

ORIGINAL REPORT

BRIEF ICF CORE SETS FOR THE ACUTE HOSPITAL

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Objective: To identify candidate categories for brief International Classification of Functioning, Disability and Health (ICF) Core Sets for the reporting and measurement of functioning in patients in the acute hospital.

Design: Prospective multi-centre cohort study.

Patients: Patients receiving rehabilitation interventions for musculoskeletal, neurological or cardiopulmonary injury or disease in acute hospitals.

Methods: Functioning and contextual factors were coded using the ICF. The criterion for selecting candidate categories for the brief ICF Core Sets was based on their ability to discriminate between patients with high or low functioning status. Discrimination was assessed using multivariable regression models, the independent variables being all of the ICF categories of the respective comprehensive ICF Core Set. Analogue ratings of overall functioning as reported by patients and health professionals were used as dependent variables.

Results: A total of 391 patients were included in the study (91 neurological, 109 cardiopulmonary, 191 musculoskeletal), mean age 63.4 years, 50.1% female. Selection yielded 33 categories for neurological, 31 for cardiopulmonary, and 30 for musculoskeletal.

Conclusion: The present selection of categories can be considered an initial proposal, serving to identify the ICF categories most relevant for the practical assessment and monitoring of functioning in patients with acute neurological, cardiopulmonary, and musculoskeletal conditions.

Key words: ICF; health status measurements; outcome assessment; classification; regression analysis; intensive care.

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INTRODUCTION

Patients in developed countries now have a higher likelihood of surviving acute injury or illness (1–2). However, recovery

may be marred by significant loss of functioning. Several factors are increasing the risk for future disability in patients in the acute hospital, e.g. prolonged stay at intensive care, old age, or frailty. Therefore, the risk for disability has to be identified, and appropriate interventions should be provided at the earliest possible stage in acute treatment (3), e.g. after acute stroke (4). It is held that healthcare professionals in the acute hospital should be able to make a brief assessment of their patients' functioning, so as to identify those patients who are especially vulnerable to future disability, and set in motion timely strategies for meeting their subsequent rehabilitation needs. In order to communicate their patients' particular needs to all other professionals involved in the provision of rehabilitation care, healthcare professionals must have recourse to a standard system for describing human functioning and rating disability. To this end, there must be defined standards for what to report and how to measure functioning and disability. However, instruments recommended for the use in the acute situation, such as the Functional Independence Measure (FIMTM) (5), measure selected aspects of self care and are not commonly used in all acute care settings. For example, the FIM is used most frequently in neurological care, but displays ceiling effects in other care situations (6).

The International Classification of Functioning, Disability and Health (ICF), a part of the family of international classifications of the World Health Organization (WHO), provides a common framework for describing and classifying health and disability. The ICF classifies domains of functioning, along with their contextual factors, which are encountered in human life. As such, the ICF may arguably constitute a comprehensive framework and a guide for healthcare planning and for measuring the changes brought by interventions across a multitude of dimensions from body functions to personal activities, societal participation and environmental factors. It also provides the potential framework for transition along the continuum of care. For example, assessment of functioning in acute care cannot be carried over to other episodes of care, such as rehabilitation, unless there is a common assessment scheme. A classification must be exhaustive by its very nature and becomes very complex in daily use unless it is transformed into practice-friendly tools. Comprising over 1400 categories,

the entire volume of the ICF cannot be applied by the clinicians to all their patients. In daily practice clinicians will need only a fraction of the categories found in the ICF. Although there are generic instruments based on the ICF that are designed as practical translations of the ICF and are usable across a wide range of applications, the generic character may be a drawback in specific settings. Thus, in this trade-off between generalizability and the need to capture the detail, the ICF must be adapted to the perspectives and needs of different users. The need to tailor ICF to the needs of particular contexts is the primary motivation behind the ICF Core Set project, which aims to extract selections of ICF categories from the entire classification that are relevant to specific health conditions or care situations. This on-going project of selection of the so-called comprehensive ICF Core Sets will define common standards for what should properly be measured and reported.

