation? *Clin Rehabil*, **17**(8), 890-8.
- Boldt, C., Brach, M., Grill, E., Berthou, A., Meister, K., Scheuringer, M. & Stucki, G. (2005a). The ICF categories identified in nursing interventions administered to neurological patients with post-acute rehabilitation needs. *Disabil Rehabil*, **27**(7-8), 431-6.
- Boldt, C., Scheuringer, M. & Grill, E. (2005b). [Functional health and nursing performance: WHO classification challenge]. *Pflege Z.*, **58**(3), 164-8. German.
- Bulechek, G.M., Butcher, H.K. & McCloskey Dochterman, J. (2007). *Nursing Interventions Classification (NIC)*, C V Mosby Co., St. Louis.
- Chen, H.Y. & Boore, J.R. (2007). Establishing a super-link system: spinal cord injury rehabilitation nursing. *J Adv Nurs*, **57**(6), 639-48.
- Cieza, A., Brockow, T., Ewert, T., Amman, E., Kollerits, B., Chatterji, S., Ustun, T.B. & Stucki, G. (2002). Linking health-status measurements to the international classification of functioning, disability and health. *J Rehabil Med*, **34**(5), 205-10.
- Cieza, A., Geyh, S., Chatterji, S., Kostanjsek, N., Ustun, B. & Stucki, G. (2005). ICF linking rules: an update based on lessons learned. *J Rehabil Med*, **37**(4), 212-8.
- Cieza, A., Kirchberger, I., Biering-Sorensen, F., Baumberger, M., Charlifue, S., Post, M.W., Campbell, R., Kovindha, A., Ring, H., Sinnott, A., Kostanjsek, N. & Stucki, G. (2010). ICF Core Sets for individuals with spinal cord injury in the long-term context. *Spinal Cord*, **48**(4), 305-12.
- Cohen, J. (1968). Weighted kappa: nominal scale agreement with provision for scaled disagreement or partial credit. *Psychol Bull*, **70**(4), 213-20.
- Cox, R.J., Amsters, D.I. & Pershouse, K.J. (2001). The need for a multidisciplinary outreach service for people with spinal cord injury living in the community. *Clin Rehabil*, **15**(6), 600-6.
- Duffield, C. (1993). The Delphi technique: a comparison of results obtaining from two expert panels. *Int J Nurs Stud*, **30**, 227-37.
- Geyh, S., Peter, C., Müller, R., Bickenbach, J.E., Kostanjsek, N., Ustün, B.T., Stucki G., Cieza A. (2006). The Personal Factors of the International Classification of Functioning, Disability and Health in the literature - a systematic review and content analysis. *Disabil Rehabil*. **33**(13-14):1089-102.
- Goodman, C. (1987). The Delphi technique: a critique. *J Adv Nurs*, **12**(6), 729-34.
- Hasson, F., Keeney, S. & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *J Adv Nurs*, **32**(4), 1008-15.
- Heinen, M.M., van Achterberg, T., Roodbol, G. & Frederiks, C.M. (2005). Applying ICF in nursing practice: classifying elements of nursing diagnoses. *Int Nurs Rev*, **52**(4), 304-12.
- International Council of Nurses (2009). *International Classification for Nursing Practice ((ICNP® - Version 2)*, International Council of Nurses, Geneva.

- Jelles, F., Van Bennekom, C. & Lankhorst, G. (1995). Instruments to structure interdisciplinary team conferences in rehabilitation medicine: Added value of the rehabilitation activities profile. *Journal of Rehabilitation Sciences*, **8**(2), 51-57.
- Johnson, K., Bailey, J., Rundquist, J., Dimond, P., McDonald, C.A., Reyes, I.A., Thomas, J. & Gassaway, J. (2009). SCIRehab Project series: the supplemental nursing taxonomy. *J Spinal Cord Med*, **32**(3), 329-35.
- Karlet, M.C. (2001). Acute management of the patient with spinal cord injury. *Int J Trauma Nurs*, **7**(2), 43-8.
- Kennedy, H.P. (2004). Enhancing Delphi research: methods and results. *J Adv Nurs*, **45**(5), 504-11.
- Kim, T.Y. & Coenen, A. (2011). Toward harmonising WHO International Classifications: a nursing perspective. *Informatics for Health & Social Care*, **36**(1), 35-49.
- Kirchberger, I., Cieza, A., Biering-Sorensen, F., Baumberger, M., Charlifue, S., Post, M.W., Campbell, R., Kovindha, A., Ring, H., Sinnott, A., Kostanjsek, N. & Stucki, G. (2010). ICF Core Sets for individuals with spinal cord injury in the early post-acute context. *Spinal Cord*, **48**(4), 297-304.
- Linstone, H. & Turoff, M. (1975). *The Delphi technique: techniques and applications*. Addison Wesley, London.
- Marino, R., Barros, T., Biering-Sorensen, F., Burns, S., Donovan, W., Graves, D., Haak, M., Hudson, L., Priebe, M. & ASIA Neurological Standards Committee 2002 (2003). International standards for neurological classification of spinal cord injury. *Journal of Spinal Cord Medicine*, **26**(Suppl 1), S50-6.
- Moorhead, S., Johnson, M. & Maas, M.L. (2007). *Nursing Outcomes Classification (NOC)*, C V Mosby Co., St. Louis.
- Mueller, M., Boldt, C., Grill, E., Strobl, R. & Stucki, G. (2008). Identification of ICF categories relevant for nursing in the situation of acute and early post-acute rehabilitation. *BMC Nurs*, **7**(3), 1-8. (E-pub: <http://www.biomedcentral.com/content/pdf/1472-6955-7-3.pdf> February 18th 2008).
- Mumma, C.M. (2001). Rehabilitation and rehabilitation nursing. *Crit Care Nurs Clin North Am*, **13**(3), 335-40.
- NANDA International (2009). *Nursing Diagnoses: Definitions and Classification, 2009-2011*, Wiley-Blackwell, Chichester.
- Nolan, M. & Nolan, J. (1998). Rehabilitation following spinal injury: the nursing response. *Br J Nurs*, **7**(2), 97-104.
- Pryor, J., Forbes, R. & Hall-Pullin, L. (2004). Is there evidence of the International Classification of Functioning, Disability and Health in undergraduate nursing students' patient assessments? *Int J Nurs Pract*, **10**(3), 134-41.
- Rauch, A., Kirchberger, I., Boldt, C., Cieza, A. & Stucki, G. (2009). Does the Comprehensive International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis capture nursing practice? A Delphi survey. *Int J Nurs Stud*, **46**(10), 1320-34.
- Royal College of Nursing (RCN) (2003). Defining nursing. London. <http://rcn.org.uk/publications/definitionnursing> download: May 24th 2006.
- Schoenherr, M.C., Groothoff, J.W., Mulder, G.A. & Eisma, W.H. (1999). Functional outcome of patients with spinal cord injury: rehabilitation outcome study. *Clin Rehabil*, **13**(6), 457-63.

- Steiner, W.A., Ryser, L., Huber, E., Uebelhart, D., Aeschlimann, A. & Stucki, G. (2002). Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. *Physical Therapy*, **82**(11), 1098-107.
- Van Achterberg, T., Frederiks, C., Thien, N., Coenen, C. & Persoon, A. (2002). Using ICDH-2 in the classification of nursing diagnoses: Results from two pilot studies. *J Adv Nurs*. **37**(2), 135-44.
- Van Achterberg, T., Holleman, G., Heijnen-Kaales, Y., Van der Brug, Y., Roodbol, G., Stallinga, H.A., Hellema, F. & Frederiks, C.M. (2005). Using a multidisciplinary classification in nursing: the International Classification of Functioning, Disability and Health. *J Adv Nurs*. **49**(4), 432-41.
- Van Grunsven, A., Bindels, R., Coenen, C. & de Bel, E. (2006). Developing an integrated electronic nursing record based on standards. *Stud Health Technol Inform*. **122**, 294-7.
- Verma, S., Paterson, M. & Medves, J. (2006). Core competencies for health care professionals: what medicine, nursing, occupational therapy and physiotherapy share. *J Allied Health*, **35**(2), 109-15.
- Vierkant, R. (1996). A SAS® macro for calculating bootstrapped confidence intervals about a kappa coefficient. Cary, NC: SAS Institute Inc.
<http://www2.sas.com/proceedings/sugi22/STATS/PAPER295.PDF>. download: December 9th 2010.
- Williams, P.L. & Webb, C. (1994). The Delphi technique: a methodological discussion. *J Adv Nurs*. **19**(1), 180-6.
- World Health Organization (WHO) (2001). International Classification of Functioning, Disability and Health: ICF, WHO, Geneva.

2. Research article 1: Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II

Christine Boldt, MSc RN ^{1 2 3}

Eva Grill, PhD MPH ^{3 4}

Sabine Bartholomeyczik, PhD RN ⁵

Mirjam Brach, MBA MPH RN ^{1 6}

Alexandra Rauch, BSc PT ^{1 2}

Inge Eriks-Hoogland, MD ^{1 2}

Gerold Stucki, MD, MS ^{1 2 7}

¹ *Swiss Paraplegic Research (SPF), Nottwil, Switzerland*

² *ICF Research Branch of the WHO FIC Collaborating Center (DIMDI) at SPF, Nottwil, Switzerland*

³ *Institute for Health and Rehabilitation Sciences, Ludwig-Maximilian University, Munich, Germany*

⁴ *ICF Research Branch of the WHO FIC Collaborating Center (DIMDI) at IHRS, Ludwig-Maximilian University, Munich, Germany*

⁵ *Institute of Nursing Science, Witten/Herdecke University, Witten, Germany*

⁶ *Department of Physical Medicine and Rehabilitation, Ludwig-Maximilian University, Munich, Germany*

⁷ *Seminar of Health Sciences and Health Policy at University of Lucerne, and at SPF, Nottwil, Switzerland*

SHORT TITLE

Combined application of ICF and NANDA-I Taxonomy II

KEYWORDS

Nursing

International Classification of Functioning, Disability and Health (ICF)

NANDA-International Taxonomy II

Nursing diagnoses

Spinal cord injury

Conceptional and applied comparison

Accepted for publication on 2nd April 2010 by *Journal of Advanced Nursing* in revised form

ISI Journal Citation Reports® Ranking: 2009 9/70

Impact Factor: 1.518

Boldt C, Grill E, Bartholomeyczik S, Brach M, Rauch A, Eriks-Hoogland I, Stucki G. (2010). Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II. *J Adv Nurs*. 66(8): 1885-1898.

2.1. ABSTRACT

Aim

This paper presents a discussion of the conceptual and practical relationships between the International Classification of Functioning, Disability and Health (ICF) and the NANDA-International Taxonomy II for nursing diagnoses, and their use in nursing practice.

Background

The ICF provides a common framework for all health professionals, including nurses. Nursing care plans are broadly based on NANDA-I taxonomies. No published attempt has been made to systematically compare the NANDA-I Taxonomy II to the ICF.

Data Sources

The most recently published descriptions of both classifications and the illustration of a case example presenting the combined use of both classifications.

Discussion

The described conceptual commonalities and differences between the ICF and the NANDA-I Taxonomy II should be taken into account. In the given case example, the overlap between the ICF categories and the NANDA-I nursing diagnoses reflects the fact that the ICF, focusing on functioning and disability, and the NANDA-I Taxonomy II, with its functioning health patterns, are similar in their approaches.

Implications for Nursing

The NANDA-I Taxonomy II permits the fulfillment of requirements that are important to nursing issues exclusively. The application of the ICF is useful for nurses to communicate abbreviated nursing issues with other health professionals in a common language. For nurses, knowledge shared with other health professionals may contribute to a broader understanding of a patient's situation.

Conclusion

The ICF and the NANDA-I Taxonomy II should be used in concert by nurses and can complement each other to enhance the quality of clinical team work and nursing practice.

2.2. SUMMARY STATEMENT

What is already known about this topic

- The International Classification of Functioning, Disability and Health (ICF) provides a common framework for all health professionals, including nurses.
- Nursing care plans are broadly based on NANDA-International taxonomies.
- In the current literature, the value of both classifications for nursing has often been stated.

What this paper adds

- The in-depth comparison of both classifications shows that the ICF and the NANDA-I Taxonomy II both have a comprehensive view of the person's situation, which is independent of the underlying health condition, including interactions with related factors, and taking into account the resources of the person.
- The differences between the ICF and the NANDA-I Taxonomy II are that the latter is more complex, including risks and period surveyed, not providing an additional domain of related factors, but rather including them in the approved diagnoses.

Implications for practice and/or policy

- The ICF and the NANDA-I Taxonomy II should be used in concert by nurses and can complement each other to enhance the quality of clinical team work and nursing practice.
- A direct comparison that accentuates the strengths and weaknesses of the two classifications for nursing practice provides a basis for the further beneficial development of both, especially with regard to their completion in relevant scopes in spinal cord injury nursing.

2.3. INTRODUCTION

Human responses to actual or potential health problems and illness are the centre of nursing efforts (American Nurses Association (ANA) 1980, International Council of Nurses (ICN) 1987). The purpose of nursing is promoting, maintaining or recovering health, caring for people when their health is hazarded, enabling people to cope with health problems, facilitating independence, and improving and maintaining well being and quality of life while minimising distress and suffering (Royal College of Nursing (RCN) 2003).

In the nursing process, which involves assessment, diagnoses, and outcome evaluation, human functioning is the essential focus (Van Achterberg et al. 2005). As has been shown by previous studies, functioning, rather than medical diagnosis, reflects nursing-related resource utilization (Disler et al. 1993, Granger et al. 1993).

The increasing pressure on health care systems by limited resources generates a huge challenge to nurses. Services must be provided to more patients with more severe problems in less time without forgoing the requirement for high quality health care. Therefore, it is of the utmost importance to understand which and how much care should be provided to what patients (Bode et al. 2004). Evidence-based practice in nursing, which is related to evidence-based medicine (EBM), would be able to describe the most successful and cost-effective approaches to care (Closs 1999, Ingersoll 2000). Based on the definition of EBM, evidence-based practice in nursing is "... the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients." (Sackett et al. 1996). However, one requirement for establishing such an evidence-based practice in nursing is the development and utilization of a standardised language (Thoroddsen 2005).

Nursing science has developed several taxonomies to classify the different stages of the nursing process. Among those are the Nursing Diagnoses Classification (NANDA-I Taxonomy II) (NANDA International 2009), the Nursing Intervention Classification (NIC) (Bulechek et al. 2007) and the Nursing Outcome Classification (NOC) (Moorhead et al. 2007). These nursing classifications were established within the nursing community and were not designed to be shared by other health professionals.

Nurses, however, collaborate very closely with other health professionals, or are part of multidisciplinary and interdisciplinary teams. Despite the team work, to

communicate and register goals and results, all health professions need common terminology to describe the functional status of patients (Heerkens et al. 2003).

A common framework and classification for all health professionals and in all settings is the International Classification of Functioning, Disability and Health (ICF) (World Health Organization (WHO) 2001). Since its approval by the World Health Assembly in May 2001, all member states are called upon to implement the ICF for several purposes, e.g. as a clinical, research and educational tool. Contrary to mono-disciplinary classifications, the ICF was designed to facilitate communication between all health professions and is therefore highly relevant to the quality of patient care (Van Achterberg et al. 2005).

In the current literature, both conceptual considerations as well as several investigations that answer questions regarding the implementation of the ICF in nursing can be found. The usefulness of the ICF in increasing awareness of social, political and cultural dimensions of disability has been emphasized at the conceptual level (Kearney & Pryor 2004, Kearney 2005). The ICF has also been viewed as a tool that contains relevant aspects addressed in nursing care, but which needs additional operationalization in order to be implemented in nursing practice (Bartholomeyczik et al. 2006).

Standard nursing documentation and terminology, nursing diagnoses, and nursing interventions have been successfully linked to the ICF, emphasizing that it contains the areas of functioning and disability that nurses care for in different health care settings (Van Achterberg et al. 2002, Pryor et al. 2004, Boldt et al. 2005a, Boldt et al. 2005b, Van Achterberg et al. 2005, Heinen et al. 2005, Van Grunsven et al. 2006, Mueller et al. 2008, Rauch et al. 2009). A sensitive and systematic search strategy in PubMed and CINAHL from 1999 to June 2009 including the search terms "ICF" and "nursing" yielded 37 publications from which only one (Müller-Staub et al. 2007) provided a comparison of both classifications. These authors introduced specific criteria for nursing diagnoses classifications and stated that the ICF fulfils one of three criteria, whereas the NANDA-I taxonomy fulfils all of these criteria.

There is no further published attempt at systematically comparing the NANDA-I Taxonomy II to the framework of the ICF. Since both approaches are based on functioning, disability and health (ICF), or human responses to actual or potential health problems (NANDA-I Taxonomy II), we would expect to see a close relationship

between the two classifications. Only a thorough examination of commonalities and differences will allow nurses to actively implement both classifications in practice.

The aim of this paper is to present a discussion of the conceptual and practical relationships between the ICF and the NANDA-I Taxonomy II for nursing diagnoses, and their use in nursing practice.

The specific aims are (1) to introduce the ICF and the NANDA-I Taxonomy II, (2) to outline the commonalities and differences between the conceptual framework and assessment principles of the ICF and the NANDA-I Taxonomy II, (3) to introduce the ICF Assessment Sheet as a tool for nursing practice, and (4) to demonstrate, by means of a case example, how both classifications can serve as a combined approach in nursing practice.

2.4. BACKGROUND

The International Classification of Functioning, Disability and Health (ICF)

The ICF is a multipurpose classification that belongs to the WHO (World Health Organization) family of international classifications and is designed to organize a wide range of information about health and health-related domains.

Based on the integrative bio-psycho-social model, *Functioning* and *Disability*, with its components of *Body Functions* and *Body Structures*, respectively *Activities and Participation*, are viewed in relation to the health condition under consideration, as well as to *Personal* and *Environmental Factors* (see Fig. 1). *Functioning* denotes the positive aspects of integrity. *Disability* describes the negative aspects of the interaction between an individual with a health condition and the *Contextual Factors* (*Environmental* and *Personal Factors*) for that individual. Thus, *Disability* is an umbrella term denoting impairments of *Body Functions* and *Body Structures*, limitation of *Activities*, or restriction of *Participation*.

- See figure 1 -

The ICF classification contains lists of so-called ICF categories organized into the different components of *Functioning* and *Disability*, and into *Environmental Factors*. *Personal Factors*, which also constitute a component of the integrative bio-psycho-social model, have not been classified yet. The ICF categories represent the units of the ICF classification. Within the hierarchical code system of the ICF

classification, the ICF categories are designated by the letters b (*Body Functions*), s (*Body Structures*), d (*Activities and Participation*), and e (*Environmental Factors*), followed by a numeric code starting with the chapter number (e.g. b1 *Mental functions*), followed by the second level (e.g. b114 *Orientation functions*), the third level (e.g. b1142 *Orientation to person*) and the fourth level (e.g. b11420 *Orientation to self*). Thus, within each chapter there are two-, three- or four-level categories.

The ICF provides the so-called qualifier scale, which ranges from 0 (*no problem*) to 4 (*complete problem*) to quantify functioning and disability by rating the severity of the problem in the different ICF categories. *Environmental Factors* may be coded as a barrier and/or a facilitator (World Health Organization (WHO) 2001).

