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Toward the International Classification of Functioning, Disability and Health (ICF) Rehabilitation Set: A minimal generic set of domains for rehabilitation as a health strategy

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Toward the International Classification of Functioning, Disability and Health (ICF) Rehabilitation Set: A minimal generic set of domains for rehabilitation as a health strategy.

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Toward the International Classification of Functioning, Disability and Health (ICF) Rehabilitation Set: A minimal generic set of domains for rehabilitation as a health strategy.

Abstract

Objective: To develop a comprehensive set of categories from the International Classification of Functioning, Disability and Health (ICF) as a minimal standard for reporting and assessing functioning and disability in clinical populations along the continuum of care. The specific aims were to specify the domains of functioning recommended for such ICF Rehabilitation Set and to identify a minimal set of environmental factors (EFs) to be used alongside the ICF Rehabilitation Sets when describing disability across individuals and populations with various health conditions.
Design: A secondary analysis of existing data sets was performed using regression methods (Random Forests and Group Lasso regression) and expert consultation.
Setting: Along the continuum of care, including acute, early-post acute, and long-term and community rehabilitation settings.
Participants: In the primary studies 9863 persons participated with various health condition. The number of respondents for whom the dependent variable data were available and used for this analysis consisted of 9264 participants.
Interventions: Not applicable
Main Outcome Measures: For the Regression analyses, self-reported general health was used as dependent variable. The ICF categories from the functioning component and EFs component were used as independent variables for the development of the ICF Rehabilitation Set and minimal set of EFs respectively.
Results: Thirty ICF categories to be complemented with 12 EFs were identified as relevant for the identified ICF sets. The ICF Rehabilitation Set constitutes of 9 ICF categories from the component Body Functions and 21 from the component Activities and Participation. The minimal set of EFs contains 12 categories spanning all chapters of the EFs component of the ICF.
Conclusion: The identified sets proposed serve as minimal generic sets of aspects of functioning in clinical populations for reporting data within and across heath conditions, time, clinical settings including rehabilitation, and countries. These sets present a reference framework for harmonizing existing information on disability across general and clinical populations.

Keywords: ICF, Functioning, Environmental Factors, Health, Data comparability, Data standards, Convention on the Rights of Persons with Disability, Disability Statistics

Abbreviations:
CRPD = Convention of the Rights of Persons with Disabilities
EFs = Environmental Factors
ICF = International Classification of Functioning, Disability and Health
ISO = International Organization for Standardization
MDS = Model Disability Survey
WHO = World Health Organization

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Background

Ensuring that persons with disabilities reach their highest attainable level of health and enjoy their human right to health and wellbeing are major public health goals of the World Health Organization (WHO). Hence, it is of utmost importance to have practical tools available to strengthen the collection of relevant and internationally comparable data to support evidence-informed development and implementation of policies, programs and services to achieve this goal.[1] Disability, as characterized in the WHO's International Classification of Functioning, Disability and Health (ICF), is a universal human experience and involves the interaction between a health condition, a person's decrease in body function, structure or capacity and the environment.[2] Functioning is an umbrella term for structures and functions of the body, persons' capacity to perform activities and, in interaction with the environment, how they are actually engaged in daily life. Personal characteristics such as gender, age, ethnicity, cultural heritage, socio-economic status as well as the diverse environments in which people live contribute to the heterogeneity among people with disability. In addition, structural determinants, such as access to health care services or education, or conditions of work or people's homes, shape functioning outcomes.[3] This multi-dimensional and interactive understanding of functioning and disability emphasises that disability is not a stable human attribute, but rather a fluid and continuous interaction between person and environment, and so always contextual.[4]

The conceptual framework underpinning the ICF is utilised in both the World Report on Disability and the WHO's Global Disability Action Plan for collecting data on disability.[5] In addition, the ICF has been proposed as best suited for data collection for the monitoring of the implementation of the United Nations' Convention on the Rights of Persons with Disabilities (CRPD) as it allows for data collection based on international standards and at the same time provides a model that reflects the complexity of disability.[4] The ICF has also proven to be suitable and feasible to be implemented at the level of clinical and rehabilitation practice,[6-8] at the level of service provision and payment,[9-11] as well as on the level of policy and program planning.[12-14]

As the ICF is a comprehensive classification with more than 1450 categories, all of these uses require the development of practical tools that use a parsimonious set of categories to be feasible

for routine use and to ensure data comparability. Toward this end, a minimal set of domains of functioning has been identified – the ICF Generic Set – that has been shown empirically to best describe self-reported general health across individuals with varying health conditions and the general population.[15] It consists of seven ICF categories shown in Table 1.