In general, the ICF Core Set project seeks to define on an empirical basis the ICF categories relevant for the condition and rehabilitation of typical patients in acute care, especially when applied as an endpoint in clinical trials, or if identified as being relevant following discussion among health professionals (7). By including all potentially relevant categories, the Core Set selection process is comprehensive, omitting only those factors that proved to be irrelevant to designing treatment strategy or assessing outcome. Due to the consensus process, the ICF Core Sets in their present version are comprehensive, and applicable for the assessment of individual problems and needs. As such, they permit the estimation of prognosis and the potential for rehabilitation, with general applicability for assessment of functioning in the acute situation, e.g. at the intensive care unit. Comprehensive acute ICF Core Sets were developed for patients with conditions falling into 3 main categories: neurological, cardiopulmonary and musculoskeletal (8–10). This stratification was based on practical considerations related to healthcare provision being organized according to organ system and the varying spectrum of problems experienced in patients with neurological, musculoskeletal and cardiopulmonary conditions. This approach was used in prior studies on functioning in the acute care situation (11) and verified by focus groups (12). The comprehensive Core Sets have been validated from the perspectives of patients and healthcare professionals (13–15). The 3 comprehensive acute ICF Core Sets include second-level ICF categories, encompassing 85 neurological conditions, 48 cardiopulmonary conditions, and 47 musculoskeletal conditions. While the ICF is comprehensive, it is usually necessary to obtain a minimally sufficient data-set: In clinical practice, this may encompass only 20 different concepts or topics, selected from the comprehensive ICF Core Sets. Thus, subsets from the comprehensive Core Sets must be created, also on an empirical basis, and according to specific needs of the individual user. Methods have been proposed for identifying candidate categories for brief ICF Core Sets, selected from the comprehensive acute ICF Core Sets (16). The objective of this study was to employ these methods for identifying candidate categories for brief ICF Core Sets for the reporting and measurement of functioning in patients in the acute hospital.

METHODS

Detailed methods of the ICF Core Set development have been described elsewhere (16). In brief, a prospective multi-centre cohort study was conducted from May 2005 to August 2008 in 5 acute hospitals in Germany, Austria and Switzerland. The participating facilities were University Hospital Vienna (Department of Physical Medicine and Rehabilitation, Vienna, Austria), Kaiser-Franz-Josef-Spital (Institute for Physical Medicine and Rehabilitation, Vienna, Austria), University Hospital Zurich (Department of Rheumatology and Institute for Physical Medicine, Zurich, Switzerland), Hannover Medical School (Department of Rehabilitation Medicine, Hannover, Germany), and Orthopaedic University Hospital (Heidelberg, Germany). Selection of study centres was based on size of the respective wards and on previous experience of the facility with the ICF. Precondition for inclusion of the facility was a multi-disciplinary team-oriented approach to rehabilitation. Patients were eligible if they were at least 18 years of age and received team integrated multiprofessional rehabilitation interventions for acute musculoskeletal, neurological, or cardiopulmonary injury or disease. As such, rehabilitation interventions could be provided either at a dedicated rehabilitation ward situated in the acute hospital or by mobile rehabilitation teams caring for patients on medical or surgical wards or at an intensive care unit. Informed consent was obtained from the patients or from the patient's care-giver in cases where the patient was unable to make an informed decision. Approval was obtained from institutional ethics committees from all involved institutions prior to starting the study.

As noted above, we have developed the comprehensive ICF Core Sets in order to facilitate and promote the use of the ICF in clinical practice and research. The comprehensive ICF Core Sets are selections from the entire list of ICF categories, which emerged from a multi-stage consensus process seeking to identify those aspects of functioning most relevant for patients in specific settings or with specific health conditions. Three comprehensive ICF Core Sets were developed for patients receiving acute treatment for neurological (NEUR), cardiopulmonary (CP) and musculoskeletal (MSK) conditions in the acute situation (8–10). The current study made use of a combination of these 3 comprehensive ICF Core Sets for patient assessment.