NANDA-I Taxonomy II

The purpose of NANDA-I Taxonomy II is to provide a recognized and clinically useful classification to achieve a standardized description of nursing diagnoses. A NANDA-I nursing diagnosis is defined as “A clinical judgment about individual, family or community responses to actual or potential health problems/life processes. A nursing diagnosis provides the basis for selecting nursing interventions to achieve outcomes for which the nurse is accountable.” (NANDA International 2009). The classification is ordered into three levels. Thirteen *Domains* constitute the highest level (e.g. Domain 4: *Activity/Rest*), followed by 47 *Classes* (e.g. Class 2: *Activity/Exercise*), and followed by 206 currently approved *Nursing Diagnoses* (e.g. 00085 *Impaired Physical Mobility*) (see Fig. 2).

- See figure 2 -

Each approved NANDA-I nursing diagnosis is intrinsically structured and consists of different parts, including a *Diagnostic Code* and a *Diagnosis Label* (e.g. 00085 *Impaired Physical Mobility*) and a *Definition* (Limitation in independent, purposeful physical movement of the body or of one or more extremities) and *Defining Characteristics* (e.g. postural instability, limited ability to perform fine motor skills, difficulty turning) and *Related Factors* (e.g. pain, sensoriperceptual impairments, decreased muscle strength, control and/or mass). The diagnostic process should start with the *Defining Characteristics*, the data from which are collected during the initial personal assessment.

NANDA-I Taxonomy II is structured in a multiaxial system to show all dimensions of a human response that should be considered in the diagnostic process. The seven *Axes* are *Diagnostic Concept* (e.g. bed mobility or pain), *Subject of the Diagnosis* (e.g. individual or family), *Judgment* (e.g. impaired or readiness for), *Location* (e.g. bladder or oral), *Age* (e.g. fetus or old adult), *Time* (e.g. acute or chronic), and *Status of the Diagnosis* (e.g. wellness, risk, actual). The construction of reasonable nursing diagnoses in multiple combinations is made possible using the values of the *Axes* where needed (NANDA International 2009).

2.5. DATA SOURCES

The discussion of the conceptual and practical relationships between the ICF and the NANDA-I Taxonomy II is based on (1) the most recently published descriptions of both classifications (World Health Organization (WHO) 2001, NANDA International 2009) and (2) the illustration of a case example presenting the combined use of both classifications.

2.6. DISCUSSION

Conceptional comparison of framework and assessment principles of the ICF and the NANDA-I Taxonomy II

Commonalities between both frameworks

Conceptions obviously common to both classifications pertain to their broad view of the patient's situation, independent of the underlying health condition, to the interaction with related factors, and to the definition of resources. This is supported by the following aspects:

Firstly, both classifications consider the patient's situation in a comprehensive way. The ICF encompasses all aspects of human health and some health-relevant components of well-being from a bio-psycho-social perspective. This is in line with the holistic view of many nurse theorists, as exemplified by Gordon's functional health patterns (Gordon 1982). Gordon's model was the basis for the described taxonomy by NANDA-I (NANDA International 2005).

Secondly, neither framework assumes a compelling causal relationship between a medical diagnosis and functioning or functional health patterns. Patients with different health conditions may have similar nursing needs. In contrast, patients

with the same health condition may have different nursing needs. The level of functioning, as seen by the ICF, is a human response by every person, irrespective of health conditions or personal factors such as gender or age. Two individuals of the same age with the same health condition can differ substantially in their level of functioning, depending on bodily impairments, activity limitations, participation restrictions, and the influence of the environment or personal factors. This analogy may prove helpful for nurses to underscore the fact that functioning, rather than medical diagnoses, reflects nursing-related resource utilization (Disler et al. 1993, Granger et al. 1993).

Thirdly, both frameworks address interactions. The integrative bio-psycho-social model of the WHO focuses on functioning and disability and its interactions with a health condition and relevant contextual factors. For the NANDA-I Taxonomy II, a nursing diagnosis takes into account all related factors and is a human response to actual or potential health problems/life processes.

Fourthly, both frameworks deal with resources. The ICF describes functioning, disability and health. Different aspects of functioning and health can be viewed as resources, depending on the person. In addition, the possibility of qualifying *Contextual Factors* as facilitators underscores the resource-oriented quality of the ICF. Accordingly, the NANDA-I Taxonomy II provides a description of patient resources in the *Axis Judgement*, e.g. the value *Effective* (producing the intended or desired effect) or *Readiness for* (in a suitable state for an activity or situation). In addition, one might categorize the diagnosis in the *Axis Status of the Diagnosis* with values such as *Wellness*, respectively *Health promotion*.

Differences between both frameworks and their assessment principles

Differences between the framework of the ICF and the NANDA-I Taxonomy II pertain to the level of complexity, description of risks, period surveyed, and consideration of contextual factors. This is supported by the following aspects:

Firstly, the level of complexity of the structure of both classifications is different. The ICF is organized in a hierarchical and monoaxial scheme. The ICF categories, with its *Definition* and *Inclusion/Exclusion criteria*, are arranged in a stem-branch-leaf structure, so that a lower-level ICF category includes the attributes of the higher-level categories of which it is a part. In contrast, the NANDA-I Taxonomy II is a multiaxial classification that offers the user the possibility of creating manifold combinations of

the seven Axes to generate a nursing diagnosis rich in content. Furthermore, in addition to the *Definition*, an approved NANDA-I nursing diagnosis contains the *Defining Characteristics*, respectively the *Risk Factors* and *Related Factors*.

Secondly, the classifications describe risks differently. The NANDA-I Taxonomy II provides the possibility of coding a nursing diagnosis as a *Risk* under the Axis *Status of the Diagnosis*. The qualifier scale of the ICF does not allow the coding of risks. Nevertheless, any combination of ICF categories can be used to paraphrase a risk while classifying the reason for the risk. For example, a patient who is at increased risk for falls might have a limitation in the ICF category *Maintaining one's health*, impaired *Control of voluntary movement functions*, or impaired *Vestibular functions*.

Thirdly, the classifications differ in regard to the documented period of time. The ICF provides codes for functioning and disability at the time of data collection, and thus it does not model "the process of functioning". In contrast, nurses assess incidents retrospectively (e.g. with *Chronic* in the Axis *Time*) and potential developments prospectively (e.g. with *Risk* in the Axis *Status of the Diagnosis*), because these may be relevant to actual nursing interventions. The integrative bio-psycho-social model of the WHO implies *Personal Factors* (e.g. habits and experiences) that are not yet classifiable. In the future the documentation of personal factors using the ICF may clarify biographical aspects of a patient's life for interdisciplinary documentation.

Fourthly, both classifications accentuate influencing contextual factors differently. In the NANDA-I Taxonomy II, environmental factors appear only as *Related Factors* in the approved NANDA-I nursing diagnoses. In contrast, the ICF contains *Environmental Factors* as one separate component in which each ICF category can be coded as a barrier and/or a facilitator. *Personal Factors* have not yet been classified in the ICF; however, in NANDA-I Taxonomy II several *Diagnostic Concepts* cover personal factors such as *Identity*, *Knowledge*, and *Role Performance*.

Applied comparison of the ICF to the NANDA-I Taxonomy II using a case example

The following example illustrates the applicability of the ICF and the NANDA-I Taxonomy II in nursing practice. A patient with spinal cord injury was classified as a case in point.

Description of the case example

Mr. H., a 33-year-old patient with an acute spinal cord injury (SCI) at the level of T12/L1, was diagnosed using the ASIA Impairment Scale (AIS) with A. He fell from the roof of a building three weeks ago, while working in construction. The spinal column was immediately stabilized after the accident and he was transferred to an early post-acute rehabilitation unit on the 15th day after surgery.

The symptoms corresponded to the severity and level of injury. Touch and other sensory functions in his legs were lost, resulting in disturbed body image. Control of voluntary and involuntary movement of the legs was absent, corresponding to loss of related muscle power. Due to disuse of the lower extremities, he had a higher risk of developing deep vein thrombosis, and a higher risk of contractures and pressure ulcers. Sexual functions were impaired. During his stay at the hospital the majority of his former physical endurance was lost. In addition, he suffered from intense back pain in the surgical area and muscle stiffness in his legs. Insomnia at night resulted in diminished concentration and fatigue during daytime. A pressure ulcer stage III developed on the right heel, with disturbed wound healing. Anal sphincter control was absent, as was management of defecation. At the time, he could not catheterize his bladder independently for voiding, although nurses instructed him several times. Even so, he was very engaged in enhancing his skills concerning this issue, as he was aware of his risk of bladder infection. He required extensive support in most activities of self-care, particularly in washing, toileting and dressing. Changing his body position in bed required great effort. As a result of reduced balance, he could not sit without using his arms to maintain posture. Independent movement from bed to wheelchair without risking a fall was impossible. He could not sit for extended periods in his wheelchair due to pain, and he was unable to move around on his own using his wheelchair. In summary, there were aspects in Mr H.'s situation that decreased his ability to guard against certain threats and to care for his health, that is, e.g. development of further impaired skin integrity or risk for falls.

His wife supported him in a sensitive way, especially when he felt a lack of energy and drive. Formerly an active person who spent recreational time with his family and enjoyed sporting activities, he was now unable to drive his motorbike as he had done previously. Until now, he has been living with his wife and two children

in a flat on the 2nd floor without an elevator; relocation to a barrier-free apartment would therefore be necessary. In addition, he is unable to return to work for a couple of months and he will not be able to continue working in construction. Mr H. was therefore worried about whether he could continue to fulfil his role as breadwinner for his family. Overall, he was insecure and concerned about his current situation, because he had only little knowledge of SCI or how to handle his limitations. However, he was willing to expand his knowledge and skills to cope with his state of affairs. Mr. H. was motivated for daily therapy and he was compliant. He wanted to realise an independent way of life at his earliest convenience.

Documentation of the case example using the ICF Assessment Sheet

To illustrate the applicability of the ICF in nursing, we documented Mr H.'s situation using the so-called ICF Assessment Sheet (Cieza and Stucki 2006, Steiner et al. 2002). In clinical practice all involved health professionals in a rehabilitation team assess a patient's problems. The integrative, bio-psycho-social model of functioning, disability and health (see Fig.1) can be used to guide this process.

The structure of the integrative bio-psycho-social model, with its different components (*Body Functions, Body Structures, Activity and Participation* and *Contextual Factors*), is clearly visible in the ICF Assessment Sheet (see Table 1). The ICF Assessment Sheet is divided into two sections. The upper section corresponds to the patient's perspective, and the lower section to the health-professional perspective.

This structured approach has the advantage that different team members can take primary responsibility for the assessment of certain aspects of functioning. For example, it may be decided that the nurse observes the repair functions of the skin while the sensory-motor testing is performed by the physician. This approach may reduce redundancies and inconveniences to patients who otherwise often have to repeatedly answer similar questions.

Illustrated by the case example, Mr H.'s perspective was documented using his original wording, for example, "I have a pressure ulcer on the right heel" in the upper section of Table 1. In the lower section of Table 1, the ICF categories considered relevant in the current rehabilitation phase are documented from interdisciplinary health-professional perspective. In this example, impairments, or limitations of functioning, such as *Protective functions of the skin, Repair functions of*

the skin, Structures of areas of the skin and Looking after one's health, should be documented. The documentation of the ICF categories *Blood vessel functions* and *Mobility of joint functions*, with the positive aspect of integrity, emphasized that these body functions were currently not impaired but were under observation or relevant to be treated preventively to reduce the risk of deep vein thrombosis or the risk of contractures, respectively.

- See table 1 -

Documentation of the case example using NANDA-I Taxonomy II

Nursing care plans that are broadly based on NANDA-I taxonomies have been used in paper version for some time (Turner 1991, Carlson-Catalano 1998) and are currently transferred to electronic form (Van Krogh et al. 2005, Docherty 2006, Keenan et al. 2006). To illustrate the applicability of the NANDA-I Taxonomy II, Mr H.'s situation was documented so as to gain experience and to understand the structure of this classification.

Nurses can systematically assess a patient's situation by taking into account all available information directly from patient interviews or through observation, from the medical history, clinical examinations and technical diagnostic procedures. The diagnostic process can be structured by the NANDA-I Taxonomy II, using its *Domains*, *Classes* and the 206 currently approved *Nursing Diagnoses*. With an accurate interpretation of patient data, further NANDA-I nursing diagnoses can be constructed using all relevant *Axes*. These nursing diagnoses from the NANDA-I Taxonomy II, which are relevant to the patient's current situation, are then transferred to the nurse's documentation.

In the case of Mr. H., the *Domains* and the *Classes* of NANDA-I Taxonomy II, as well as the *Axes Status Diagnosis, Judgement, Time, Location and Diagnostic Concept* were applied to document his human responses to SCI (see Table 2). For example, his pressure ulcer on the right heel was reflected in the *Domain Safety/Protection* in the *Class Physical Injury* with the nursing diagnoses *Actual impaired skin integrity*, *Actual impaired tissue integrity*, and *Actual ineffective protection*. Mr H.'s nursing diagnosis *Disturbed body image* in the *Domain Self-Perception* and *Class Body Image* may have contributed additionally to the development of the pressure ulcer.

To illustrate the diagnostic process in the present case, the *Defining Characteristics* which led to the nursing diagnosis *Actual impaired skin integrity* were *Invasion of body structures* and *Destruction of skin layers*. The listed *Related Factors* for this nursing diagnosis are *Physical immobilisation* and *Impaired sensation*. The nursing diagnosis *Actual ineffective protection* has been chosen because of the attendant *Defining Characteristics Neurosensory alteration, Pressure ulcers and Immobility* (NANDA International 2009).

- See table 2 -

Comparison of both documentations

The comparative documentation of Mr H.'s situation, using ICF categories on the one hand and NANDA-I nursing diagnoses on the other hand, is shown in Table 3. The influencing environmental factors were not a part of this comparison, due to variable handling in both classifications.

- See table 3 -

For 21 ICF categories chosen for the description of Mr H.'s situation a corresponding NANDA-I nursing diagnosis could be linked. This overlap reflects the fact that the ICF, focusing on functioning and disability, and the NANDA-I Taxonomy II, with its functioning health patterns, are very similar in their approaches.

For eight ICF categories for the component *Body Functions*, no corresponding NANDA-I Taxonomy II expression could be found (*Impairment of Touch functions, Sensory functions related to temperature and other stimuli, Power of isolated muscles and muscle groups, Involuntary movement reaction functions, Sensation of muscle stiffness, Repair functions of the skin, respectively Integrity of Blood vessel functions and Mobility of joint functions*). Equally, for one ICF category in the component *Activities and Participation*, no NANDA-I Taxonomy II expression could be found (*Limitation of Maintaining a body position*). This showed that, in Mr H.'s case, the relevant ICF categories were concerned with body functions at a higher rate as compared to activities. In particular, his higher risk of deep vein thrombosis and the risk of contractures, which are both important targets of nursing interventions, were able to be documented with the ICF categories *Blood vessel functions and Mobility of joint functions* in combination with the positive aspect of functioning integrity. No NANDA-I nursing diagnosis reflected this clearly.

The ICF category *Looking after one's health* addressed five NANDA-I nursing diagnoses: two of them with the positive aspect of functioning integrity (*Effective therapeutic regimen management*, *Readiness for enhanced urinary elimination*) and three of them with a limitation or impairment (*Ineffective protection*, *Risk for impaired skin integrity* and *Risk for falls*). This emphasized that an important purpose of nursing is the promotion of health and the prevention of disease and disability (International Council of Nurses (ICN) 1987, Royal College of Nursing (RCN) 2003).

No corresponding ICF categories were found for 5 NANDA-I nursing diagnoses (*Readiness for enhanced coping*, *Readiness for enhanced knowledge*, *Ineffective role performance*, *Impaired tissue integrity*, *Risk for infection*). Although the component *Personal Factors* of the ICF includes coping styles and knowledge, these attributes of Mr H. could not yet be classified as ICF categories. And even though *Economic self-sufficiency* is part of the ICF, Mr H.'s performance in the role of family provider had no equivalent in an ICF category. In addition, Mr H.'s *Impaired tissue integrity* at the right heel could not be translated, either as a structure or as a function, into ICF categories. The NANDA-I nursing diagnosis *Risk of infection* covered the risk of severe secondary complication, e.g. of an infection of the upper and lower urinary tract in case of SCI (Girard et al. 2006). As a result of diffuse physiological correlations and attribution, this particular risk was associated with more than one ICF category, and a classification using ICF categories would amount to the mere hypothetical.

The possibility of coding the value *Risk* in the *Axis Status of the Diagnosis* includes potential problems that need to be prevented. With the *Descriptor Readiness for enhanced* resources can be coded, which might be of value in the patient's treatment. The current qualifier scale of the ICF does not enable health professionals to document future potential patient problems (Van Achterberg et al. 2002). Until now, the positive aspects of functioning for Mr H., expressed in ICF categories and coded with *Integrity*, were used as an indicator of a potential problem. This might be a solution to the paradox of not having a *Diagnostic concept* in the NANDA-I Taxonomy II, e.g. for impaired blood vessel functions or impaired joint functions, but having adequate *Descriptors*, along with the coexisting problem of not having an appropriate qualifier scale in the ICF but a fitting ICF category. Thus, to use the ICF in nursing practice, it may be helpful to define a qualifier scale that enables the coding of potential problems as well as resources of patients in addition

to the exclusive coding of *Impairment*, *Limitation*, and *Integrity*. It will be helpful, when using the NANDA-I Taxonomy II, to provide further *Diagnostic concepts* concerning common nursing needs, such as prevention of contractures or deep vein thrombosis prophylaxis. To date, the number of diagnoses is limited to 206 NANDA-I nursing diagnoses. Nurses seem to prefer acting on diagnoses rather than articulating them (Müller-Staub et al. 2006).

Implications for nursing

By applying both the ICF and the NANDA-I Taxonomy II in the stages of assessment and diagnosis, we were able to show how a patient's situation can be mapped in a multi-faceted way. The use of both classifications enables the care and treatment of patients tailored according to their specific needs.

The end products of an assessment by nurses are nursing diagnoses (Hogston 1997). When using the ICF as a framework for assessment, nurses obtain more structured information. But nevertheless, the coded NANDA-I nursing diagnoses additionally meet most of the requirements that are important to nursing issues exclusively.

The ICF may be particularly useful for identifying and documenting patient functioning and thus for generating the corresponding nursing diagnoses. Alternatively, nursing diagnoses which were developed and documented previously by means of a nursing diagnostic process could be linked into ICF categories to provide other health professionals with patient information.

The simultaneous use of the ICF and NANDA-I Taxonomy II needs further exploration. A direct comparison, accentuating the strengths and weaknesses of both classifications for nursing practice, provides a basis for their further beneficial development, especially with regard to their completion in relevant scopes in spinal cord injury nursing. A complete linkage of both classifications may reveal their commonalities and differences in a more detailed way.

It is important to emphasize that this paper concentrates on the common application of two classifications that have their roots in different theoretical and conceptual foundations. The ICF is embedded in a bio-psycho-social model of functioning and disability. The NANDA-I Taxonomy II is based on Gordon's functional health patterns (Gordon 1994) which can be considered as a representative of a stream of thought in nursing in which the needs of the patient are the starting point of

conceptual models and theories (Orem 1971, Roper et al. 2000, Henderson 2006). Whereas models and theories represent the conceptual understanding of a determined reality, classifications based on them allow their implementation in practice. This paper shows the link between both classifications and their practical implications. A detailed discussion of the conceptual models from a historical perspective goes beyond the scope of this paper. However, the concepts “person”, “environment” and “health” in the conceptual foundations of both classifications already reveal a common understanding of human reality.