[Table 1 to appear here]

In this previous study, the potential for developing a clinical set of ICF items to best describe functioning in clinical populations, which would complement the ICF Generic Set, was proposed.[15] While the ICF Generic Set and the proposed clinical set are most promising for establishing a minimal set of domains to be reported in a standardized manner within and across levels of health systems, there are two challenges that still need to be considered. First, the empirical study for identifying the ICF Generic and proposed clinical set focus mainly on adults in long-term, out-patient or community settings. If these minimal generic sets of ICF categories are meant to be applicable to monitor the functioning of clinical populations along the continuum of care, then they need to capture also the most relevant aspects of functioning in acute and early-post acute settings. Secondly, the ICF Generic Set has been thought to be limited to domains related to body functions and structures, as well as activities and participation. However, a complete description of functioning and disability based on the ICF also requires the identification of environmental factors (EFs) that, in the ICF conceptual model, are effect modifiers for levels of functioning. Hence, to understand functioning most accurately, there is also a need to develop a set of EFs to be collected in a standardized manner.

In light of these two points, the objective of this study is to develop recommendations for a more comprehensive set of ICF categories as a minimal standard for reporting and assessing functioning and disability in clinical populations along the continuum of care. As this set would be primarily applied in contexts relying on a rehabilitative health strategy, where optimizing functioning is the primary outcome,[16] this set will be named ICF Rehabilitation Set. More specifically, this study aims

i) to specify the domains of functioning recommended for an ICF Rehabilitation Set; and

ii) to identify a minimal set of environmental factors to be used alongside the ICF Generic and Rehabilitation Sets when describing disability across individuals and populations with various health conditions.

Methods

Secondary analysis of existing data sets using regression methods and expert consultations was the approach used to derive the ICF Rehabilitation Set and Minimal Set of EFs. Figure 1 outlines this process, and specifies in the upper part the health condition characteristics of the primary data sets.

[Figure 1]

Regression methods

Data were analysed from 22 previously conducted international multi-centre empirical studies carried out at the ICF Research Branch of the WHO Collaborating Centre for the Family of International Classifications in Germany from 2004 to 2010 in collaboration with institutions in 44 countries in clinical settings ranging outpatient settings to primary care.[17] Inclusion criteria for these studies were i) being diagnosed with the respective health condition according to established criteria, ii) being at least 18 years of age, and iii) able to comprehend the purpose of the study and to sign an informed consent form.

Descriptive statistics were used to characterize the study populations in terms of age, gender, and percentage of people living alone. To ensure robustness of analyses, Random Forests and Group Lasso regression[18-20] were applied to the data from the ICF Core Set studies. Random Forests based on regression trees is a non-parametric regression technique that can be used to obtain a rank of the explanatory relevance of the independent variables with respect to one dependent variable.[21] Group Lasso regression is a parametric regression technique that allows for the selection of the ordinal independent variables that explain most of the variance of a dependent variable by taking their ordinal structure into account. Group Lasso can also be used to rank independent variables according to their level of explanatory relevance based on the highest penalty term for which each of those independent variables is first selected for the model.[22, 23]

The self-reported general health question *In general, would you say your health is (excellent/very good/good/fair/poor)?* was used as dependent variable. This question offers a self-reported evaluation of the person's state of health. A similar approach has been used in previous research providing meaningful results.[24, 25] Empirical work has consistently shown that the self-reported general health question requires recalibration, since the intervals between adjacent response categories are unequal. Thus, the scale values were transformed into excellent = 5.0, very good = 4.4, good = 3.4, fair = 2.0, and poor = 1.0 and after re-scaling considered as continuous variable in the further analysis.[26] ICF categories from the functioning component (body functions, structures, activities and participation) have been used for the development of the ICF Rehabilitation Set as independent variables and ICF categories from the component of environmental factors for the minimal set of EFs. In the absence of any standard cut-off for when an ICF category should be included in the ICF Rehabilitation Set and the Minimal set of EFs, ICF categories which ranked among the top 50% of the categories in both regression methodologies and the expert consultation process were considered.