For scoring of the Core Sets, the ICF suggests assigning qualifiers ranging from 0 to 4 for each category. Because the properties of all qualifiers are not yet sufficiently evaluated, in the present study we used a simplified qualifier, defined as follows. Each category of the components Body Functions and Activities and Participation was graded with the qualifiers 0 for "no impairment/limitation", 1 for "moderate impairment/limitation" and 2 for "severe impairment/limitation". The categories of the component Body Structures were graded with the qualifiers 0 for "no impairment" and 1 for "impairment". The categories of the component Environmental Factors were graded with 0 for "no barrier/facilitator" and 1 for "barrier/facilitator". Impairments of body functions or structures, and limitations or restrictions of activities and participation were recorded if they were directly associated with the condition necessitating rehabilitation.

To provide a global overview of functioning, the patients were asked to report their difficulties in overall functioning using a horizontal visual analogue scale, ranging from zero, for complete difficulty in all aspects of functioning to 10, for no difficulty in functioning). "Overall functioning" was defined as encompassing all aspects of physical or mental state, of daily living, mobility and interaction with the environment and with others. Patients were asked to relate to their current health condition and their present state. Independently, and blinded to the patients' responses, the health professionals were asked to appraise their patients' functioning on the same analogue scale.

Patients were recruited and interviewed by health professionals who were trained in the application and principles of the ICF. Interviewers were trained during a structured 1-day meeting, and were provided with a comprehensive manual. Ongoing supervision of interviewers was ensured by periodic telephone calls between each interviewer and the responsible member of their research team. Data was primarily collected from patients' medical record sheets, by interview of health

professionals in charge of the patients, and by patient interviews. ICF Core Set categories were assessed within the first 24 h after admission (baseline).

The criterion for selecting candidate categories for the brief ICF Core Sets was based on their ability to discriminate between patients with high or low functioning status. Discrimination was assessed using multivariable regression models, in which the independent variables were all of the ICF categories of the respective comprehensive ICF Core Set. Analogue ratings of overall functioning as reported by patients and health professionals were used as dependent variables. To improve prediction accuracy, and to derive small subsets of independent variables having the strongest effects on the dependent variable, we used the least absolute shrinkage and selection operator (LASSO) (17). This procedure minimizes the residual sum of squared errors with a bound on the sum of the absolute values of the coefficients. To avoid large variance, as often occurs in ordinary least square regression, the LASSO sets some regression coefficients to zero and shrinks others based on a pre-set regularization parameter, the so-called penalty. Thus, the method acts recursively to select valid subsets with adequate discrimination.

To validate the approach for selection of brief ICF Core Sets described above, we additionally used the Random Forest algorithm, which is based on Classification and Regression Trees (CART) non-parametric regression techniques. CART divides a population into several subpopulations depending on provisional characteristics defined by successive binary splits in predictor variables. In the course of the iterations, successive subpopulations emerge as increasingly homogenous with respect to the outcome variable, which in this case is the overall functioning as reported by patients and health professionals. Of the many different ways to construct CART, we employed the technique proposed by Breiman et al. (18–19).

If the 2 regression techniques yielded differing sets of categories results, the union of the 2 resulting sets would be reported.

All data analyses were carried out with R 2.9.0 (20).

RESULTS

A total of 391 patients were included in the study; 91 with neurological, 109 with cardiopulmonary and 191 with musculoskeletal conditions. Mean age was 63.4 years (neurological: 64.6 years, cardiopulmonary: 68.9 years, musculoskeletal: 59.7 years), 50.1% were female (neurological: 50.5%, cardiopulmonary: 45.9%, musculoskeletal: 52.4%). Mean length of hospital stay in acute care was 14.9 days (neurological: 17.7 days, cardiopulmonary: 14.4 days, musculoskeletal: 13.9 days). The most frequent diagnoses are shown in Table I. Patients with neurological conditions reported a mean functioning score of

4.9 (95% CI 4.4–5.4) at admission and of 6.6 (95% confidence interval (CI) 6.1–7.0) at discharge. Patients with cardiopulmonary conditions reported a mean functioning score of 4.9 (95% CI 4.4–5.3) at admission and of 6.9 (95% CI 6.6–7.3) at discharge. Patients with musculoskeletal conditions reported a mean functioning score of 4.1 (95% CI 3.8 to 4.4) at admission and of 6.5 (95% CI 6.2–6.8) at discharge.