2.7. CONCLUSIONS

The described commonalities and differences between the ICF and the NANDA-I Taxonomy II should be taken into account when implementation is intended in nursing practice. With the NANDA-I Taxonomy II, requirements can be met that are important for nursing issues exclusively. The ICF is a promising new framework for classifying patient functioning and disability appropriate for a multiprofessional setting.

The application of the ICF is useful for nurses to communicate abbreviated nursing issues with other health professionals in a common language. For nurses, knowledge shared with other health professionals may contribute to a broader understanding of a patient's situation.

A combined application of both classifications is valuable, as shown in the case example. The ICF and the NANDA-I Taxonomy II should be used in concert by nurses and can complement each other to enhance the quality of clinical team work and nursing practice.

2.8. ACKNOWLEDGEMENT

The authors would like to thank Alarcos Cieza for her valuable support in the thinking process.

2.9. REFERENCES

- American Nurses Association (ANA) (1980). Nursing: A social policy statement. ANA, Kansas City.
- Bartholomeyczik, S., Boldt, C., Grill, E., & König, P. (2006). [Development and use of the ICF from the nursing point of view - a position statement of the German speaking working group "ICF and Nursing"]. *Pflege Z.* **59**(9), suppl 2-7. German.
- Bode, R.K., Heinemann, A.W., Semik, P., & Mallinson, T. (2004). Patterns of therapy activities across length of stay and impairment levels: peering inside the "black box" of inpatient stroke rehabilitation. *Arch Phys Med Rehabil.* **27**(7-8), 431-6.
- Boldt, C., Brach, M., Grill, E., Berthou, A., Meister, K., Scheuringer, M., & Stucki, G. (2005a). The ICF categories identified in nursing interventions administered to neurological patients with post-acute rehabilitation needs. *Disabil Rehabil.* **27**(7-8), 431-6.
- Boldt, C., Scheuringer, M., & Grill, E. (2005b). [Functional health and nursing performance: WHO classification challenge]. *Pflege Z.* **58**(3), 164-8. German.
- Bulechek, G.M., Butcher, H.K., & McCloskey Dochterman, J. (2007). *Nursing Interventions Classification (NIC)*, C V Mosby Co., St. Louis.
- Carlson-Catalano, J. (1998). Nursing diagnoses and interventions for post-acute-phase battered women. *Nurs Diagn.* **9**(3), 101-10.
- Cieza, A. & Stucki, G. (2006). International Classification of Functioning, Disability and Health (ICF): A Basis for Multidisciplinary Clinical Practice. In *Clinical Care in Rheumatic Disease. Association of Rheumatology Health Professionals (3rd ed)* (Bartlett, S., Bingham, C., Maricic, M., Iversen, M., & Ruffing, V. eds.) Division of ACR, Atlanta, 79-87.
- Closs, S.J. (1999). Evidence for nursing practice: a clarification of the issues. *J Adv Nurs.* **30**(1), 10-17.
- Disler, P.B., Roy, C.W., & Smith, B.P. (1993). Predicting hours of care needed. *Arch Phys Med Rehabil.* **74**, 139-43.
- Docherty, C. (2006). The structure and content of the nursing component of a pilot electronic health record for the cardiac managed clinical network in Scotland. *Stud Health Technol Inform.* **122**, 342-5.
- Girard, R., Mazoyer, M., Plauchu, M., & Rode, G. (2006). High prevalence of nosocomial infections in rehabilitation units accounted for by urinary tract infections in patients with spinal cord injury. *J Hosp Infect.* **62**(4), 473-9.
- Gordon, M. (1982). *Manual of nursing diagnosis*, Mc Graw-Hill, New York.
- Gordon, M. (1994). *Nursing Diagnosis: Process and Application*, Mosby, St. Louis.

- Granger, C.V., Cotter, A.C., Hamilton, B.B., & Fiedler, R.C. (1993). Functional assessment scales: a study of persons after stroke. *Arch Phys Med Rehabil.* **74**, 133-7.
- Heerkens, Y., Van der Brug, Y., Napel, H.T., & Van Ravensberg, D. (2003). Past and future use of the ICF (former ICIDH) by nursing and allied health professional. *Disabil Rehabil.* **25**(11-12), 620-7.
- Heinen, M.M., van Achterberg, T., Roodbol, G., & Frederiks, C.M. (2005). Applying ICF in nursing practice: classifying elements of nursing diagnoses. *Int Nurs Rev.* **52**(4), 304-12.
- Henderson, V. (2006). The concept of nursing. *J Adv Nurs.* **53**(1), 21-34.
- Hogston, R. (1997). Nursing diagnosis and classification systems: A position paper. *J Adv Nurs.* **26**, 496-500.
- Ingersoll, G. (2000). Evidence-based nursing: what it is and what it isn't. *Nurs Outlook*, **48**(4), 151-2.
- International Council of Nurses (ICN) (1987). Position statement. ICN, Geneva.
- Kearney, P. (2005). The ICF and rehabilitation nursing: emphasizing the social. *JARNA*, **8**(1), 9-16.
- Kearney, P.M. & Pryor, J. (2004). The International Classification of Functioning, Disability and Health (ICF) and nursing. *J Adv Nurs.* **46**(2), 162-70.
- Keenan, G., Yakel, E., & Marriott, D. (2006). HANDS: A revitalized technology supported care planning method to improve nursing handoffs. *Stud Health Technol Inform.* **122**, 580-4.
- Moorhead, S., Johnson, M., & Maas, M.L. (2007). *Nursing Outcomes Classification (NOC)*, C V Mosby Co., St. Louis.
- Mueller, M., Boldt, C., Grill, E., Strobl, R., & Stucki, G. (2008). Identification of ICF categories relevant for nursing in the situation of acute and early post-acute rehabilitation. *BMC Nurs.* **7**(3), 1-8. Retrieved from <http://www.biomedcentral.com/content/pdf/1472-6955-7-3.pdf> on 18 February 2008).
- Müller-Staub, M., Lavin, M.A., Needham, I., & van Achterberg, T. (2006). Nursing diagnoses, interventions and outcomes - application and impact on nursing practice: systematic review. *J Adv Nurs.* **56**(5), 514-31.
- Müller-Staub, M., Lavin, M.A., Needham, I., & Van Achterberg, T. (2007). Meeting the criteria of a nursing diagnosis classification: evaluation of ICNP, ICF, NANDA and ZEPF. *Int J of Nurs Stud.* **44**(5), 702-13.
- NANDA International (2005). *Nursing diagnoses: definitions & classification 2005-2006*, NANDA International, Philadelphia.
- NANDA International (2009). *Nursing Diagnoses: Definitions and Classification, 2009-2011*, Wiley-Blackwell, Chichester.

Orem, D.E. (1971). *Nursing: Concepts of practice*, McGraw-Hill, New York.

Pryor, J., Forbes, R., & Hall-Pullin, L. (2004). Is there evidence of the International Classification of Functioning, Disability and Health in undergraduate nursing students' patient assessments? *Int J Nurs Pract.* **10**(3), 134-41.

Rauch, A., Kirchberger, I., Boldt, C., Cieza, A., & Stucki, G. (2009). Does the Comprehensive International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis capture nursing practice? A Delphi survey. *Int J Nurs Stud.* **46**, 1320-34.

Roper, N., Logan, W., & Tierney, A.J. (2000). *The Roper-Logan-Tierney Model of Nursing: Based on Activities of Living*, Churchill Livingstone, Edinburgh.

Royal College of Nursing (RCN) (2003). *Defining Nursing*. RCN, London. Retrieved from http://www.rcn.org.uk/__data/assets/pdf_file/0008/78569/001998.pdf on 30 April 2003.

Sackett, D.L., Rosenberg, W.M.C., Muir Gray, J.A., Brian Haynes, R., & Scott, W. (1996). Evidence based medicine: what it is and what it isn't. *Br Med J.* **312**, 71-2.

Steiner, W.A., Ryser, L., Huber, E., Uebelhart, D., Aeschlimann, A., & Stucki, G. (2002). Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. *Phys Ther.* **82**(11), 1098-107.

Thoroddsen, A. (2005). Applicability of the Nursing Interventions Classification to describe nursing. *Scand J Caring Sci.* **19**(2), 128-39.

Turner, S.J. (1991). Nursing process, nursing diagnoses, and care plans in a clinical setting. *J Nurs Staff Dev.* **7**(5), 239-43.

Van Achterberg, T., Frederiks, C., Thien, N., Coenen, C., & Persoon, A. (2002). Using ICIDH-2 in the classification of nursing diagnoses: Results from two pilot studies. *J Adv Nurs.* **37**(2), 135-44.

Van Achterberg, T., Holleman, G., Heijnen-Kaales, Y., Van der Brug, Y., Roodbol, G., Stallinga, H.A., Hellema, F., & Frederiks, C.M. (2005). Using a multidisciplinary classification in nursing: the International Classification of Functioning, Disability and Health. *J Adv Nurs.* **49**(4), 432-41.

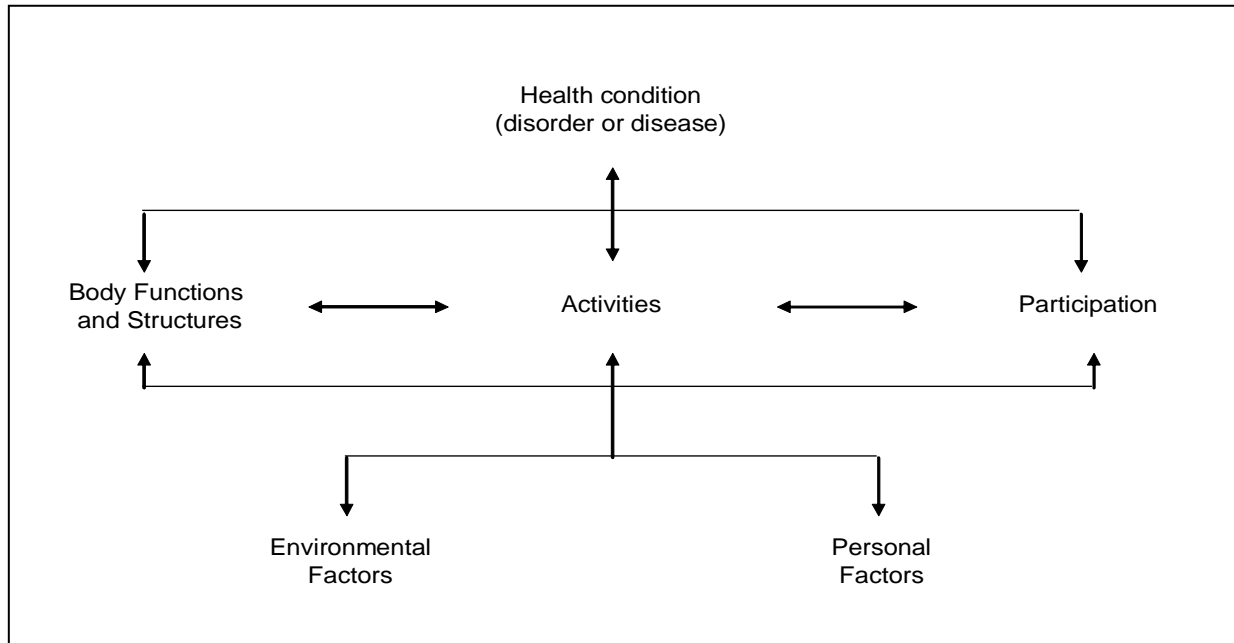
Van Grunsven, A., Bindels, R., Coenen, C., & de Bel, E. (2006). Developing an integrated electronic nursing record based on standards. *Stud Health Technol Inform.* **122**, 294-7.

Van Krogh, G., Dale, C., & Naden, D. (2005). A framework for integrating NANDA, NIC, and NOC terminology in electronic patient records. *J Nurs Scholarsh.* **37**(3), 275-81.

World Health Organization (WHO) (2001). *International Classification of Functioning, Disability and Health (ICF)*, WHO, Geneva.

2.10. FIGURES AND TABLES

Figure 1: The integrative bio-psycho-social Model of Functioning, Disability and Health of the WHO (World Health Organization (WHO) 2001, p. 18)



Reproduced by permission of WHO

Figure 2: The organization of NANDA-I Taxonomy II with its 13 Domains and 47 Classes (NANDA International 2009, p. 368-9)

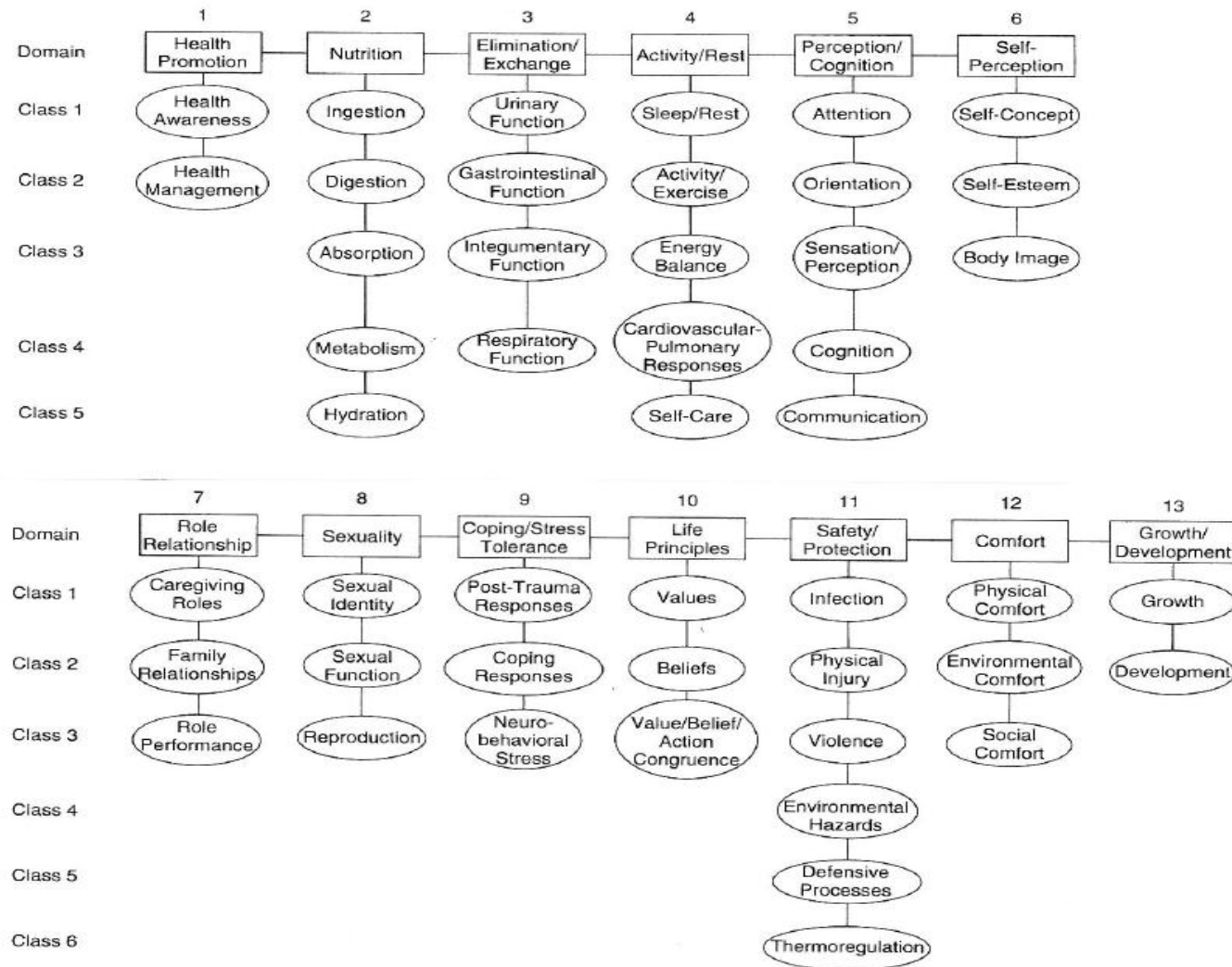


Table 1: ICF Assessment Sheet: Illustration of how ICF components can be used to structure the patient's problems and resources (listed in the upper section "patient perspective") as well as findings and observations by the team (listed in the lower section "health professional perspective"). Please note that the wording listed in the upper section denotes the patient's words. In the lower section ICF categories describe the patient's situation.

Name		H.	
Date of birth		01.02.1974	
Diagnosis		SCI, T12/L1, AIS A	
Patients Perspective	I can't move my legs I have no sensation in my legs I have a pressure ulcer on my right heel I have no balance in my body I have little muscle power in my body I have severe pain in my back I can't empty my bladder and my bowel I can't have sex I don't really sleep at night I can't concentrate, e.g. reading a book Often I am very tired Sometimes I feel a lack of energy and drive I am insecure and concerned about my situation		I can't get out of my bed by myself I can't move the wheelchair It takes a lot of effort to change my body position in bed I can't sit without using my arms to balance I can't sit for a long time I can't walk I can't go to toilet I can't wash myself
	Body Structures/Body Functions b134 Sleep functions* b130 Energy and drive functions* b1801 Body Image* b265 Touch functions* b270 Sensory functions related to temperature and other stimuli* b28013 Pain in back* b415 Blood vessel functions** b455 Exercise tolerance functions* b525 Defecation functions* b620 Urination functions* b640 Sexual functions* b710 Mobility of joint functions** b7300 Power of isolated muscles and muscle groups* b755 Involuntary movement reaction functions* b760 Control of voluntary movement functions* b7800 Sensation of muscle stiffness* b810 Protective functions of the skin* b820 Repair functions of the skin* s810 Structures of areas of skin*		Activities and Participation d410 Changing basic body position* b415 Maintaining a body position* d420 Transferring oneself* d450 Walking* d4551 Climbing* d465 Moving around using equipment* d510 Washing oneself* d520 Caring for body parts* d530 Toileting* d540 Dressing* d570 Looking after one's health ***
Health Professional Perspective			
Environmental Factors		Personal Factors	
e1101 Drugs e1201 Assistive products for mobility and transportation e1550 Design for buildings for private use e310 Immediate family		e355 Health professionals e5800 Health services 33 years old Married Father of two children Construction worker	
		Only little knowledge about SCI and how to handle the limitations and impairments Ready to enhance his coping strategies Active and motivated person	

* coded as impairment or limitation

** coded as integrity (currently no problem, but under observation or relevant to be treated preventively)

*** coded as limitation and integrity

Table 2: Classification of Mr. H.'s nursing needs using NANDA-I Taxonomy II with coded Domains and Classes and the Axes *Status of the Diagnosis, Judgement, Time, Location* and/or *Diagnostic Concept*. Approved NANDA-I nursing diagnoses are marked in bold.