The descriptive statistics, the Random Forests and the Group Lasso regression were performed with R version 2.11.1.[27]

Expert consultations

As the statistical sets were derived primarily from data of adults in long-term, out-patient or community settings, in a second step an expert consultation was conducted to review the existing ICF Core Sets for acute and early-post acute settings. Each of the health condition group specific ICF Core Sets (musculoskeletal, neurological, cardio-pulmonary) within the identified settings were examined.[28-32] The ICF Core Set for post-acute setting was in additional also studied for geriatric patients.[33] The experts constituted an interdisciplinary group of 5 international researchers with expertise in conceptualization and measurement of health. They proposed that an ICF category would be added to the proposed ICF Rehabilitation Set if it was relevant in at least one health condition groups in each setting, and was identified in at least half of the examined settings.

As providing options for adding categories to an essential set of categories allows for flexibility within an information system and yet facilitates the implementation of minimal standards,[34] a

more relaxed cut-off at 40 % was also examined for both, the results of the Regression analyses and the Expert consultation.

Results

In total, data from 9863 persons who participated in the ICF Core Set studies were used encompassing the health conditions detailed in Figure 1. The number of respondents for whom the dependent variable data were available and used for this analysis consisted of 9264 participants. The mean age (SD) in years was 53.1 (15.9). 44.6% were male and 18.7% were living alone. The ICF categories proposed to be included in the ICF Rehabilitation Set and the Minimal Set of EFs based on the regression methods are presented in Table 2 and the expert consultation in Table 3.

[Table 2]
[Table 3]

Based on the Regression analyses and the application of a cut-off of 50 %, 15 ICF categories from the functioning component and 10 from the EFs revealed in addition to the 7 ICF categories of the ICF Generic Set (Table 2). Relaxing the cut-off to 40 % adds another 7 ICF categories from the functioning and 4 from the environmental factor component.

The expert consultation process revealed 10 ICF categories from the functioning and 4 from the environmental factors component. Relaxing the cut-off to 40 % results in further 7 functioning and 2 environmental factor categories. As outlined in Part C of Table 3, eight ICF categories that were relevant in the regression methods or had already been identified as relevant in the ICF Generic Set did not meet the criteria of the expert consultation. For instance, *b640 Sexual functions*, *d455 Moving around*, and *d850 Remunerative employment* did not reveal in the acute or post-acute setting but only in the ICF Core Set studies conducted predominantly in out-patient or community settings.

An overview of the final list of ICF categories and the methods by which they were identified is outlined in Table 4. Four ICF categories from the functioning component (*b455 Exercise*

tolerance functions, d240 Handling stress and other psychological demands, d510 Washing oneself, d540 Dressing) and 2 ICF categories from the environmental factors component (*e110 Products or substances for personal consumption, e120 Products and technology for personal indoor and outdoor mobility*) appeared across both the regression methods as well as the expert consultations within the top 50 %. Table 4 shows that categories captured within *d6 Domestic life, d7 Interpersonal Interactions and Relationships, d8 Major life areas*, including education and employment, as well as *d9 Community, social and civic life* were primarily identified in the Regression analyses, and thus, long-term, out-patient and community settings, whereas aspects related to changing and maintaining a body position were more salient in the acute and early-post acute settings.

[Table 4]

Discussion

This study proposed 30 ICF categories from the components of body functions, and activities and participation, and 12 ICF categories from EFs to serve as minimal generic set of aspects of functioning and disability in clinical populations for reporting data within and across various heath condition groups, time, clinical settings, and countries. Further ICF categories – based on a cut-off of 40 %, existing ICF Core Sets, or the whole ICF – can be added to meet local needs. To ensure that at least a core set of information is comparable and can serve as the anchor for linking disparate data sets, minimal standards specifying information to assess and report are essential. From a clinical point of view the findings are meaningful as for instance domains related to Assisting others, Interpersonal interactions, Employment and Leisure, and are of less immediate relevance in an acute setting but become salient once a person returns to community life.