For patients with neurological conditions, statistical selection of ICF categories by LASSO and CART yielded 13 categories for the component Body Functions, 12 categories for the component Activities and Participation, 3 categories for the component Body Structures and 5 categories for the component Environmental Factors, i.e. a total of 28 categories for the functioning part and 5 categories for the contextual part of the ICF.

For patients with cardiopulmonary conditions, statistical selection of ICF categories by LASSO and CART yielded 12 categories for the component Body Functions, 9 categories for the component Activities and Participation, 2 categories for the component Body Structures and 8 categories for the component Environmental Factors, i.e. a total of 23 categories for the functioning part and 8 categories for the contextual part of the ICF.

For patients with musculoskeletal conditions, statistical selection of ICF categories by LASSO and CART yielded 9 categories for the component Body Functions, 12 categories for the component Activities and Participation, 6 categories for the component Body Structures and 3 categories for the component Environmental Factors, i.e. a total of 27 categories for the functioning part and 3 categories for the contextual part of the ICF.

The particulars of the selected categories for patients with neurological, cardiopulmonary and musculoskeletal conditions, along with information on the corresponding comprehensive ICF Core Sets are shown in Tables II–V.

DISCUSSION

From a sample of 391 patients in the acute hospital we identified candidate categories for brief ICF Core Sets extracted from the comprehensive acute ICF Core Sets. These candidate categories

Table I. Most frequent diagnoses responsible for inpatient stay (International Classification of Diseases (ICD-10))

	All conditions <i>n</i> = 391 <i>n</i> (%)	Neurological conditions <i>n</i> = 91 <i>n</i> (%)	Cardiopulmonary conditions <i>n</i> = 109 <i>n</i> (%)	Musculoskeletal conditions <i>n</i> = 191 <i>n</i> (%)
Diseases of the respiratory system (J00-J99)	28 (7.2)	2 (2.2)	26 (23.9)	0 (0)
Diseases of the circulatory system other than cerebrovascular diseases (I00-I52 and I70-I99)	69 (17.6)	3 (3.3)	66 (60.6)	0 (0)
Cerebrovascular diseases (I60-I69)	46 (11.8)	46 (50.5)	0 (0)	0 (0)
Diseases of the nervous system (G00-G99)	18 (4.6)	18 (19.8)	0 (0)	0 (0)
Diseases of the musculoskeletal system and connective tissue (M00-M99)	87 (22.3)	3 (3.3)	1 (0.9)	83 (43.5)
Injury, poisoning and certain other consequences of external causes (S00-T98)	80 (20.5)	4 (4.4)	0 (0)	76 (39.8)
Neoplasms (C00-D48)	37 (9.5)	11 (12.1)	7 (6.4)	19 (9.9)
Symptoms, signs, etc. (R00-R99)	6 (1.5)	2 (2.2)	3 (2.8)	1 (0.5)
Other diagnoses	20 (5.1)	2 (2.2)	6 (5.5)	12 (6.3)

Table II. *International Classification of Functioning, Disability and Health (ICF) – categories of the component Body Functions contained in the comprehensive ICF Core Sets (comp) and proposed as candidates for the ICF Core Sets for patients with neurological (NEUR), cardiopulmonary (CP) and musculoskeletal (MSK) conditions in the acute hospital*