Domain	Class	Status	Diagnosis	Judgement	Time	Location	Diagnostic concept
1 - Health Promotion	2 - Health Management	Actual		Effective			therapeutic regimen management
3 - Elimination and Exchange	1 - Urinary Function	Actual		Impaired		urinary	elimination
	2 - Gastrointestinal Function	Actual		Readiness (for enhanced)		urinary bowel	elimination incontinence
4 - Activity/ Rest	1 - Sleep/rest	Actual		Disturbed			sleep pattern
	2 - Activity/ exercise	Actual		Impaired			physical mobility
		Actual		Impaired			walking
		Actual		Impaired			wheelchair mobility
		Actual		Impaired			transfer ability
		Actual		Impaired			bed mobility
	3 - Energy balance	Actual					fatigue
	4 - Cardiovascular/ Pulm. Responses	Actual					activity intolerance*
	5 - Self - care	Actual					bathing self - care deficit*
		Actual					dressing self - care deficit*
		Actual					toileting self - care deficit*
5 - Perception/ Cognition	4 - Cognition	Actual		Readiness (for enhanced)			knowledge
6 - Self-Perception	3 - Body Image	Actual		Disturbed			body image
7 - Role Relationships	3 - Role Performance			Ineffective			role performance
8 - Sexuality	2 - Sexual Function	Actual					sexual dysfunction
9 - Coping/ Stress Tolerance	2 - Coping Responses	Actual		Readiness (for enhanced)			coping*
11 - Safety/ Protection	1 - Infection	Risk for					infection
	2 - Physical Injury	Risk for					falls
		Actual		Impaired			skin integrity
		Risk for		impaired			skin integrity
		Actual		Impaired			tissue integrity
		Actual		Ineffective			protection
12 - Comfort	1 - Physical Comfort	Actual			Acute		pain

* This concept is not explicitly named in the Axis Diagnostic Concept of NANDA-I taxonomy II 2009-2011, but part of an approved NANDA-I nursing diagnosis 2009-2011.

Table 3: Mr. H.'s functioning and disability classified using the ICF in comparison to documentation of his nursing needs using NANDA-I Taxonomy II

Patient's functioning and disability classified using ICF categories			Patient's nursing needs using NANDA-I Taxonomy II	
* mapped to five nursing diagnoses			(bold = Approved diagnosis by NANDA-I) ** mapped twice to ICF categories	
ICF Code	Aspect (+/-)	Name of the ICF category	Diagnostic Code	Diagnosis Label
b134	Impairment of	Sleep functions	00198	Disturbed sleep pattern
b130	Impairment of	Energy and drive functions	00093	Fatigue
b1801	Impairment of	Body image	00118	Disturbed body image
b265	Impairment of	Touch functions	--	--
b270	Impairment of	Sensory functions related to temperature and other stimuli	--	--
b28013	Impairment of	Pain in back	00132	Acute pain
b415	Integrity of	Blood vessel functions	--	--
b455	Impairment of	Exercise tolerance functions	00092	Activity intolerance
b525	Impairment of	Defecation functions	00014	Bowel incontinence
b620	Impairment of	Urination functions	00016	Impaired urinary elimination
b640	Impairment of	Sexual functions	00059	Sexual dysfunction
b710	Integrity of	Mobility of joint functions	--	--
b7300	Impairment of	Power of isolated muscles and muscle groups	--	--
b755	Impairment of	Involuntary movement reaction functions	--	--
b760	Impairment of	Control of voluntary movement functions	00085	Impaired physical mobility
b7800	Impairment of	Sensation of muscle stiffness	--	--
b810	Impairment of	Protective functions of the skin	00046	Impaired skin integrity
b820	Impairment of	Repair functions of the skin	--	--
s810	Impairment of	Structures of areas of skin		Impaired skin integrity **
d410	Limitation of	Changing basic body position	00091	Impaired bed mobility
d415	Limitation of	Maintaining a body position	--	--
d420	Limitation of	Transferring oneself	00090	Impaired transfer ability
d450	Limitation of	Walking	00088	Impaired walking
d4551	Limitation of	Climbing	00088	Impaired walking **
d465	Limitation of	Moving around using equipment	00089	Impaired wheelchair mobility
d510	Limitation of	Washing oneself	00108	Bathing self - care deficit
d520	Limitation of	Caring for body parts	00108	Bathing self - care deficit **
d530	Limitation of	Toileting	00110	Toileting self - care deficit
d540	Limitation of	Dressing	00109	Dressing self - care deficit
d570	Integrity of	Looking after one's health*	--	Effective therapeutic regimen management
	Integrity of	Looking after one's health*	00166	Readiness for enhanced urinary elimination
	Limitation of	Looking after one's health*	00043	Ineffective protection
	Limitation of	Looking after one's health*	00047	Risk for impaired skin integrity
	Limitation of	Looking after one's health*	00155	Risk for falls
--	--	-- (Personal Factor)	00158	Readiness for enhanced coping
--	--	-- (Personal Factor)	00161	Readiness for enhanced knowledge
--	--	--	00044	Impaired tissue integrity
--	--	--	00004	Risk for infection
--	--	-- (Personal Factor)	00055	Ineffective role performance

3. Research article 2: Nurses' intervention goal categories for persons with spinal cord injury based on the International Classification of Functioning, Disability and Health: an international Delphi survey

Boldt, Christine, MSc, RN ^{1 2}

Professor

Velstra, Inge-Marie, MSc, OT ^{2 3}

Research Fellow

Brach, Mirjam, MBA, MPH ^{2 4}

Research Manager

Linseisen, Elisabeth, MSc, RN ⁵

Research Fellow

Cieza, Alarcos, PhD, MPH ^{5 6}

Professor

¹ *Department of Applied Social Sciences, University of Applied Sciences Munich, Munich, Germany*

² *Swiss Paraplegic Research, Nottwil, Switzerland*

³ *Swiss Paraplegic Centre, Clinical Trial Unit, Nottwil, Switzerland*

⁴ *Seminar of Health Sciences and Health Policy, University of Lucerne, Lucerne, Switzerland*

⁵ *Department of Medical Informatics, Biometry and Epidemiology – IBE, Research Unit for Biopsychosocial Health, Ludwig-Maximilian University, Munich, Germany*

⁶ *Faculty of Social and Human Sciences, School of Psychology, University of Southampton, Southampton, United Kingdom*

SHORT TITLE

Nurses' intervention goal categories based on the ICF

KEYWORDS

Delphi technique

International Classification of Functioning, Disability and Health

Nursing

Spinal Cord Injuries

Accepted for publication on 21st May 2012 by *Journal of Advanced Nursing* in revised form

Ranked 9th of 85 in the 2010 Thomson Reuters Journal Citation Report (Social Science – Nursing)

Impact Factor: 1.540

Boldt C, Velstra IM, Brach M, Linseisen E, Cieza A. (2013).

Nurses' intervention goal categories for persons with spinal cord injury based on the International Classification of Functioning, Disability and Health: an international Delphi survey. *J Adv Nurs*. 69(5): 1109-1124.

3.1. ABSTRACT

Aim

To examine whether the International Classification of Functioning, Disability and Health can be used as standard language to express intervention goals on the part of nurses caring for persons with spinal cord injury.

Background

This classification is multipurpose and is designed to organize a wide range of health-related information that can be used in any health-care context and especially by interdisciplinary teams.

Design

A three-round, consensus-building, electronic-mail survey using the Delphi technique.

Methods

In the Delphi process spinal cord injury nurses were asked to name the problems, resources and aspects of the environment that they address when treating patients with spinal cord injury. The answers were linked to the categories of the International Classification of Functioning, Disability and Health. The study was carried out in 2007.

Results

Nurses (N=35) from 17 countries provided 823 answers that were linked to a set of 143 categories, 24 Personal Factors and 51 concepts categorized as 'Not-covered', of which 32 were areas of fundamental importance to nurses. These were mainly risks that persons with spinal cord injury may face, such as the risk for future impairments.

Conclusion

The use of the data set resulting from this study should help determine and document the needs that pertain to spinal cord injury nursing on an international level. Future research should confirm the usefulness of such a data set in clinical practice and can contribute to the update process of the International Classification of Functioning, Disability and Health.

3.2. SUMMARY STATEMENT

What is already known about this topic

- The International Classification of Functioning, Disability and Health provides a common framework for all health professionals, including nurses.
- The nursing of individuals with a spinal cord injury requires a comprehensive view of the intervention goals to appropriately address all of a person's needs in the different phases of their care.

What this paper adds

- A list of categories of the International Classification of Functioning, Disability and Health and other domains relevant to nursing practice that can be used as a data set to document patients' problems and nurses' intervention goals when treating persons with spinal cord injury.
- Supporting evidence to the well known fact that nurses care for patients from a biopsychosocial perspective; their intervention goals go beyond Activities and Participation, also addressing Body Functions, Environmental and Personal Factors.
- A data set that enables nurses to compare their contributions to patient care with other health professionals, in different settings and on an international level.

Implications for practice and/or policy

- This study advocates a list for the care of persons with spinal cord injury based on the International Classification of Functioning, Disability and Health to be used as a starting point in the nursing process and ensuring comprehensive, standardized documentation of intervention goals as well as improved exchange of information with other health professionals in a common language.
- It places emphasis on how the International Classification of Functioning, Disability and Health might be updated, for example by adding the nursing concept 'Risk for' so that it better fits the needs of nursing.
- This study has taken one step forward in making the International Classification of Functioning, Disability and Health a user-friendly tool for everyday nursing practice.

3.3. INTRODUCTION

Spinal cord injury (SCI) results in permanent or temporary impairment or loss of motor and/or sensory function in the cervical, thoracic, lumbar or sacral segments of the spinal cord following damage to neural elements in the spinal canal (Marino *et al.* 2003) with tremendous implications for the lives of those afflicted (Schoenherr *et al.* 1999). SCI represents a life-long challenge (Nolan & Nolan 1998) and is, therefore, a devastating health condition imposing enormous personal, social and financial costs (Ackery *et al.* 2004).

Regardless of the health-care context and setting, when caring for persons with SCI, nurses aim to promote, maintain and improve health while optimizing their patients' well-being and quality of life (Royal College of Nursing (RCN) 2003).

Nurses work in collaboration with other health professions as a professional group having its own identity based on specific knowledge, clinical and interpersonal skills, problem-solving approaches, clinical judgment and technical skills (Verma *et al.* 2006).

The acute management of SCI will influence the patient's eventual neurological and functional outcome and ultimately their quality of life. Common acute-care interventions aim to reestablish physiologic homeostasis, reduce the number of secondary conditions and preserve neurologic function (Karlet 2001).

Rehabilitative care begins as soon as the patient is medically stable. All rehabilitation professionals on the interdisciplinary team reflect on how to promote the highest possible quality of life in the context of the patient's social situation (Mumma 2001). Rehabilitation nurses carry out several interventions, including direct patient care, collaborative medical care, patient and caregiver education, care management and psychosocial support for patients and their families (Johnson *et al.* 2009). They attempt to empower patients and their families or caregivers in taking control of and managing their own care and futures (Chen & Boore 2007).

After discharge from clinical rehabilitation, persons with SCI are confronted with numerous serious problems that include the need to perform intermittent catheterization and the higher risk of skin ulcers caused by mobility restrictions. Many of these problems can be solved or ameliorated by expert nursing care. Nurses contribute significantly e.g. in the prevention of complications in the community setting (Bloemen-Vrencken & de Witte 2003). Nurses supervise clean self-intermittent catheterizations to avoid infections and they continue providing advice on

how to perform daily skin inspection to prevent ulcers. Persons with SCI have highly individualized needs during long-term community care and skills from different disciplines are required to meet them (Cox *et al.* 2001).

During the course of their routine work, health professions use different documentation systems, terminologies and classifications to describe patients' problems and their intervention goals. The classifications widely used in nursing practice are the Nursing Diagnoses Classification (NANDA-I Taxonomy II) (NANDA International 2009), the Nursing Intervention Classification (NIC) (Bulechek *et al.* 2007), the Nursing Outcome Classification (NOC) (Moorhead *et al.* 2007) and the International Classification for Nursing Practice (ICNP - Version 2) (International Council of Nurses 2009). Specific professional terminologies that are not designed to be used by other healthcare professionals are established in the respective communities.

The lack of a common language and viewpoint may constitute a barrier to optimal patient management (Jelles *et al.* 1995). Different languages and information systems encumber patient-centered management. The management process, which proceeds from identification of patient problems to intervention evaluation, does not integrate the viewpoints of different health professionals; instead, it is carried out independently by each health profession. A common frame of reference could facilitate multi- and interdisciplinary cooperation (Steiner *et al.* 2002).

3.4. BACKGROUND

The International Classification of Functioning, Disability and Health (ICF) (World Health Organization (WHO) 2001) is a framework and classification for all health professionals to be used in any health-care context (e.g. acute, post-acute or community) and setting (e.g. acute or specialized hospital or nursing home) and especially by interdisciplinary teams.

Both conceptual and practical considerations regarding the practicability and usefulness of the ICF in nursing can be found in the current nursing literature (Boldt *et al.* 2010). The link between the ICF and the different nursing terminologies has also been addressed, emphasizing that the ICF includes the areas of functioning and disability that nurses care for in different settings (Boldt *et al.* 2005a, Boldt *et al.* 2010, Boldt *et al.* 2005b, Heinen *et al.* 2005, Mueller *et al.* 2008, Pryor *et al.* 2004, Rauch *et al.* 2009, Van Achterberg *et al.* 2002, Van Achterberg *et al.* 2005, Van

Grunsvén *et al.* 2006). However, concrete approaches to facilitate the use of the ICF in nursing practice have not yet been developed.

One of the strengths of the ICF is its internationality. Its coding system enables any health professional anywhere to describe the functioning of their patients in the same language. Health statistics can also be standardized and compared among countries. Nursing-care requirements can be determined and reported internationally. Additional strengths are its etiological neutrality and its comprehensiveness. The latter can also constitute a hindrance in everyday clinical practice because the ICF is very exhaustive and highly complex. Therefore, it has to be transformed into a practice-friendly tool to initiate its application in nurses' day-to-day work. One approach to achieving this is to identify nurses' intervention goals in patients with a determined health condition and to study the extent to which those goals can be expressed in the ICF language.

Such an approach would allow nurses to use the same terminology as other health professionals when discussing and documenting the needs of patients from assessment to evaluation during the nursing process. This approach would complement the use of the nursing-specific classifications to enhance the quality of clinical teamwork and nursing practice. Above all, the question still remains how far the ICF can be routinely applied by nurses in the nursing process.

3.5. THE STUDY

Aim

The objective of this investigation was to determine the extent to which the intervention goals of nurses caring for persons with SCI can be expressed in the standardized language of the ICF. The specific aims were to: (1) identify the problems and resources of persons with SCI and the relevant aspects of the environment that are treated by nurses; (2) determine whether those problems, resources and aspects of the environment can be translated into the ICF language; and (3) establish whether there are other problems, resources or aspects of the environment that are relevant to nurses but are still missing in the ICF.

Design

A three-round, consensus-building, electronic-mail survey using the Delphi technique was conducted with nurses experienced in caring for patients with SCI

(Duffield 1993, Goodman 1987, Linstone & Turoff 1975, Williams & Webb 1994). The Delphi technique aims to gain consensus from a panel of individuals-knowledgeable in the topic being investigated (McKenna 1994). It is a multi-stage process, with each stage building on the results of the previous. A series of rounds are used to both gather and provide information on a particular topic (Jones & Hunter 1995). In nursing research, the Delphi technique has been a valuable tool used to investigate several themes and to achieve consensus on issues where none existed previously (Hasson *et al.* 2000, Kennedy 2004).

Participants

The recruitment phase took place from February to April 2007. Three strategies were used to identify experts. First, nurse associations worldwide were contacted by e-mail and asked to provide names of nurses working in the field of SCI. We contacted all of those nursing associations having no specific focus on a health condition, such as the 'American Nurses Association, Inc.' and all nursing associations focused on SCI, such as the 'Spinal Injury Nurses Association' or with a focus that potentially includes SCI, such as the 'World Federation of Neuroscience Nurses'. Second, a literature search was performed to identify authors with a nursing background in SCI. Third, those cooperating partners of the ICF Research Branch of the World Health Organization, Collaborating Centre for the Family of International Classifications in German, who have a background in nursing (Biering-Sorensen *et al.* 2006).

All identified experts were contacted via a brief e-mail that included a description of the study aim and an invitation to participate. To assure that participants in the study were experts in SCI treatment, it was emphasized that they should be nurses with at least two years of experience in the treatment of SCI.

Data collection

The process and verbatim questions of the electronic-mail survey using the Delphi technique are displayed in Figure 1.

First Delphi Round

In the first Delphi round, an informational letter and an open-ended, health-professional-specific questionnaire were sent by email. The questionnaire requested the participants to name the problems, resources and aspects of the environment that nurses address when treating patients with SCI. It also contained questions on demographic characteristics and professional experience. The participants had three weeks to respond and reminders were sent out two days before the deadline.

All responses to the open-ended questionnaire were recorded. The concepts contained in each of the responses were identified and linked to the categories of the ICF according to established linking rules (Cieza *et al.* 2002, Cieza *et al.* 2005).

The ICF categories are divided into four components that are coded by a letter: Body Functions (b), Body Structures (s), Activities and Participation (d) and Environmental Factors (e). In each component there are up to four levels of categories: first- (chapter), second-, third- and fourth-level ICF categories. On the first level, the letter of the component is followed by one digit that indicates the chapter (e.g. b2 Sensory functions and pain). On the second level, two additional digits follow (e.g. b280 Sensation of pain). On the third and fourth levels, an additional digit is added, (e.g. b2801 Pain in body part and b28013 Pain in back).

Problems, resources and environmental factors not found in the ICF were listed as 'Not-covered in the ICF'. We differentiated a subgroup of 'Not-covered in the ICF' concepts that referred to risks possibly faced by the person with SCI. Aspects related to personal characteristics were listed as Personal Factors.

Twenty percent of the responses were linked independently by two health professionals (CB, IMV). Consensus between both was used to decide which concepts were contained in each response and which ICF category should be linked to each concept. If the two health professionals disagreed, a third person (AC) was consulted and a final decision was made based on discussion.

Second Delphi Round

In the second Delphi round, the participants received a closed-ended questionnaire containing a list of the ICF categories linked to the responses from the first round organized according to the ICF components, a list of the Personal Factors and the concepts 'Not-covered in the ICF'.

The participants were asked to agree or disagree on whether the respective elements in the lists constituted a problem, a resource, or an aspect of the environment that nurses address when treating patients with SCI. They had three weeks to respond and reminders were sent out two days before the deadline.

Third Delphi Round

In the third round, a questionnaire and the corresponding instructions were sent to those participants who had responded to at least one of the first two rounds. This questionnaire included the same list of ICF categories, of Personal Factors and of the concepts 'Not-covered in the ICF' that had been sent in the second round.

For each element in the list, the participant could see whether s/he had agreed or disagreed in the second round and the percentage of participants who had agreed. They were asked to take into account their own answers and the answers of the group from the second round. In this last round, the participants had four weeks to respond and reminders were sent out two days before the deadline.

Ethical considerations

The Ethics Committee of the Canton Lucerne, Switzerland, which is responsible for the ethical approval of any study in the field of health-care and health-services research, was consulted for ethical approval (Request number 11068) and concluded that no formal ethical scrutiny was required for this study.

Data analysis

Descriptive statistics were used to characterize the participants and the frequencies of their answers in the second and third rounds. Kappa statistics with bootstrapped confidence intervals were used to describe the agreement between the two health professionals during the linking process on the first, second and third levels of the ICF hierarchy (Cohen 1968, Vierkant 1996). Statistical analysis was performed using SAS for Windows V8 (SAS Institute Inc, PO Box 8000, Cary, NC 27511).