ICF code and category description		NEUR comp Core Set	NEUR brief Core Set	CP comp Core Set	CP brief Core Set	MSK comp Core Set	MSK brief Core Set
b110	Consciousness functions	×	×	×	×	×	
b114	Orientation functions	×		×			
b130	Energy and drive functions	×		×	×	×	×
b134	Sleep functions	×		×		×	
b140	Attention functions	×	×				
b147	Psychomotor functions	×					
b152	Emotional functions	×				×	×
b156	Perceptual functions	×					
b167	Mental functions of language	×	×				
b180	Experience of self and time functions	×				×	
b210	Seeing functions	×					
b215	Functions of structures adjoining the eye	×	×				
b230	Hearing functions	×					
b235	Vestibular functions	×	×				
b240	Sensations associated with hearing and vestibular functions	×	×				
b260	Proprioceptive functions	×				×	
b265	Touch functions	×					
b270	Sensory functions related to temperature and other stimuli	×	×				
b280	Sensation of pain	×		×	×	×	
b310	Voice functions	×					
b410	Heart functions	×		×			
b415	Blood vessel functions	×	×	×	×	×	×
b420	Blood pressure functions	×		×	×		
b430	Haematological system functions	×	×	×			
b435	Immunological system functions	×		×	×		
b440	Respiration functions	×	×	×	×	×	×
b445	Respiratory muscle functions			×	×		
b450	Additional respiratory functions	×		×	×		
b455	Exercise tolerance functions	×		×	×	×	×
b460	Sensations associated with cardiovascular and respiratory functions			×	×		
b510	Ingestion functions	×		×	×		
b525	Defecation functions	×	×			×	×
b535	Sensations associated with the digestive system	×	×				
b540	General metabolic functions	×					
b545	Water, mineral and electrolyte balance functions	×		×			
b610	Urinary excretory functions			×			
b620	Urination functions	×				×	×
b710	Mobility of joint functions	×	×	×		×	×
b715	Stability of joint functions	×				×	
b730	Muscle power functions	×		×		×	
b735	Muscle tone functions	×				×	×
b755	Involuntary movement reaction functions	×					
b760	Control of voluntary movement functions	×					
b810	Protective functions of the skin	×					
b820	Repair functions of the skin			×		×	

represent a practical alternative to the lengthy comprehensive sets, in providing a minimal standard for measuring and communicating patients' functioning in the acute care setting. Our approach considers the specific methods that have been proposed for the definition of brief ICF Core Sets, especially with respect to the properties of feasibility and discrimination of measures (21) and their usefulness for the specific setting. In general, the criterion *feasibility* is satisfied when a measure can in practical terms be applied by health professionals, given circumstances of restricted time and resources, which may be especially limited in the acute hospital setting. With this in mind, in the present study we sought to define practical and applicable brief ICF

Core Sets with no more than 20 items or ICF categories. This upper limit was based on the precedent set by generic health status measures, and the practical requirement for a measure to be completed in a 20-min interview. The brief ICF Core Sets emerging in the present study are generally feasible in the acute situation, albeit containing slightly more than 20 categories to assess functioning. We proposed assessing a total of 21–25 categories from the components Body Functions and Activities and Participation, electively supplemented with an additional 8–10 categories from Environmental Factors. Use of categories from Body Structures would depend on the underlying health condition, as required by the routine medical assessment.

Table III. *International Classification of Functioning, Disability and Health (ICF) – categories of the component Activities and Participation contained in the comprehensive ICF Core Sets (comp) and proposed as candidates for the ICF Core Sets for patients with neurological (NEUR), cardiopulmonary (CP) and musculoskeletal (MSK) conditions in the acute hospital*

ICF code and category description		NEUR comp Core Set	NEUR brief Core Set	CP comp Core Set	CP brief Core Set	MSK comp Core Set	MSK brief Core Set
d240	Handling stress and other psychological demands			×		×	×
d315	Communicating with – receiving – nonverbal messages	×					
d330	Speaking	×		×	×		
d335	Producing nonverbal messages	×					
d360	Using communication devices and techniques	×	×				
d410	Changing basic body position	×	×	×	×	×	×
d415	Maintaining a body position	×	×	×	×	×	×
d420	Transferring oneself	×	×	×	×	×	×
d440	Fine hand use (picking up, grasping)	×					
d445	Hand and arm use	×					
d450	Walking			×	×	×	×
d465	Moving around using equipment	×	×				
d510	Washing oneself	×	×	×	×	×	×
d520	Caring for body parts	×	×	×	×	×	×
d530	Toileting	×	×	×	×	×	×
d540	Dressing	×	×	×	×		
d550	Eating	×	×			×	×
d560	Drinking	×	×				
d760	Family relationships	×	×			×	
d930	Religion and spirituality					×	
d940	Human rights	×				×	

The second essential criterion, *discrimination*, refers to the ability of a measure to discriminate between different states of functioning or medical conditions. A discriminating measure must enable the distinguishing between different patient groups in a cross-sectional manner. In order to ensure discrimination of our brief Core Sets, we applied modern regression techniques, which accommodate collinearities of many variables, thus ensuring that the minimally sufficient predictors of functioning, as reported from the perspectives of both patient and healthcare professional, were included in the final selection. By design, we ensured that categories from all components of the ICF remained in the selection. By using two different statistical techniques, the validity of the choice was increased. The results of the selection processes have high face validity, as the selected categories seem accurately to represent the relevant issues in the acute situation.

For patients with neurological conditions, the selected categories mainly represented impairment of consciousness, attention and mental functions of language. Indeed, these are the most disabling consequences of neurological injury or disease impinging on functioning, which furthermore have immediate significance for therapy, e.g. after an acute stroke (22–23). Similarly, vascular, respiratory and elimination functions also emerged as categories to be monitored in acute neurological conditions. Aspects of activities of daily living and mobility from the component Activities and Participation that were included in the final selection are also highly relevant in the acute situation (24). Indeed, precisely these aspects are also covered by existing measurement instruments, which are commonly recommended for acute care of neurological conditions such as stroke (25), for example the FIM™ (5). Additionally,

Table IV. *International Classification of Functioning, Disability and Health (ICF) – categories of the component Body Structures contained in the comprehensive ICF Core Sets (comp) and proposed as candidates for the ICF Core Sets for patients with neurological (NEUR), cardiopulmonary (CP) and musculoskeletal (MSK) conditions in the acute hospital*

ICF category		NEUR comp Core Set	NEUR brief Core Set	CP comp Core Set	CP brief Core Set	MSK comp Core Set	MSK brief Core Set
s110	Structure of brain	×	×				
s120	Spinal cord and related structures	×	×				
s410	Structure of cardiovascular system	×		×		×	×
s430	Structure of respiratory system	×		×		×	
s710	Structure of head and neck region	×	×			×	×
s720	Structure of shoulder region					×	
s730	Structure of upper extremity					×	×
s740	Structure of pelvic region					×	×
s750	Structure of lower extremity					×	
s760	Structure of trunk			×	×	×	×
s810	Structure of areas of skin			×	×	×	×

Table V. *International Classification of Functioning, Disability and Health (ICF) – categories of the component Environmental Factors contained in the comprehensive ICF Core Sets (comp) and proposed as candidates for the ICF Core Sets for patients with neurological (NEUR), cardiopulmonary (CP) and musculoskeletal (MSK) conditions in the acute hospital*

ICF category	NEUR comp Core Set	NEUR brief Core Set	CP comp Core Set	CP brief Core Set	MSK comp Core Set	MSK brief Core Set
e110 Products or substances for personal consumption	×		×	×	×	×
e115 Products and technology for personal use in daily living	×		×	×	×	
e120 Products and technology for personal indoor and outdoor mobility and transportation	×	×	×	×	×	
e125 Products and technology for communication	×					
e150 Design, construction and building products and technology of buildings for public use	×				×	
e240 Light	×					
e250 Sound	×		×	×		
e260 Air quality			×	×		
e310 Immediate family	×		×	×	×	
e315 Extended family	×	×				
e320 Friends	×		×		×	
e355 Health professionals	×		×		×	×
e360 Health related professionals	×					
e410 Individual attitudes of immediate family members	×		×		×	
e415 Individual attitudes of extended family members	×					
e420 Individual attitudes of friends	×		×		×	×
e450 Individual attitudes of health professionals	×		×		×	
e455 Individual attitudes of other professionals	×					
e465 Social norms, practices and ideologies	×	×				
e550 Legal services, systems and policies	×	×				
e570 Social security, services, systems and policies	×	×	×	×		
e580 Health services, systems and policies	×		×	×	×	

family relationships from Activities and Participation and the Environmental Factor component of extended family came up as candidate categories, which is concordant with the current literature on acute neurological care, e.g. after traumatic brain injury (26).