Validity and reliability/rigour

In summary, four approaches were used to ensure the trustworthiness of the data: (1) the open-ended questionnaire of the e-mail survey contained questions,

which had been used and validated in other investigations (Kirchberger *et al.* 2007, Rauch *et al.* 2009); (2) the concepts contained in the responses were identified and linked to the ICF based on established linking rules; (3) twenty percent of the responses were linked independently by two health professionals; and (4) Kappa statistics were used to describe the agreement between both health professionals.

3.6. RESULTS

Recruitment and participants

Nurses' associations (N=143) were contacted and they provided the names of 28 potential participants, of whom 18 agreed to participate. Fifty-four nurses (authors of SCI literature) were identified from the literature search. Some of the contacted authors argued that they had been out of clinical nursing practice for too long to be able to participate. Only one of the 54 authors agreed to participate. Forty-seven cooperating partners of the ICF Research Branch were contacted and 16 agreed to participate. No further reasons for non-participation were provided. Five additional nurses who agreed to participate were contacted on the basis of personal recommendations by other participants ("snowball system"). A total of 40 nurses agreed to participate.

Of those, 35 answered the first round. The demographic and professional characteristics, as well the home country of the experts who answered the first round, are shown in Table 1. Nurses from 17 countries in five WHO regions provided answers.

Delphi process

823 patients' problems, patients' resources or aspects of the environment that nurses address in patients with SCI were named in the first Delphi round. Of 40 nurses who agreed to participate, 35 (88%) answered the first round. Twenty-seven of the 35 (77%) returned the second-round questionnaire. Regardless of whether they had answered the second round or not, all participants in the first round received the third-round questionnaire. None of the 8 participants who missed the second round answered the third. Of the 27 participants in the second round, 25 (71%) returned the third round questionnaire.

Linking the responses to the ICF and agreement

Altogether, 143 ICF categories were linked to the participants' responses in the first round. The results, including the percentage of agreement among the participants in the third round, are presented in Tables 2 – 8.

All ICF components were represented (see Tables 2 – 5). The responses of the participants in the first round were linked to a total of 15 first-level, 73 second-level, 54 third-level categories and one fourth-level category.

In the component Body Functions, 8 of the 9 ICF chapters were represented by three first-, 30 second- and 18 third-level categories and one fourth-level category. Six belong to chapter b1 Mental functions, four to b2 Sensory functions and pain, 14 to b4 Functions of the cardiovascular, haematological, immunological and respiratory systems, ten to b5 Functions of the digestive, metabolic and endocrine systems, eight to b6 Genitourinary and reproductive functions, six to b7 Neuromusculoskeletal and movement-related functions and four to b8 Functions of the skin and related structures. There were numerous ICF categories that featured a level of more than 90% agreement in all the chapters. The only chapter not represented was b3 Voice and speech functions.

In the component Body Structures, six ICF chapters were represented by one first-, three second- and four third-level categories. S1 Structures of the nervous system, s4 Structures of the cardiovascular, immunological and respiratory systems, s5 Structures related to the digestive, metabolic and endocrine systems, s6 Structures related to the genitourinary and reproductive systems and s8 Skin and related structures were represented by one ICF category each. S7 Structures related to movement was represented by three ICF categories. The named ICF categories in the chapters s1 Structures of the nervous system, s4 Structures of the cardiovascular, immunological and respiratory systems, s6 Structures related to the genitourinary and reproductive systems and s8 Skin and related structures for the most part featured agreement >90%.

All nine chapters of the ICF were represented in the component Activities and Participation. A total of eight first-, 24 second- and 24 third-level categories were addressed in the participants' responses. One of these belongs to chapter d1 Learning and applying knowledge, three to d2 General tasks and demands, two to d3 Communication, 16 to d4 Mobility, 15 to d5 Self-care, two to d6 Domestic life, five to

d7 Interpersonal interactions and relationships, eight to d8 Major life areas and four to d9 Community, social and civic life. Only three chapters had ICF categories above 90% agreement, namely d3 Communication, d4 Mobility and d5 Self-care.

Four of the five chapters were represented in the component Environmental Factors. A total of three first-, 16 second- and eight third-level categories were addressed in the participants' responses. Thirteen of those belong to chapter e1 Products and technology, six to e3 Support and relationships, three to e4 Attitudes and five to e5 Services, systems and policies. The chapter that was not represented was e2 Natural environment and human-made changes to environment. The only ICF categories at >90% agreement were e3 Support and relationships and d5 Services, systems and policies.

Table 6 shows the 24 Personal Factors that were linked to the participants' responses, as well as the percentage of agreement in the third round. Thirteen of them had >90% agreement. Table 7 shows the 19 concepts categorized as 'Not-covered in the ICF in general'. Seven were agreed to by >90% of the participants. Table 8 shows the 32 concepts categorized as 'Not-covered in the ICF and which referred to risks the person with SCI may have'. Twenty-nine of the 32 were agreed to by >90% of the participants.

The Kappa statistic for the linking was as follows:

- On the first level: 0.44 (0.36; 0.51); Percentage of agreement: 47.4%,
- on the second level: 0.35 (0.28; 0.42); Percentage of agreement: 37.1% and
- on the third level: 0.22 (0.15; 0.28); Percentage of agreement: 23.4%.

3.7. DISCUSSION

The results of this study show us which areas of functioning, disability and contextual factors nurses target with their interventions in persons with SCI. Nurses agreed that they target a broad spectrum of Body Functions involving almost all body systems, some areas of Activities and Participation domains, especially those related to Communication, Mobility and Self-care and single aspects of the social environment, including the family and health services.

It was possible to express many of the intervention goals in the language of the ICF, showing that nurses could use the ICF to document the problems of persons with SCI that will become their intervention goals. In this way, the ICF could be used as a common language to be shared with other health professionals. Studies have already shown that the ICF can also be used to report the intervention goals of occupational therapists (Herrmann *et al.* 2011a), physical therapists (Herrmann *et al.* 2011b), physicians (Gebhardt *et al.* 2010) and psychologists (Becker *et al.* 2010). The use of a standardized, common language unifies communication in a discipline across health-care settings (Mrayyan 2005) and facilitates the exchange of information among different health professions (Steiner *et al.* 2002). The question that needs to be answered is, at which stage of the nursing process the ICF should be integrated, especially because there are already well-established nursing classifications, such as the NANDA-I Taxonomy II, the NIC and the NOC. To answer this question, it is important to remind ourselves that the ICF, as a classification of functioning and disabilities, cannot be considered a classification of nursing intervention goals per se, but as a classification that enables patient problems to be identified and formulated, facilitating the expression of nursing intervention goals.

In the nursing process, the ICF could be advantageously integrated into patient assessment, where no specific nursing classification exists and which should ideally be performed by an interdisciplinary team. This assessment then becomes the basis for the nursing diagnosis for which, for example, the NANDA-I Taxonomy II can be used. The NIC and the NOC have been respectively recommended to determine nursing interventions and to evaluate nursing outcomes (Bulechek *et al.* 2007, Moorhead *et al.* 2007). Some attempts have already been made to link and harmonize the different classifications (Goossen 2006, Kim & Coenen 2011).

The results of this study contribute to the implementation of the ICF in nursing practice in SCI. We present a list of ICF categories that can be used as a data set to document patients' problems and, consequently, nurses' intervention goals when treating persons with SCI. We have taken one step forward in making the ICF a user-friendly tool for everyday nursing practice.

This survey also found different intervention goals that could not be translated into the ICF language. This applies in particular to areas that are of fundamental importance to nurses, i.e. detecting the risk of secondary conditions or the risk of future impairments or limitations in self-care. We named these interventions as goals 'Not-covered in the ICF and which referred to risks the person with SCI may have'. One example is the risk for pressure ulcers, which is one of the most common complications (New *et al.* 2004, Raghavan *et al.* 2003) and which nurses continuously have in mind when taking care of persons with SCI.

Risks for developing impairments, limitations or restrictions cannot be documented in the ICF. Previous publications have suggested that a qualifier for potential problems should be added to address this information (Van Achterberg *et al.* 2002). This should be addressed in the update process of the ICF, which is currently taking place. For the time being, risks can be coded with the Nursing Diagnoses Classification (NANDA-I Taxonomy II) (NANDA International 2009). The value Risk in the axis Status of the Diagnosis includes potential problems that need to be prevented. For example, in the NANDA-I nursing diagnosis Risk for impaired skin integrity (00047) is defined as 'Risk for skin being adversely altered'. For this risk, several external and internal risk factors, such as Moisture, Physical immobilization or Impaired sensation are also mentioned (NANDA International 2009, p. 321). This results in a very comprehensive description of the relationships among risks and risk factors fundamental to good nursing practice.

One relevant issue not mentioned by the participants is 'falls'. In the NANDA-I Taxonomy II the diagnosis Risk for falls (00155) is available and is defined as 'Increased susceptibility to falling that may cause physical harm' (NANDA International 2009, p.312). Persons with SCI have a higher incidence of falls and more reported fractures caused by falls as compared with older adult populations (Brotherton *et al.* 2007). Their importance has also been frequently emphasized from the economic point of view. For example, wheelchair-related falls are costly to both the individual concerned and the health-care system. The medical costs of

wheelchair-related falls, including rehabilitation, were estimated at between \$25,000 and \$75,000 (Gavin-Dreschnack *et al.* 2005).

The reason why falls were not mentioned by the participants in this Delphi survey cannot be answered. However, this omission points out the need to validate the results of this study in clinical practice. The list of ICF categories, together with the list of identified risks, could be applied in everyday clinical practice. Such a data set can be used by health professionals to guide the assessment and the overall management of patients. This approach, also taking nurses into account, has already been proposed using the ICF (Rauch *et al.* 2010).

There were also intervention goals that were mentioned and strongly supported by the participants in this study, but that could not be linked to the ICF. We categorized them under 'Not covered in the ICF in general'. They refer to domains of life in general, such as autonomy, dependency and privacy, which have already been recognized as areas not covered in the ICF in previous publications (Cieza *et al.* 2008).

Finally, there were several intervention goals that could not be linked to specific ICF categories, but to the component Personal Factors, which has not been classified in the ICF yet. Personal Factors are factors that relate to the individual, such as age, gender, coping styles and individual psychological assets (World Health Organization (WHO) 2001). The importance of Personal Factors as treatment goals of nurses has been recognized in previous studies (Rauch *et al.* 2009). In this study, the main Personal Factors identified were the acceptance of, adjustment to and coping with the new life situation after SCI. A previous study also highlighted the importance of considering coping strategies in designing interventions to facilitate social adjustment and rehabilitation in the SCI population (Song & Nam 2010). In addition, the person's level of knowledge as to how to handle and manage his/her situation was mentioned and agreed to by >90% of participants. This is in line with the literature, which showed that the enhancement of self-care skills and health education among persons with SCI needs to focus specifically on those individuals with greater assistance needs in daily living activities (Kroll *et al.* 2007).

The ICF is an international classification; if a common data set of intervention goals was consistently used in different settings and countries, it would be possible to compare nurses' contributions to patient care among different settings and countries and over time. The requirements for nursing care could be determined and reported

at an international level. A next step in this direction would be the development of recommendations to foster the use of the ICF in nursing practice. Since the ICF is an official WHO classification and health-care systems need to respond to increased globalization, it would be worthwhile to proceed in this direction and pave the way for future generations of nurses. Up to now, very valuable efforts have been made to harmonize the ICNP - Version 2 and the ICF (Kim & Coenen 2011).

In the last few years, the ICF Research Branch, the International Spinal Cord Society (ISCoS), WHO and other partner organizations have developed so-called ICF Core Sets for SCI. These are selections of ICF categories relevant to persons with SCI in the early post-acute context (Kirchberger *et al.* 2010) and the long-term context (Cieza *et al.* 2010) for interdisciplinary assessment and patient management (Rauch *et al.* 2008). Some ICF categories included in the ICF Core Sets are not included in the lists of intervention goals of nurses as presented here (e.g. Acquiring a place to live and Doing housework). The ICF Core Sets contain the intervention goals of all health professionals involved in the treatment of persons with SCI and therefore they are more comprehensive.

Implications for nursing

The nursing literature contains criticisms of the ICF. Some authors argue that the ICF is not specifically tailored to nurses. Müller-Staub *et al.* (2007) introduced specific criteria for nursing diagnoses classifications and stated that the ICF fulfils only one of three criteria (Müller-Staub *et al.* 2007). It has also been argued that, although the ICF is a tool with relevant aspects addressing nursing care, additional operationalization is required to implement it in nursing practice (Bartholomeyczik *et al.* 2006).

The present investigation indicates that the ICF contains most aspects pertaining to the functioning of persons with SCI that are treated by nurses and that the ICF is useful for nurses in providing a common basis for an interdisciplinary team to document patients' problems and needs, as well as patients' resources, prior to standard nursing care. Based on this common basis, different treatment goals can be assigned to the appropriate health professionals, who can then use the appropriate documentation forms and classifications.

The ICF, however, will never supplant other specific nursing classifications. It is important to assign an adequate classification to each stage of the nursing

process. The ICF can be used during interdisciplinary assessment and before the assignment of corresponding interventions. It should be borne in mind that nursing diagnoses represent the end product of an assessment by nurses (Hogston 1997).

Limitations of the study

There are certain limitations of the study that need to be discussed. First, selection bias cannot be excluded. Only nurses from seventeen countries who agreed to participate were represented in the sample. Therefore, we can only assume that our results represent the entire spectrum of nurses treating persons with SCI. Second, we had a small sample size even though great effort was put into recruiting as many nurses who treat persons with SCI as possible. This recruitment was not an easy task because the study was performed in English and knowledge of the language was required. The questionnaire was sent via e-mail and not all nurses had access to a computer. Answering the questionnaires of the Delphi-rounds was time consuming and no personal incentive was provided to participate. Third, we had a relatively high number of participants lost to follow-up, even though they were encouraged to continue participating with reminder e-mails. This fact is probably also related to the time needed to fill in the questionnaire. In future studies, it would be important to determine the reasons for dropout. Finally, for practical reasons, only one of the persons linking the answers to the ICF was a nurse. This may explain the moderate level of agreement according to the Kappa statistics. Future studies using similar methodology should consider involving only persons of the profession relevant to the study question for the linking process.

3.8. CONCLUSIONS

The results of this study contribute to the implementation of the ICF in nursing practice in SCI. We present a list of ICF categories and other domains relevant to nursing practice that can be used as a data set to document patients' problems and nurses' intervention goals when treating persons with SCI. The use of this data set would contribute to the determination and standard documentation of the needs of SCI nursing at an international level. Future research is required to confirm the usefulness of such a data set in clinical practice and can contribute to updating the ICF to assure that this WHO classification is explicitly tailored to the requirements of

nurses. Up to now, very valuable efforts have been made to harmonize other nursing classifications with the ICF. The way forward, however, is to develop recommendations that foster the use of the ICF in nursing practice.

3.9. ACKNOWLEDGEMENT

The authors would like to express a special thank to all of the participants of the Delphi survey for their invaluable contribution and their time in responding to the questionnaires: Oitsile Basuhi-Msimanga, Arlene Bernardo, Lesley Brennan, Toni Broman, Peter Brüstle, Maureen Coggrave, Ellen Graff Combs, Kari Anne Dammen, Hester Dunne, Ellen Eugarde, Dafna Grosberg, Paul Harrison, Vo Thi Huong, Päivi Jääskeläinen, Ting Li, Debbie Lockley, Neetu Maitra, Anita Malhotra, Charles Manise, Pelonomi Mazonde, Tlhaloganyo Mbalambi, Katrina McGinnis, Magret L. Molefi, Stephen Muldoon, Sarah Ninan, Ana Luisa Penicheiro Jesus Correia, Deanna Persaud, Wanpen Pinyopasakul, Tami Polliac, Maria De Fatima Ribeiro B. Periera, Diane Rowles, Donna Smith, Renato Jorge Soares Da Mota, Peter Stewart, Hanne Vest Hansen.

We want to thank Deniz Aras and Alissa Dress for their support of identifying participants of the Delphi survey in contacting nursing associations and authors of nursing literature in SCI.

We like to thank Heinrich Gall and Cristina Bostan from the ICF Research Branch in Munich for their most helpful contribution regarding data management and analysis of Kappa statistics.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for profit-sectors.

Conflict of interest

No conflict of interest has been declared by the authors.

3.10. REFERENCES

- Ackery, A., Tator, C. & Krassioukov, A. (2004). A global perspective on spinal cord injury epidemiology. *J Neurotrauma*, **21**(10), 1355-70.
- Bartholomeyczik, S., Boldt, C., Grill, E. & König, P. (2006). [Development and use of the ICF from the nursing point of view - a position statement of the German speaking working group 'ICF and Nursing']. *Pflege Z.* **59**(9), suppl 2-7. German.
- Becker, S., Kirchberger, I., Cieza, A., Berghaus, A., Harreus, U., Reichel, O. & Tschiesner, U. (2010). Content validation of the Comprehensive ICF Core Set for Head and Neck Cancer (HNC): the perspective of psychologists. *Psychooncology*, **19**(6), 594-605.
- Biering-Sorensen, F., Scheuringer, M., Baumberger, M., Charlifue, S.W., Post, M.W., Montero, F., Kostanjsek, N. & Stucki, G. (2006). Developing core sets for persons with spinal cord injuries based on the International Classification of Functioning, Disability and Health as a way to specify functioning. *Spinal Cord*, **44**(9), 541-6.
- Bloemen-Vrencken, J.H. & de Witte, L.P. (2003). Post-discharge nursing problems of spinal cord injured patients: on which fields can nurses contribute to rehabilitation? *Clin Rehabil.* **17**(8), 890-8.
- Boldt, C., Brach, M., Grill, E., Berthou, A., Meister, K., Scheuringer, M. & Stucki, G. (2005a). The ICF categories identified in nursing interventions administered to neurological patients with post-acute rehabilitation needs. *Disabil Rehabil.* **27**(7-8), 431-6.
- Boldt, C., Grill, E., Bartholomeyczik, S., Brach, M., Rauch, A., Eriks-Hoogland, I. & Stucki, G. (2010). Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II. *J Adv Nurs.* **66**(8), 1885-98.
- Boldt, C., Scheuringer, M. & Grill, E. (2005b). [Functional health and nursing performance: WHO classification challenge]. *Pflege Z.* **58**(3), 164-8. German.
- Brotherton, S.S., Krause, J.S. & Nietert, P.J. (2007). Falls in individuals with incomplete spinal cord injury. *Spinal Cord*, **45**(1), 37-40.
- Bulechek, G.M., Butcher, H.K. & McCloskey Dochterman, J. (2007). *Nursing Interventions Classification (NIC)*, C V Mosby Co., St. Louis.
- Chen, H.Y. & Boore, J.R. (2007). Establishing a super-link system: spinal cord injury rehabilitation nursing. *J Adv Nurs.* **57**(6), 639-48.
- Cieza, A., Bickenbach, J. & Chatterji, S. (2008). The ICF as a conceptual platform to specify and discuss health and health-related concepts. *Gesundheitswesen*, **70**(10), e47-56.
- Cieza, A., Brockow, T., Ewert, T., Amman, E., Kollerits, B., Chatterji, S., Ustun, T.B. & Stucki, G. (2002). Linking health-status measurements to the international classification of functioning, disability and health. *J Rehabil Med.* **34**(5), 205-10.
- Cieza, A., Geyh, S., Chatterji, S., Kostanjsek, N., Ustun, B. & Stucki, G. (2005). ICF linking rules: an update based on lessons learned. *J Rehabil Med.* **37**(4), 212-8.
- Cieza, A., Kirchberger, I., Biering-Sorensen, F., Baumberger, M., Charlifue, S., Post, M.W., Campbell, R., Kovindha, A., Ring, H., Sinnott, A., Kostanjsek, N. & Stucki, G. (2010). ICF Core Sets for individuals with spinal cord injury in the long-term context. *Spinal Cord*, **48**(4), 305-12.

- Cohen, J. (1968). Weighted kappa: nominal scale agreement with provision for scaled disagreement or partial credit. *Psychol Bull*, **70**(4), 213-20.
- Cook, N. (2003). Respiratory care in spinal cord injury with associated traumatic brain injury: bridging the gap in critical care nursing interventions. *Intensive Crit Care Nurs*, **19**(3), 143-53.
- Cox, R.J., Amsters, D.I. & Pershouse, K.J. (2001). The need for a multidisciplinary outreach service for people with spinal cord injury living in the community. *Clin Rehabil*. **15**(6), 600-6.
- Duffield, C. (1993). The Delphi technique: a comparison of results obtaining from two expert panels. *Int J Nurs Stud*. **30**, 227-37.
- Gavin-Dreschnack, D., Nelson, A., Fitzgerald, S., Harrow, J., Sanchez-Anguiano, A., Ahmed, S. & Powell-Cope, G. (2005). Wheelchair-related falls: current evidence and directions for improved quality care. *J Nurs Care Qual*. **20**(2), 119-27.
- Gebhardt, C., Kirchberger, I., Stucki, G. & Cieza, A. (2010). Validation of the comprehensive ICF Core Set for rheumatoid arthritis: the perspective of physicians. *J Rehabil Med*. **42**(8), 780-8.
- Goodman, C. (1987). The Delphi technique: a critique. *J Adv Nurs*. **12**(6), 729-34.
- Goossen, W. (2006). Cross-mapping between three terminologies with the international standard nursing reference terminology model. *Int J Nurs Terminol Classif*. **17**(4), 153-64.
- Hasson, F., Keeney, S. & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *J Adv Nurs*. **32**(4), 1008-15.
- Heinen, M.M., van Achterberg, T., Roodbol, G. & Frederiks, C.M. (2005). Applying ICF in nursing practice: classifying elements of nursing diagnoses. *Int Nurs Rev*. **52**(4), 304-12.
- Herrmann, K.H., Kirchberger, I., Stucki, G. & Cieza, A. (2011a). The comprehensive ICF core sets for spinal cord injury from the perspective of occupational therapists: a worldwide validation study using the Delphi technique. *Spinal Cord*, **49**(5), 600-13.
- Herrmann, K.H., Kirchberger, I., Stucki, G. & Cieza, A. (2011b). The Comprehensive ICF core sets for spinal cord injury from the perspective of physical therapists: a worldwide validation study using the Delphi technique. *Spinal Cord*, **49**(4), 502-14.
- Hogston, R. (1997). Nursing diagnosis and classification systems: A position paper. *J Adv Nurs*. **26**, 496-500.
- International Council of Nurses (2009). *International Classification for Nursing Practice (ICNP® - Version 2)*, International Council of Nurses, Geneva.
- Jelles, F., Van Bennekom, C. & Lankhorst, G. (1995). Instruments to structure interdisciplinary team conferences in rehabilitation medicine: Added value of the rehabilitation activities profile. *Journal of Rehabilitation Sciences*, **8**(2), 51-57.
- Johnson, K., Bailey, J., Rundquist, J., Dimond, P., McDonald, C.A., Reyes, I.A., Thomas, J. & Gassaway, J. (2009). SCIRehab Project series: the supplemental nursing taxonomy. *J Spinal Cord Med*. **32**(3), 329-35.
- Jones, J. & Hunter, D. (1995). Consensus methods for medical and health services research. *BMJ*, **311**, 376-80.
- Karlet, M.C. (2001). Acute management of the patient with spinal cord injury. *Int J Trauma Nurs*. **7**(2), 43-8.
- Kennedy, H.P. (2004). Enhancing Delphi research: methods and results. *J Adv Nurs*. **45**(5), 504-11.

- Kim, T.Y. & Coenen, A. (2011). Toward harmonising WHO International Classifications: a nursing perspective. *Informatics for Health & Social Care*, **36**(1), 35-49.
- Kirchberger, I., Cieza, A., Biering-Sorensen, F., Baumberger, M., Charlifue, S., Post, M.W., Campbell, R., Kovindha, A., Ring, H., Sinnott, A., Kostanjsek, N. & Stucki, G. (2010). ICF Core Sets for individuals with spinal cord injury in the early post-acute context. *Spinal Cord*, **48**(4), 297-304.
- Kirchberger, I., Stamm, T., Cieza, A. & Stucki, G (2007). Does the Comprehensive ICF Core Set for rheumatoid arthritis capture occupational therapy practice? A content-validity study. *Can J Occup Ther*. **74** (Spec No), 267-80.
- Kroll, T., Neri M.T. & Ho P-S. (2007). Secondary conditions in spinal cord injury: Results from a prospective survey. *Disabil Rehabil*. **29**(15), 1229-37.
- Linstone, H. & Turoff, M. (1975). *The Delphi technique: techniques and applications*. Addison Wesley, London.
- Marino, R., Barros, T., Biering-Sorensen, F., Burns, S., Donovan, W., Graves, D., Haak, M., Hudson, L., Priebe, M. & ASIA Neurological Standards Committee 2002 (2003). International standards for neurological classification of spinal cord injury. *Journal of Spinal Cord Medicine*, **26**(Suppl 1), S50-6.
- McKenna, H. (1994). The Delphi Technique: a worthwhile approach for nursing? *J Adv Nurs*. **19**, 1221-25.
- Moorhead, S., Johnson, M. & Maas, M.L. (2007). *Nursing Outcomes Classification (NOC)*, C V Mosby Co., St. Louis.
- Mrayyan, M.T. (2005). The influence of standardized languages on nurses' autonomy. *J Nurs Manag*. **13**(3), 238-41.
- Mueller, M., Boldt, C., Grill, E., Strobl, R. & Stucki, G. (2008). Identification of ICF categories relevant for nursing in the situation of acute and early post-acute rehabilitation. *BMC Nurs*. **7**(3), 1-8. (E-pub: <http://www.biomedcentral.com/content/pdf/1472-6955-7-3.pdf> February 18th 2008).
- Müller-Staub, M., Lavin, M.A., Needham, I. & Van Achterberg, T. (2007). Meeting the criteria of a nursing diagnosis classification: evaluation of ICNP, ICF, NANDA and ZEPF. *Int J of Nurs Stud*. **44**(5), 702-13.
- Mumma, C.M. (2001). Rehabilitation and rehabilitation nursing. *Crit Care Nurs Clin North Am*, **13**(3), 335-40.
- NANDA International (2009). *Nursing Diagnoses: Definitions and Classification, 2009-2011*, Wiley-Blackwell, Chichester.
- New, P.W., Rawicki, H.B. & Bailey, M.J. (2004). Nontraumatic spinal cord injury rehabilitation: pressure ulcer patterns, prediction and impact. *Arch Phys Med Rehabil*. **85**(1), 87-93.
- Nolan, M. & Nolan, J. (1998). Rehabilitation following spinal injury: the nursing response. *Br J Nurs*. **7**(2), 97-104.
- Pryor, J., Forbes, R. & Hall-Pullin, L. (2004). Is there evidence of the International Classification of Functioning, Disability and Health in undergraduate nursing students' patient assessments? *Int J Nurs Pract*. **10**(3), 134-41.
- Raghavan, P., Raza, W.A., Ahmed, Y.S. & Chamberlain, M.A. (2003). Prevalence of pressure sores in a community sample of spinal injury patients. *Clin Rehabil*. **17**(8), 879-84.
- Rauch, A., Cieza, A. & Stucki, G. (2008). How to apply the International Classification of Functioning, Disability and Health (ICF) for rehabilitation management in clinical practice. *Eur J Phys Rehabil Med*. **44**(3), 329-42.

- Rauch, A., Escorpizo, R., Riddle, D.L., Eriks-Hoogland, I., Stucki, G. & Cieza, A. (2010). Using a case report of a patient with spinal cord injury to illustrate the application of the International Classification of Functioning, Disability and Health during multidisciplinary patient management. *Phys Ther.* **90**(7), 1039-52.
- Rauch, A., Kirchberger, I., Boldt, C., Cieza, A. & Stucki, G. (2009). Does the Comprehensive International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis capture nursing practice? A Delphi survey. *Int J Nurs Stud.* **46**(10), 1320-34.
- Royal College of Nursing (RCN) (2003). Defining nursing. London.
<http://rcn.org.uk/publications/definitionnursing> download: May 24th 2006.
- Schoenherr, M.C., Groothoff, J.W., Mulder, G.A. & Eisma, W.H. (1999). Functional outcome of patients with spinal cord injury: rehabilitation outcome study. *Clin Rehabil.* **13**(6), 457-63.
- Song, H.Y. & Nam, K.A. (2010). Coping strategies, physical function and social adjustment in people with spinal cord injury. *Rehabil Nurs.* **35**(1), 8-15.
- Steiner, W.A., Ryser, L., Huber, E., Uebelhart, D., Aeschlimann, A. & Stucki, G. (2002). Use of the ICF model as a clinical problem-solving tool in physical therapy and rehabilitation medicine. *Physical Therapy*, **82**(11), 1098-107.
- Van Achterberg, T., Frederiks, C., Thien, N., Coenen, C. & Persoon, A. (2002). Using ICIDH-2 in the classification of nursing diagnoses: Results from two pilot studies. *J Adv Nurs.* **37**(2), 135-44.
- Van Achterberg, T., Holleman, G., Heijnen-Kaales, Y., Van der Brug, Y., Roodbol, G., Stallinga, H.A., Hellema, F. & Frederiks, C.M. (2005). Using a multidisciplinary classification in nursing: the International Classification of Functioning, Disability and Health. *J Adv Nurs.* **49**(4), 432-41.
- Van Grunsven, A., Bindels, R., Coenen, C. & de Bel, E. (2006). Developing an integrated electronic nursing record based on standards. *Stud Health Technol Inform.* **122**, 294-7.
- Verma, S., Paterson, M. & Medves, J. (2006). Core competencies for health care professionals: what medicine, nursing, occupational therapy and physiotherapy share. *J Allied Health*, **35**(2), 109-15.
- Vierkant, R. (1996). A SAS® macro for calculating bootstrapped confidence intervals about a kappa coefficient. Cary, NC: SAS Institute Inc.
<http://www2.sas.com/proceedings/sugi22/STATS/PAPER295.PDF>. download: December 9th 2010.
- Williams, P.L. & Webb, C. (1994). The Delphi technique: a methodological discussion. *J Adv Nurs.* **19**(1), 180-6.
- World Health Organization (WHO) (2001). *International Classification of Functioning, Disability and Health: ICF*, WHO, Geneva.

3.11. FIGURES AND TABLES

Figure 1: Description of the Delphi process

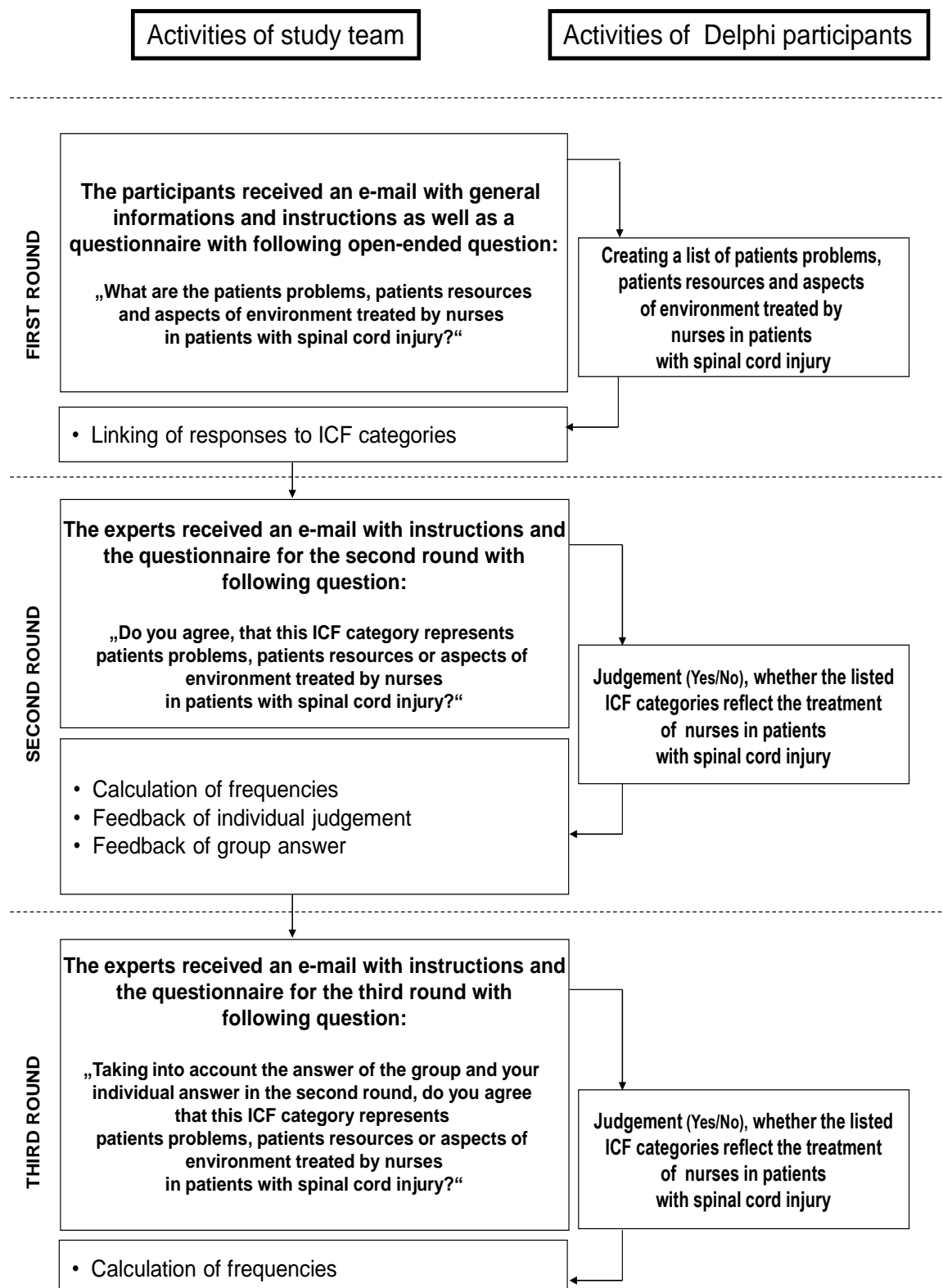


Table 1: Participant attrition between Delphi rounds, the demographics and professional experience of the first round participants

Country	Round 1 (n)	Round 2 (n)	Round 3 (n)	Number of females in round 1	Age Median (Min-Max)	Professional experience (years) Median (Min-Max)	SCI experience (years) Median (Min-Max)	Self-rating SCI expertise+ Median (Min-Max)
Australia	3	3	3	3	38 (32-61)	19 (11-40)	12 (10-25)	8 (8)
Belgium	1	1	1	0	55*	33*	11*	6*
Botswana	4	2	2	3	46 (32-50)	24.5 (6-25)	10 (6-14)	6 (6-8)
Canada	1	1	1	1	33*	10*	9*	8*
China	1	0	0	1	27*	3*	3*	7*
Denmark	1	1	1	1	58*	34*	18*	8*
Finland	2	1	1	1	40 (30-50)	18 (7-29)	18 (7-29)	8 (7-9)
Germany	1	1	1	0	44*	19*	21*	8*
India	2	2	1	2	37 (28-46)	15.5 (6-25)	2 (2)	7 (6-8)
Israel	2	2	2	2	41.5 (38-45)	21.5 (20-23)	16 (12-20)	8.5 (8-9)
Norway	2	1	1	2	47.5 (46-49)	25*	4.5 (1-8)	7.25 (6.5-8)
Portugal	3	3	2	2	42 (31-47)	20 (9-26)	9 (4-12)	8 (7-9)
Sri Lanka	1	1	1	0	38*	17*	12*	8*
Thailand	1	1	1	1	47*	24*	16*	9*
United Kingdom	4	3	3	3	46 (45-48)	30 (26-30)	20 (20)	9 (8-10)
USA	5	3	3	5	50 (44-57)	30 (22-37)	20 (14-30)	10 (8-10)
Vietnam	1	1	1	0	40*	17*	9*	6*
Total	35	27	25	27	45.5 (27-61)	24 (3-40)	12 (1-30)	8 (6-10)

+ 1 =low 10 =excellent

* Data of one participant

Table 2: ICF component Body Functions: Percentage of participants who considered the respective ICF category as relevant in the third round.

ICF Code				ICF Category Title	3rd round (n=25)
1st level	2nd level	3rd level	4th level		% Agreement
b1				CHAPTER 1 MENTAL FUNCTIONS	40
		b1266		Confidence	92
		b1301		Motivation	96
		b1303		Craving	88
	b134			Sleep functions	96
	b152			Emotional functions	96
	b260			Proprioceptive function	100
	b265			Touch function	100
				Sensory functions related to temperature and	
	b270			other stimuli	100
	b280			Sensation of pain	96
				CHAPTER 4 FUNCTIONS OF THE CARDIOVASCULAR, HAEMATOLOGICAL, IMMUNOLOGICAL AND RESPIRATORY SYSTEMS	52
b4	b410			Heart functions	96
		b4100		Heart rate	92
	b415			Blood vessel functions	96
		b4152		Functions of veins	96
	b420			Blood pressure functions	88
		b4200		Increased blood pressure	96
		b4201		Decreased blood pressure	96
	b440			Respiration functions	100
		b4402		Depth of respiration	96
	b445			Respiratory muscle functions	96
		b4451		Functions of the diaphragm	92
	b450			Additional respiratory functions	100
				Sensations associated with cardiovascular and respiratory functions	96
	b460				96
	b510			Ingestion functions	96
		b5105		Swallowing	88
	b525			Defecation functions	96
		b5250		Elimination of faeces	92
		b5253		Faecal continence	96
	b530			Weight maintenance functions	88
		b5450		Water balance	96
			b54500	Water retention	84
		b5452		Electrolyte balance	88
	b550			Thermoregulatory functions	96

	b620	Urination functions	96
	b6200	Urination	96
	b6202	Urinary continence	96
	b640	Sexual functions	88
	b6400	Functions of sexual arousal phase	84
	b650	Menstruation functions	84
	b660	Procreation functions	80
		Sensations associated with genital and reproductive	
	b670	functions	76
		CHAPTER 7 NEUROMUSCULOSKELETAL AND	
b7		MOVEMENT-RELATED FUNCTIONS	36
	b710	Mobility of joint functions	92
	b7100	Mobility of a single joint	88
	b735	Muscle tone functions	80
	b750	Motor reflex functions	80
	b755	Involuntary movement reaction functions	92
	b810	Protective functions of the skin	100
	b820	Repair functions of the skin	100
	b830	Other functions of the skin	100
	b840	Sensation related to the skin	96

Table 3: ICF component Body Structures: Percentage of participants who considered the respective ICF category as relevant in the third round.