For patients with cardiopulmonary conditions, heart functions, blood functions, blood pressure functions and respiratory functions along with exercise tolerance were included in the candidate selection. These factors certainly represent the most important issues that should be assessed and monitored in cardiopulmonary patients (27). In addition, it must be considered that activities of daily living are frequently limited in patients with cardiac or pulmonary disease (28). Categories from the component Environmental Factors, namely *Social security* (e570) and *Health services* (e580), were also included in the selection, which is consistent with current literature showing that the survival of patients with acute cardiorespiratory conditions largely depends on the availability of healthcare and the quality of treatment (29). Interestingly, the categories *Sound* (e250) and *Air quality* (e260) also entered the selection. These environmental issues might reflect the subjectively “hostile environment” of the acute ward or intensive care unit, which has been described previously and illustrates the particular vulnerability of patients to this kind of stress (30).

For patients with musculoskeletal conditions, some very basic categories from the component Body Functions were included into the selection of candidate categories, specifically blood vessel functions, respiration, exercise tolerance, defecation, urination, mobility of joints and muscle tone. These reflect key

issues arising in the context of medical or surgical interventions in musculoskeletal diseases or injuries (31–32). Emotional functions and energy and drive functions also emerged as issues to be monitored, consistent with findings that early psychosocial support is essential for neuromuscular rehabilitation (33). Accordingly, limitations in mobility and self care from the component Activities and Participation entered the selection.

In general, patients with neurological, cardiopulmonary or musculoskeletal conditions largely differ as regarding their specific impairments, activity limitations and participation restrictions. Several communalities, however, deserve mention. Notably, aspects of basic transfer, mobility and self-care are common to all patients in acute care.

Among the limitations of this study, it must be considered that selection bias may have occurred due to the use of a convenience sample of patients and participating facilities. Team-integrated multiprofessional rehabilitation intervention may have contributed to the selection reducing the representativeness of the results. Still, the spectrum of impairments and limitations encountered in our group of 391 patients was consistent with the results from similar studies (11–12). Another limitation might arise from the statistical selection process. Although we used 2 established methods, a split-sample approach might have proved superior validation of the results. However, this approach was not possible because of the limited sample size. Further studies of sufficient size would establish the validity of the proposed selection more firmly, and would yield more insights into the association structures (34) and potential scale attributes (35) of the categories.

Defining brief ICF Core Sets for the acute care situation has distinct advantages. Standardized health status measures are of interest for the acute situation because there is growing concern over costs and because patients are to return to a high level of functioning as soon as possible (36). Measuring functioning thus is an issue for health professionals and healthcare providers. The ICF provides the potential framework for standardized reporting and measurement in the acute situation and the framework along the continuum of care. Brief ICF Core Sets are a focused approach to measuring health status from a patient-centred and multi-professional perspective.

In conclusion, the present selection of categories can be considered an initial proposal, serving to identify the issues most relevant for the assessment and monitoring of functioning in patients with acute neurological, cardiopulmonary, and musculoskeletal conditions. The main strength of the study lies in the selection of a restricted set of categories, facilitating the inclusion of brief ICF Core Sets into daily clinical routine. If it should occur that important categories are missing from the brief Core Sets, the comprehensive ICF Core Sets could easily be used to reconfigure the assessment. Also, for patients with multiple diagnoses or for aged patients, a more generic Set could be constructed, containing all categories from the 3 acute brief ICF Core Sets. Another advantage of the proposed selection is derived from its participatory approach, taking into consideration the perspectives both of patients and healthcare professionals. Thus, the brief ICF Core Sets for the acute hospital can contribute substantially to the optimal management of patients, the teaching of health professionals, the planning of studies and the development of new assessment instruments.

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