ICF Code				ICF Category Title	3rd round (n=25)
1st level	2nd level	3rd level	4th level		% Agreement
	s120			Spinal cord and related structures	92
		s4301		Lungs	92
	s540			Structure of intestine	80
		s6102		Urinary bladder	92
s7				CHAPTER 7 STRUCTURES RELATED TO MOVEMENT	56
		s7600		Structure of vertebral column	88
		s7702		Muscles	84
	s810			Structure of areas of skin	92

Table 4: ICF component Activities and Participation: Percentage of participants who considered the respective ICF category as relevant in the third round.

ICF Code				ICF Category Title	3rd round (n=25)
1st level	2nd level	3rd level	4th level		% Agreement
	d155			Acquiring skills	76
d2				CHAPTER 2 GENERAL TASKS AND DEMANDS	44
		d2202		Undertaking multiple tasks independently	84
	d230			Carrying out daily routine	84
d3				CHAPTER 3 COMMUNICATION	36
	d335			Producing nonverbal messages	92
d4				CHAPTER 4 MOBILITY	48
	d410			Changing basic body position	96
		d4100		Lying down	96
		d4104		Standing	96
		d4106		Shifting the body's centre of gravity	88
		d4153		Maintaining a sitting position	96
	d420			Transferring oneself	100
		d4200		Transferring oneself while sitting	100
		d4201		Transferring oneself while lying	88
		d4300		Lifting	96
	d440			Fine hand use	68
		d4401		Grasping	76
	d445			Hand and arm use	64
		d4452		Reaching	88
	d460			Moving around in different locations	68
	d465			Moving around using equipment	76
d5				CHAPTER 5 SELF-CARE	48
	d510			Washing oneself	96
		d5101		Washing whole body	92
	d520			Caring for body parts	100
	d530			Toileting	100
		d5300		Regulating urination	100
		d5301		Regulating defecation	100
	d540			Dressing	96
		d5401		Taking off clothes	96
		d5404		Choosing appropriate clothing	84
	d550			Eating	96
	d560			Drinking	96
	d570			Looking after one's health	100
		d5701		Managing diet and fitness	84
		d5702		Maintaining one's health	100
d6				CHAPTER 6 DOMESTIC LIFE	32
		d6504		Maintaining assistive devices	44

		CHAPTER 7 INTERPERSONAL INTERACTIONS	
d7		AND RELATIONSHIPS	36
	d7500	Informal relationships with friends	60
	d760	Family relationships	76
	d770	Intimate relationships	64
	d7702	Sexual relationships	64
d8		CHAPTER 8 MAJOR LIFE AREAS	20
	d840	Apprenticeship (work preparation)	20
	d845	Acquiring, keeping and terminating a job	24
	d8450	Seeking employment	20
	d8451	Maintaining a job	20
	d850	Remunerative employment	16
	d870	Economic self-sufficiency	28
	d8700	Personal economic resources	28
		CHAPTER 9 COMMUNITY, SOCIAL AND CIVIC	
d9		LIFE	24
	d920	Recreation and leisure	52
	d9201	Sports	56
	d940	Human rights	80

Table 5: ICF component Environmental Factors: Percentage of participants who considered the respective ICF category as relevant in the third round.

ICF Code				ICF Category Title	3rd round (n=25)
1st level	2nd level	3rd level	4th level		% Agreement
e				ENVIRONMENTAL FACTORS	40
e1				CHAPTER 1 PRODUCTS AND TECHNOLOGY	32
		e1100		Food	72
		e1101		Drugs	80
	e115			Products and technology for personal use in daily living	72
		e1151		Assistive products and technology for personal use in daily living	84
		e1200		General products and technology for personal indoor and outdoor mobility and transportation	44
		e1201		Assistive products and technology for personal indoor and outdoor mobility and transportation	64
	e130			Products and technology for education	48
				Design, construction and building products and technology of buildings for public use	32
	e150			Design, construction and building products and technology of buildings for private use	44
		e1550		Design, construction and building products and technology for entering and exiting of buildings for private use	44
		e1551		Design, construction and building products and technology for gaining access to facilities in buildings for private use	36
	e160			Products and technology of land development	20
e3				CHAPTER 3 SUPPORT AND RELATIONSHIPS	36
	e310			Immediate family	92
	e315			Extended family	80
	e330			People in positions of authority	80
	e340			Personal care providers and personal assistants	84
	e355			Health professionals	96
	e410			Individual attitudes of immediate family members	80
	e415			Individual attitudes of extended family members	80
	e460			Societal attitudes	80
e5				CHAPTER 5 SERVICES, SYSTEMS AND POLICIES	44
	e540			Transportation services, systems and policies	52
	e570			Social security services, systems and policies	44
	e580			Health services, systems and policies	84
		e5800		Health services	92

Table 6: ICF component Personal Factors: Percentage of participants who considered the concept as relevant in the third round.

Personal Factor	3rd round
	(n=25) % Agreement
Acceptance of life in wheelchair	88
Acceptance of new sexuality	96
Acceptance of new identity	96
Adjustment to new body image	96
Adaptation to new life style	96
Age	84
Coping with everyday life	96
Coping with grief	96
Denial	96
Gender	88
Information for the patient	96
Knowledge deficit regarding SCI	92
Loss of status	88
Difficult behavior	96
Patient attitude	96
Patient does not want to return home	84
Patient education	96
Patient feels secure in the hospital	88
Patient teaching	96
Patient strategy to survive	88
Perceived adjustment in familial roles	84
Perceived adjustment in societal roles	88
Perceived low options	84
Profession	68

Table 7: Responses of participants that are not covered in the ICF in general: Percentage of participants who considered the concept as relevant in the third round.

Concept	3rd round
	(n=25)
	% Agreement
Advocacy	80
Aging with SCI	92
Autonomy	88
Dependency on technical goods	80
Difficulties fulfilling patient's needs	88
Disinterested in living	92
Lack of funds for family	72
Lack of health information for family member of patient	92
Lack of hygiene information for family member of patient	88
Lack of information among patients with urinary tract infection	96
Lack of prevention among patients with urinary tract infection	96
Life in wheelchair	96
Muscular movability	84
Privacy	92
Resting	88
Reluctant to meet psychologist	80
Winning patient's confidence	92
Resources for patients' families for psychosocial support	88
Series of surgeries	68

Table 8: Responses of participants that are not covered in the ICF and that referred to risks that the person with SCI may incur: Percentage of participants who considered the concept as relevant in the third round.

Concept	3rd round (n=25)
	% Agreement
Risk for autonomic dysreflexia	96
Risk for becoming too heavy	96
Risk for becoming too thin	92
Risk for burn sores	96
Risk for comorbidities	92
Risk for compromised temperature regulation	96
Risk for constipation	96
Risk for coughing problems	96
Risk for high blood pressure	92
Risk for immobilization due to the paresis	92
Risk for low blood pressure	92
Risk for no control of the anal sphincter	92
Risk for no control of the bladder sphincter	92
Risk for nutritional problems	96
Risk for orthostatic hypotension	92
Risk for pain	88
Risk for pressure sores	92
Risk for problems being washed	92
Risk for problems getting dressed	92
Risk for problems getting undressed	92
Risk for psychological crisis	92
Risk for respiratory problems	92
Risk for self care problems	88
Risk for sexual dysfunction	92
Risk for skin problems	96
Risk for spasm	92
Risk for stool incontinence	96
Risk for swollen legs	96
Risk for urine incontinence	96
Risk for urine retention	96
Risk for infection	92
Risk for violence towards patient	76

4. Appendices

4.1. Appendix 1

Study 2 - Invitation letter Delphi Survey

4.2. Appendix 2

Study 2 – Email and information letter Delphi Survey Round 1

4.3. Appendix 3

Study 2 - Questionnaire Delphi Survey Round 1 (extraction)

4.4. Appendix 4

Study 2 - Email and information letter Delphi Survey Round 2

4.5. Appendix 5

Study 2 - Questionnaire Delphi Survey Round 2 (extraction)

4.6. Appendix 6

Study 2 - Information letter Delphi Survey Round 3

4.7. Appendix 7

Study 2 - Questionnaire Delphi Survey Round 3 (extraction)

4.1. Appendix 1

Study 2 - Invitation letter Delphi Survey

INVITATION TO PARTICIPATE IN A WHO-PROJECT WITH NURSING EXPERTS

Dear XXX,

we want to invite you to take part as a nursing expert in our study to provide us with information concerning the intervention goals of patients with spinal cord injury (SCI).

Below you can find a short description of our study.

In the context of an international research project, we are currently looking for nurses with expertise in the treatment of patients with SCI.

The project is being performed by the Swiss Paraplegic Research at the Guido A. Zäch Institute in Nottwil, Switzerland, in collaboration with the International Classification of Functioning, Disability and Health (ICF) Research Branch in Munich, Germany, and the World Health Organization (WHO).

The ultimate goal of the project is to facilitate the implementation of the ICF in clinical practice when used to describe the functioning of patients with SCI. Please find attached a paper describing the research project comprehensively.

The aim of this part of the project is to identify the goals of the interventions applied by nurses when they treat patients with SCI.

We will perform an email poll with nurses from all over the world applying the Delphi methodology.

We want to thank you in advance for your collaboration on behalf of Professor Gerold Stucki, director of the Swiss Paraplegic Research and the ICF Research Branch, and all the persons involved in this project.

Yours sincerely,

Christine Boldt, MSc
Project leader

Inge-Marie Velstra, MSc
Project researcher

4.2. Appendix 2

Study 2 – Email and information letter Delphi Survey Round 1

Email

Betreff: WHO project with nurses (First Round)

Dear XXX,

we would like to thank you for taking part in this worldwide Delphi-process. Its aim is to identify the goals of the interventions applied by nurses when they treat patients with spinal cord injury (SCI).

With your highly estimated collaboration we will conduct a three-round electronic-mail survey using the Delphi technique. **Each of the three rounds should take a maximum of 30 minutes of your time.**

In the **first round**, you will be asked to list problems, resources and aspects of the environment which relate to care given by nurses to patients with SCI.

In the **2nd round** the compiled list of ICF categories will be sent back to all nursing experts. You will be asked whether the listed ICF categories represent the SCI patients' problems, the patients' resources or aspects of the environment which nurses take care of.

In the **3rd round** you will be asked to reconsider your decisions based on the group response.

The 3 rounds proceed in different successive steps. From round 2 onwards, the results of the previous round make up the starting point of the next round.

A complete Delphi three-round process will take approximately 21 weeks. See the time table for this Delphi-process for nurses below.

Recruitment	1st Round (3 weeks)	Linking (5 weeks)	2nd Round (3 weeks)	Analysis (4 weeks)	3rd Round (4 weeks)	Analysis/Feedback (2 weeks)
March/April	April 27 th to May 18 th	May 21 st to June 21 st	22 nd June to July 13 th	July 16 th to August 9 th	August 10 th to September 7 th	September 10 th to September 21 st

In the attachment you will find the questionnaire (Nurses_1.xls) and further instructions with an example (infoletter_english.doc) to help you answer the questions as easily as possible.

Please fill in the questionnaire and sent it back to us by the **18th of May 2007** at the latest.

If you have any questions, please do not hesitate to contact us.

We want to thank you in advance for your collaboration in this project.

Yours sincerely,

Prof. Dr. G. Stucki
(Head of Swiss Paraplegic Research)

Christine Boldt, MSc
(Project Coordinator)

Inge-Marie Velstra, MSc
(Project Coordinator)

Information letter

Dear participant in the Delphi exercise,

Your task within this **first Delphi-Round** is to list all problems, resources and aspects of environment which nurses take care of in patients with spinal cord injury (SCI).

To facilitate the understanding of this task we have created an example for you. Below, you can find the response of a physical therapist who participated in a Delphi survey on stroke patients. This example is by no means complete. It is intended to help you understand the task in this first Delphi-Round.

Example:

What are the problems, resources and aspects of environment of patients with stroke for which physical therapists take care of?
arm function
spasticity
range of motion
oedema
balance in sitting, standing and walking
wheelchair handling
walking aids
family support
doing housework
communicating with nonverbal messages
moving around using equipment
...

Please consider the following points when answering the question:

- Consider only the patients' problems, patients' resources and aspects of the environment which **nurses** take care of in patients with SCI.
- Keep your answers short and specific.
- Avoid abbreviations of words or technical terms.
- There is no need to specify whether the item listed is a problem, resource or aspect of environment.
- Please use a separate line for each item.

Please follow the following five steps to answer this **first Delphi-round**:

1. **List all problems, resources and aspects of environment which nurses take care of in patients with spinal cord injury** in the columns of the attached file "**Nurses_1.xls**".
2. **Answer the questions on your professional background** in the same file.
3. **Send the fulfilled document "Nurses_1.xls" to icf.delphi@paranet.ch by **May 18th**.** If you are not able to email the file, please send a hardcopy of the file per fax (+41 41 939 65 77) or per mail by **May 18th**.

4. If you send it per hardcopy please use this **address:**

Christine Boldt / Inge-Marie Velstra
Swiss Paraplegic Research
Guido A. Zäch Institute (GZI)
Human Functioning Science Division
CH-6207 Nottwil
Switzerland

5. **Keep a copy** after you have completed your task in case something goes wrong during the mailing process.

It will take us about 5 weeks to compile the results and link the named problems, patient resources and aspects of environment to the respective ICF categories. You will receive the compiled results of the first Delphi round and will be asked further questions in a second round.

Your answers will remain confidential and anonymous. Only compiled results will be provided.

To obtain reliable results, we need the responses of as many experts as possible. Therefore, your participation in this Delphi exercise is highly appreciated.

Many thanks in advance for collaborating in this important international project!

Yours sincerely,

Prof. Dr. G. Stucki
(Head of Swiss Paraplegic Research)

Christine Boldt, MSc
(Project Coordinator)

Inge-Marie Velstra, MSc
(Project Coordinator)

4.3. Appendix 3

Study 2 - Questionnaire Delphi Survey Round 1 (extraction)

A	B	C	D	E	F	G	H
1	Delphi Exercise Round 1	Health Profession: Nurses	ID:				
2							
3							
4							
5	What are the problems, resources and aspects of environment						
6	of patients with spinal cord injury (SCI) for which nurses take care of?						
7							
8	Please list your answers in the following lines.						
9	Please try to use only one line per patients' problem, per patients' resource or per aspect of the environment.						
10							
11			Some information about yourself:				
12							
13			Age	<input type="text"/>	years		
14			Gender	<input type="text"/>			
15							
16			Professional background	<input type="text"/>			
17							
18			Specialty	<input type="text"/>			
19							
20			Current professional activity	<input type="text"/>			
21							
22			Professional experience	<input type="text"/>	years		
23							
24			Practical experience with				
25	SCI patients	<input type="text"/>	years				
26							
27							
28			How would you rate your expertise				
29			in the treatment of SCI patients?				
30			<input type="text"/>				
31			Please chose an number between				
32	0 (low) and 10 (excellent)						
33							

Tabelle1 Tabelle2 Tabelle3

4.4. Appendix 4

Study 2 - Email and information letter Delphi Survey Round 2

Email

Dear XXX ,

First of all, we would like to thank you for participating in the first Delphi round and would also like to thank you in advance for participating in the second round.

You can find in the attachment the questionnaire (Nurses_2.xls) and further instructions (infoletter_round2.doc) to help you answer the questions as easily as possible.

Please fill in the questionnaire and sent it back to us by **Wednesday, August, 1st** at the latest.

If you have any questions, please do not hesitate to contact us.

Thank you very much for your patience!

With kindly regards, Christine and Inge-Marie

Information letter

Dear participant of the Delphi exercise,

The responses of all participants of the first Delphi round have been linked (or translated) to the most precise category of the International Classification of Functioning Disability and Health (ICF). For this second Delphi round the participants will not find the precise wording from the first Delphi round, but the corresponding ICF code and ICF description.

Some answers could not be linked to the ICF. These answers have also been considered and are listed in the corresponding file as “Personal factors” or as “not classified”.

For this second Delphi round, we are sending you an excel file with your personal ID number named “Nurses_2.xls” attached to this email. When you open this excel file, you will see a table with four columns.

The **first column** contains the codes of the categories linked to the answers of the participants in the first round, according to the ICF. An ICF category is coded by the component letter and a suffix of one to five digits. The letters b, s, d and e refer to the components *Body functions* (b), *Body structures* (s), *Activities and Participation* (d) and *Environmental factors* (e).

In the **second column** the titles of all ICF categories that have been linked to the answers of the participants in the first round are listed.

The **third column** contains a description of the ICF categories.

In the **fourth column**, you are requested to answer with Yes or No to the following question:

“Do you agree that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with Spinal Cord Injury?”.

Please consider that with this Delphi exercise we do not intent to identify which are the spectrum of problems, resources and aspects of the environment relevant to patients with SCI but the patients' problems, patients' resources and aspects of the environment **which nurses take care of** in patients with SCI.

Please complete the following steps when answering this second Delphi round:

1. Save the file "Nurses_2.xls" in your hard disk, memory stick or floppy.
2. Open the file and make sure that you are at the top of the excel sheet called "Questionnaire".
3. Read the title and description of the first ICF category in the first columns.
4. Answer the question whether the named ICF category represents patients' problems, patients' resources or aspects of the environment **which nurses** take care of in patients with SCI or not.
5. Scroll down in the file and follow the same procedure for each of the ICF categories, Personal Factors and further answers, which could not be classified.
6. Keep a copy of the file after you have completed your task in case something goes wrong during the mailing process.
7. Send the completed document "Nurses_2.xls" back to icf.delphi@paranet.ch

Please consider the deadline for the second round: Wednesday, August, 1st.

If you have any questions, please do not hesitate to contact us.

Yours sincerely,

Christine and Inge-Marie
(Project coordinators)

4.5. Appendix 5

Study 2 - Questionnaire Delphi Survey Round 2 (extraction)

	A	B	C	D	E	G	H
1							
2	Delphi Exercise Round 2			Nurse ID Number 1			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							

Do you agree that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with Spinal Cord Injury?

ICF cod	ICF category title	ICF category description	YES or NO
b1	CHAPTER 1 MENTAL FUNCTIONS	This chapter is about the functions of the brain: both global mental functions, such as consciousness, energy and drive, and specific mental functions, such as memory, language and calculation mental functions that produce a personal disposition that is self-assured, bold and assertive, as contrasted to being timid, insecure and self-effacing.	
b1266	Confidence		
b1301	Motivation	Mental functions that produce the incentive to act; the conscious or unconscious driving force for action.	
b1303	Craving	Mental functions that produce the urge to consume substances, including substances that can be abused.	
b134	Sleep functions	General mental functions of periodic, reversible and selective physical and mental disengagement from one's immediate environment accompanied by characteristic physiological changes.	
b152	Emotional functions	Specific mental functions related to the feeling and affective components of the processes of the mind.	
b260	Proprioceptive function	Sensory functions of sensing the relative position of body parts.	
b265	Touch function	Sensory functions of sensing surfaces and their texture or quality.	
b270	Sensory functions related to temperature and other stimuli	Sensory functions of sensing temperature, vibration, pressure and noxious stimulus.	
b280	Sensation of pain	Sensation of unpleasant feeling indicating potential or actual damage to some body structure.	
b4	CHAPTER 4 FUNCTIONS OF THE CARDIOVASCULAR, HAEMATOLOGICAL, IMMUNOLOGICAL AND	This chapter is about the functions involved in the cardiovascular system (functions of the heart and blood vessels), the haematological and immunological systems (functions of blood production and immunity), and the respiratory systems (functions of respiration and	
b410	Heart functions	Functions of pumping the blood in adequate or required amounts and pressure throughout the body.	

please fill in

4.6. Appendix 6

Study 2 - Information letter Delphi Survey Round 3

Dear participant of the Delphi exercise,

we would like to invite you again for participating in the third (final!) round, for which you are receiving all necessary information attached to this email.

Again, we have summarized the responses of all participants of the second Delphi round. We are sending you an excel file named "Nurses_3.xls" attached to this email. When you open this excel file, you will see a table with six columns.

The **first three columns** contain the codes, titles and descriptions of all ICF categories that have been linked to the answers of the participants in the first round.

The **fourth column** contains the percentage of experts who agreed in the second Delphi round that this ICF category represents patients' problems, patients' resources or aspects of the environment treated by nurses in patients with SCI.

In the **fifth column** the ID-numbers of the participants who agreed in the second Delphi round that this ICF category represents patients' problems, patients' resources or aspects of the environment treated by nurses in patients with SCI, are listed.

In the **sixth column**, you are requested to answer with yes or no to the following question:
"Taking into account the answer of the group and your individual answer in the second round, do you agree that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with SCI?"

Please complete the following steps when answering this third Delphi round:

1. Save the file "Nurses_3.xls" in your hard disk, memory stick or floppy.
2. Open the file and make sure that you are at the top of the excel sheet.
3. Read the title and description of the first ICF category in the first three columns.
4. In the next column you will find the percentage of participants who you have agreed in the second Delphi round that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with SCI.
5. Look in the following column for your ID number.

You can find your personal ID number at the top of the excel sheet in the orange cell.

You will find your ID if you have agreed in the previous Delphi round that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with SCI.

6. Taking into account your previous answer and the answer of the group, answer the question whether the named ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with SCI or not (**with YES or NO**).

7. Scroll down in the file and follow the same procedure for each of the ICF categories and of the further items.
8. Keep a copy of the file after you have completed your task in case something goes wrong during the mailing process.
9. Send the completed document “Nurses_3.xls” back to icf.delphi@paranet.ch or send a hard copy of the file per mail.

Please consider the deadline for the third round: 21st September.

If you have any questions, please do not hesitate to contact us.

Yours sincerely,

Christine Boldt
(Project coordinator)

4.7. Appendix 7

Study 2 - Questionnaire Delphi Survey Round 3 (extraction)

	C	D	E	G	H	I
2	Exercise Round 3		Your ID Number	1		
3						
4						
5						
6						
7						
8						
9						
10						
	<div> <p>Taking into account the answer of the group and your individual answer in the second round, do you agree that this ICF category represents patients' problems, patients' resources or aspects of the environment which nurses take care of in patients with Spinal Cord Injury?</p> </div>					
11	ICF category title	ICF category description	% agreement	ID number of participant	YES or NO	
12						please fill in
13	CHAPTER 1 MENTAL FUNCTIONS	This chapter is about the functions of the brain: both global mental functions, such as consciousness, energy and drive, and specific mental functions, such as memory, language and calculation mental functions.	37,0	8 13 27 60 68 70 75 79 90 101		
14	Confidence	Mental functions that produce a personal disposition that is self-assured, bold and assertive, as contrasted to being timid, insecure and self-effacing.	96,3	8 11 13 17 24 25 27 31 42 47 51 59 60 63 68 70 74 75 77 78 79 84 86 90 94 101		
15	Motivation	Mental functions that produce the incentive to act; the conscious or unconscious driving force for action.	92,6	8 11 13 24 25 27 31 42 44 51 59 60 63 68 70 74 75 77 78 79 84 86 90 94 101		
16	Craving	Mental functions that produce the urge to consume substances, including substances that can be abused.	85,2	8 11 13 17 24 25 27 31 42 47 59 60 68 74 75 77 78 79 84 86 90 94 101		
17	Sleep functions	General mental functions of periodic, reversible and selective physical and mental disengagement from one's immediate environment accompanied by characteristic physiological changes.	96,3	8 11 13 17 24 25 27 31 42 44 47 51 59 60 68 70 74 75 77 78 79 84 86 90 94 101		
18	Emotional functions	Specific mental functions related to the feeling and affective components of the processes of the mind.	92,6	8 13 17 24 25 27 31 42 44 47 51 59 60 68 70 74 75 77 78 79 84 86 90 94 101		
19	Proprioceptive function	Sensory functions of sensing the relative position of body parts.	100,0	8 11 13 17 24 25 27 31 42 44 47 51 59 60 63 68 70 74 75 77 78 79 84 86 90 94 101		
20	Touch function	Sensory functions of sensing surfaces and their texture or quality.	96,3	8 11 17 24 25 27 31 42 44 47 51 59 60 63 68 70 74 75 77 78 79 84 86 90 94 101		

Publikationsliste (Stand April 2013)

Zeitschriftenartikel

Erstautorenschaften

Boldt C, Velstra IM, Brach M, Linseisen E, Cieza A. (2013).

Nurses' intervention goal categories for persons with spinal cord injury based on the International Classification of Functioning, Disability and Health: an international Delphi survey.
J Adv Nurs. 69(5): 1109-1124.

Boldt C, Grill E, Bartholomeyczik S, Brach M, Rauch A, Eriks-Hoogland I, Stucki G. (2010).

Combined application of the International Classification of Functioning, Disability and Health and the NANDA-International Taxonomy II.
J Adv Nurs. 66(8): 1885-1898.

Boldt C, Velstra IM, Cieza A, Scheuringer M, Stucki G. (2007).

Spinal cord injury: Identifying nursing intervention categories based on the World Health Organization's International Classification of Functioning, Disability and Health.
SCI Nursing, 24(2). Epub <http://www.unitedspinal.org/publications/nursing/2007/08/06/sci-nursing-volume-24-number-2/>. July 24th, 2007.

Boldt C, Scheuringer M, Grill E. (2005).

Funktionale Gesundheit und pflegerische Leistungen: WHO-Klassifikation auf dem Prüfstand. [Functional health and nursing performance: WHO classification challenge]
Pflege Z. 58(3): 164-168. German.

Boldt C, Brach M, Grill E, Berthou A, Meister K, Scheuringer M, Stucki G. (2005).

The ICF categories identified in nursing interventions administered to neurological patients with post-acute rehabilitation needs.
Disabil Rehabil. 27(7/8): 431-436.

Boldt C, Grill E, Wildner M, Portenier L, Wilke S, Stucki G, Kostanjsek N, Quittan M. (2005).

ICF Core Set for patients with cardiopulmonary conditions in the acute hospital.
Disabil Rehabil. 27(7/8): 375-380.

Boldt C, Grill E, Winter S, Stucki G. (2004).

Einsatz standardisierter Erhebungsinstrumente in der Frührehabilitation. [Use of standardized assessment measures in acute inpatient rehabilitation]
Phys Med Rehab Kuror. 14: 18-25. German.

Zweitautorenschaften

Cieza A, **Boldt C**, Ballert CS, Eriks-Hoogland I, Bickenbach JE, Stucki G. (2011).

Setting up of a cohort study on functioning: Deciding what to measure.
Am J Phys Med Rehabil. 90(11 Suppl 2): S17-28.

Fekete C, **Boldt C**, Post M, Eriks-Hoogland I, Cieza A, Stucki G. (2011).

How to measure what matters: Development and application of guiding principles to select measurement instruments in an epidemiologic study on functioning.
Am J Phys Med Rehabil. 90(11 Suppl 2): S29-38.

Grading F, **Boldt C**, Högl B, Cieza A. (2011).

Part 2: Identification of problems in functioning of persons with sleep disorders from the health professional perspective using the International Classification of Functioning, Disability and Health (ICF) as a reference: a worldwide expert survey.
Sleep Med. 12(1): 97-101.

Mueller M, **Boldt C**, Grill E, Strobl R, Stucki G. (2008).

Identification of ICF categories relevant for nursing in the situation of acute and early post-acute rehabilitation.
BMC Nursing, 7(3): 1-8.
Epub: <http://www.biomedcentral.com/content/pdf/1472-6955-7-3.pdf>

Bartholomeyczik S, **Boldt C**, Grill E, König P. (2006).
Entwicklung und Anwendung der ICF aus der Perspektive der Pflege - Positionspapier der deutschsprachigen Arbeitsgruppe „ICF und Pflege“.
[Development and use of the ICF from the nursing point of view - a position statement of the German speaking working group „ICF and nursing“]
Pflege Z. 59(9): 2-7. German.

Autorenschaft als Senior

Fischer W, Blanco J, Butt M, Hund M, **Boldt C**. (2010).
Leistungsorientiertes Tarifmodell Rehabilitation (LTR). Erste Ergebnisse zur Patientenklassifikation in der neurologischen Rehabilitation.
Neurologie & Rehabilitation, (16)3: 113-130.

Autorenschaften an anderer Stelle

Schwegler U, Anner J, **Boldt C**, Glässel A, Lay V, De Boer WE, Stucki G, Trezzini B. (2012).
Aspects of functioning and environmental factors in medical work capacity evaluations of persons with chronic widespread pain and low back pain can be represented by a combination of applicable ICF Core Sets.
Epub: BMC Public Health. 12:1088. <http://www.biomedcentral.com/1471-2458/12/1088>

Cerniauskaite M, Quintas R, **Boldt C**, Raggi A, Cieza A, Bickenbach J, Leonardi M. (2011).
Systematic literature review on ICF from 2001 to 2009: its use, implementation and operationalisation.
Disabil Rehabil. 33(4): 281-309.

Scheuringer M, Grill E, **Boldt C**, Stucki G. (2011).
Latent Class Factor Analysis of the Functional Independence Measure confirmed four distinct dimensions in patients undergoing neurological rehabilitation.
Eur J Phys Rehabil Med. 47(1): 25-34.

Scheuringer M, Kirchberger I, **Boldt C**, Eriks-Hoogland I, Rauch A, Velstra IM, Cieza A. (2010).
Identification of problems in individuals with spinal cord injury from the health professional perspective using the ICF: a worldwide expert survey.
Spinal Cord, 48(7): 529-536.

Rauch A, Kirchberger I, **Boldt C**, Cieza A, Stucki G. (2009).
Does the Comprehensive International Classification of Functioning, Disability and Health (ICF) Core Set for rheumatoid arthritis capture nursing practice? A Delphi survey.
Int J Nurs Stud. 46(10): 1320-1334.

Grill E, Stucki G, **Boldt C**, Joisten S, Swoboda W. (2005).
Identification of relevant ICF categories by geriatric patients in an early post-acute rehabilitation facility.
Disabil Rehabil. 27(7/8): 467-473.

Grill E, Lipp B, **Boldt C**, Stucki G, Koenig E. (2005).
Identification of relevant ICF categories by patients with neurological conditions in early post-acute rehabilitation facilities.
Disabil Rehabil. 27(7/8): 459-465.

Scheuringer M, Grill E, **Boldt C**, Mittrach R, Müllner P, Stucki G. (2005).
Systematic review of measures and their concepts used in published studies focusing on rehabilitation in the acute hospital and in early post-acute rehabilitation facilities.
Disabil Rehabil. 27(7/8): 419-429.

Post MW, Brinkhof MW, von Elm E, **Boldt C**, Brach M, Fekete C, Eriks-Hoogland I, Curt A, Stucki G; SwiSCI study group. (2011).
Design of the Swiss Spinal Cord Injury Cohort Study.
Am J Phys Med Rehabil. 90(11 Suppl 2): S5-16.

Grill E, Quittan M, Huber E O, **Boldt C**, Stucki G. (2005).

Identification of relevant ICF categories by health professionals in the acute hospital.

Disabil Rehabil. 27(7/8): 437-445.

Grill E, Harder M, Fischbacher L, **Boldt C**, Mittrach R, Stucki G. (2005).

Identification of relevant ICF categories by patients in early post-acute rehabilitation facilities.

Phys Med Rehab Kuror. 15: 168-173.

Mueller M, Lohmann S, Strobl R, **Boldt C**, Grill E. (2010).

Patients' functioning as predictor of nursing workload in acute hospital units providing rehabilitation care: a multi-centre cohort study.

BMC Health Serv Res. 10: 295. Epub: <http://www.biomedcentral.com/1472-6963/10/295>.

Wildner M, Quittan M, Portenier L, Wilke S, **Boldt C**, Stucki G, Kostanjsek N, Grill, E. (2005).

ICF Core Set for patients with cardiopulmonary conditions in early post-acute rehabilitation facilities.

Disabil Rehabil. 27(7/8): 397-404.

Mittrach R, Grill E, Walchner-Bonjean M, Scheuringer M, **Boldt C**, Huber E, Stucki G. (2008).

Goals of physiotherapy interventions can be described using the International Classification of Functioning, Disability and Health.

Physiotherapy, 94: 150-157.

Eriks-Hoogland I, Cieza A, Post M, Hilfiker R, van Hedel H, Cripps R, Chen Y, **Boldt C**, Stucki G. (2011).

Category specification and measurement instruments in large spinal cord injury studies: A comparison using the International Classification of Functioning, Disability and Health as a reference.

Am J Phys Med Rehabil. 90(11 Suppl 2): S39-49.

Buchkapitel

Boldt C.

Die ICF in der Pflege.

In: Müller-Staub M, König P, Schalek K (Hrsg). Pflegedaten generieren und nutzen: Begriffssysteme und Klassifikationen. (2013 im Druck). Bern: Verlag Hans Huber.

Boldt C.

Die Abbildung von Pflegeinterventionen durch die ICF am Beispiel von Patienten in der Frührehabilitation.

In: Thoke-Colberg (Hrsg). Anwendungsorientierte Pflegeforschung - Ethik in der Pflege. (2004). München: Zuckschwerdt. 39-46.

Scheuringer M, **Boldt C**, Kostanjsek N.

WHODAS II (WHO Psychiatric Disability Schedule, Version 2).

In: Bengel, Wirtz, Zwingmann (Hrsg). Diagnostische Verfahren in der Rehabilitation. (2008). Göttingen: Hogrefe Verlag. 60-63.

Grill E, **Boldt C**.

Entwicklung von ICF-Core-Sets zur Beurteilung der Beeinträchtigung der funktionalen Gesundheit und der Pflegebedürftigkeit in der Frührehabilitation.

In: Thoke-Colberg (Hrsg). Anwendungsorientierte Pflegeforschung - Ethik in der Pflege. (2004). München: Zuckschwerdt. 31-37.

Kongress-Vorträge

Boldt C. Dualer Bachelor-Studiengang Pflege. AbsolventInnen sinnvoll im stationären Bereich einsetzen. Veranstaltung für Stationsleitungen am Klinikum rechts der Isar der TU München. December 14 - 15, 2012.

Boldt C. Interventionsziele von Pflegenden für optimale Aktivitäten/Partizipation und deren beeinflussende Faktoren. Graduiertenkolleg „Partizipation als Ziel von Pflege und Therapie“.

Internationale Graduiertenakademie der Martin-Luther-Universität Halle-Wittenberg. June 27 - 29, 2011.

Boldt C. A literature review of risk assessment scales and of related factors for pressure ulcer in SCI - Using the International Classification of Functioning, Disability and Health (ICF) as a reference. 23. Jahrestagung der Deutschsprachigen Medizinischen Gesellschaft für Paraplegie (DMGP). Nottwil, June 9 - 12, 2010.

Boldt C. Die Internationale Klassifikation der Funktionsfähigkeit, Behinderung und Funktionsfähigkeit (ICF) und ihre Anwendbarkeit in der Pflege. Pflegekongress 09. Vienna, November 5th, 2009.

Boldt C. The ICF in the nurses perspective. 5th World Congress of the ISPRM. Istanbul, June 15th, 2009.

Boldt C. Abschlussvortrag: Zukunftsvision der ICF. Tagung der Alice Salomon Hochschule Berlin. Berlin February 22 - 23, 2008.

Boldt C. Kommunikation ohne Hindernisse - die ICF als interdisziplinäre Sprache in der Frührehabilitation. Tagung der Alice Salomon Hochschule Berlin. Berlin February 22 - 23, 2008.

Boldt C. Die Relevanz und Anwendbarkeit der ICF in der Pflege. DEGEMED-Pflegetagung, Berlin, November 9th, 2006.

Boldt C, Kus S, Scheuringer M, Stucki G, Grill E.
Die Berücksichtigung der Patientenperspektive bei der Entwicklung von ICF Core Sets für Patienten der geriatrischen Frührehabilitation.
4th European Congress of Nursing, MOC Munich, October 19 – 21, 2006.

Boldt C, Scheuringer M, Stucki G, Grill E.
Aspekte der Funktionsfähigkeit geriatrischer Patienten in der Frührehabilitation und der Zusammenhang mit deren Pflegeaufwand.
4th European Congress of Nursing, MOC Munich, October 19 – 21, 2006.

Müller M, **Boldt C,** Scheuringer M, Stucki G, Grill E.
Identifikation der für die Pflege in der Frührehabilitation relevanten Kategorien der ICF.
4th European Congress of Nursing, MOC Munich, October 19 – 21, 2006.

Kongress-Poster

Boldt C, Baumberger M (on behalf of the SwiSCI Study Group).
Erste Ergebnisse der Schweizer Langzeitstudie für Rückenmarksverletzte (SwiSCI) - Charakteristika und Outcomes bei Patienten in Erstrehabilitation.
24. Jahrestagung der Deutschsprachigen Medizinischen Gesellschaft für Paraplegie (DMGP). Bad Wildbad, May 25 - 28, 2011.

Boldt C, Eriks-Hoogland I, von Elm E (on behalf of the SwiSCI Core Team).
Using the ICF Core Sets for Spinal Cord Injury (SCI) in epidemiological studies: The Swiss Spinal Cord Injury Study (SwiSCI) as an example.
17th European Congress of the European Society of Physical and Rehabilitation Medicine (ESPRM): "European Rehabilitation: Quality, evidence, efficacy and effectiveness". Venice, May 23 - 27, 2010.

Boldt C, Scheuringer M, Grill E, Stucki G.
Die Abbildung von Pflegeaufwand anhand der ICF - exemplarische Darstellung an Daten der neurologischen post-akuten Frührehabilitation.
110. Jahreskongress der DGPMR gemeinsam mit der ÖGPMR, Munich, October 13 – 15, 2005.

Boldt C, Grill E, Scheuringer M, Winter S, Stucki G.
The linkage of nursing interventions to the ICF in acute neurological rehabilitation.
14th European Congress of Physical and Rehabilitation Medicine, Advances in PMR, Traditional and Modern Concepts, Austria Center Vienna, May 12 - 15, 2004.

Boldt C, Scheuringer M, Grill E, Stucki G.
Kann Pflegeaufwand in der ICF abgebildet werden? - exemplarische Darstellung an Daten der neurologischen post-akuten Frührehabilitation.
3rd European Congress of Nursing, MOC Munich, October 14 – 16, 2004.

Glässer A, **Boldt C**, Gall H, Brach M, Bollag Y, Gyr N, Stucki G, Cieza A.
The use of the ICF Core Sets for medical expertises of patients suffering low back pain and chronic widespread pain.
Kongress Reha-Schweiz, Interlaken SAR / GSR, March 2009.

Grading F, **Boldt C**, Geyh S, Stucki A, Dahlberg A, Partinen M, Michel F.
Understanding Sleep in Spinal Cord Injury: a Literature Review
5th World Sleep Congress of the World Federation of Sleep Research and Sleep Medicine
Societies: Cairns, September 2-6, 2007.