People with disabilities are not a homogeneous group. Having information available in a standardized manner not only about the health condition, but also how a health condition plays out in daily life, will allow for a more nuanced and accurate representation of people with disabilities nationally and internationally. Including EFs in data collection on disability is most important for international comparisons and the identification of public health interventions so as to account adequately for cultural variations in environmental determinants for disability. To

meet the requirement of Article 31 in the CPRD, it requires countries to collect "appropriate information, including statistical and research data, to enable them to formulate and implement policies to give effect to this Convention".[4] This kind of information directly involves EFs, and it is therefore important to use a comprehensive, yet minimal and feasible set of EFs. The EFs identified in this study can be also seen as an interface to other classifications that provide a more specific structure and taxonomy of specific features of the environment. For example, the standard ISO9999 released from the International Organization for Standardization (ISO) is a classification and terminology for assistive products for persons with disabilities and this has already been mapped to Chapter 1 Products and technology of the ICF.[35] At the same time, the ICF has already served as a conceptual framework for the development of a process standard for assistive technology service delivery.[36,37] Ensuring that the minimal set of ICF categories as identified in this study are captured in such process standards will ensure that a minimal data set is consistently available for monitoring processes and outcomes within and across settings and services. Out of the 12 EFs identified in this study, 5 are from this Chapter. Mapping classifications and terminology standards against each other is important as it is becoming increasingly important to ensure full interoperability among information systems.[38,39]

For the development and implementation of policies and programs to strengthen disability-related services, and to monitor the implementation of the CRPD, WHO is currently developing with the World Bank the Model Disability Survey (MDS). To ensure that the most relevant aspects of functioning are addressed in the MDS, the categories contained in the ICF Rehabilitation Set and minimal set of EFs served as one source amongst others to guide what aspects of functioning to assess.[40] The MDS is a general population survey to facilitate the generation of detailed information on the lives of people with disabilities to allow for direct comparison between groups with differing levels and profiles of disability, including a comparison to people without disabilities. The evidence resulting from the MDS will help policy-makers to identify interventions best targeted toward optimizing the inclusion and functioning of people with disabilities.

Having information that matters to the persons living with any health condition and their carers routinely collected is also important to facilitate personalised care planning. A recently conducted study to identify chapter headings to be included in a standardized manner in electronic health

records, from the perspective of people living with chronic health conditions, their carers and relevant professional bodies, used the ICF Rehabilitation Set as a starting point.[41] Fifteen electronic health record headings were identified in this process. All of the ICF categories contained in the ICF Rehabilitation Set were viewed as relevant. Merging some of those into larger information domains was recommended; e.g. all ICF categories of the ICF Rehabilitation Set from the Chapter *d4 Mobility* could all be subsumed under the heading Mobility and movement. Additional headings were identified, including Memory and thoughts, Finance, and Symptoms that affect your life, as well as headings related to the care process: Understanding of health issues and treatment, Person's needs, as well as Care priorities and goals. Some of these headings are already captured in the ICF (Memory and thoughts refer to *b144 Memory functions* and *b160 Thought functions* or Finance to *d860-d879 Economic life*); others are not found in the ICF but ultimately rely on information that is captured in the ICF. This study provides supportive evidence of the content validity from the perspective of selected stakeholders and underlines the suitability of the ICF Rehabilitation Set as a starting point to implement standards on functioning information in electronic health records.

Limitations: For the interpretation of the results of this study, the limitations of the previous studies and how the original data was collected need to be taken into consideration. In the development of the ICF Generic Set, a pre-selection of variables to be included in the regression methods was performed based on the most conservative approach to ensure that all relevant, and only relevant, variables were included in the analysis.[15] With respect to the expert consultation, the development of the ICF core sets in acute and early post-acute settings were based in the German speaking countries. Cross-cultural validity and utility has therefore yet to be established. As a result, the development of the ICF Rehabilitation and Minimal set of EFs sets presented in this study might be seen as part of an evolutionary process. Further research is needed to examine the content validity and utility of these sets in various cultural and clinical contexts.

The use of the self-report general health question as dependent variable can be seen as a strength and at the same time as a limitation of this study. It is strength since it best reflects the lived experience of persons living with various health conditions.[24] It is a limitation since its response format is based on a Likert scale which reveals ordinal data. Evidence exists that the intervals between two response options in ordinal scales are not equal and may lead to misinference.[42] To

299 overcome this limitation, we applied a transformation of the self-reported general health question
300 in this study as suggested previously.[26]
301
302 **Conclusions**
303
304 The ICF Rehabilitation Set and the Minimal set of EFs proposed in this study can serve as the
305 starting point to develop practical tools toward establishing comparability of a minimal set of
306 data on disability across studies and countries. The examples of the use of the ICF Rehabilitation
307 Set provided in this study support its relevancy and suitability. It is only when the conceptual
308 issues involved in the selection of which domains to assess for clinical, allocative, or
309 epidemiological purposes have been addressed, that the question of how to assess these domains
310 becomes salient. Both, the conceptual and assessment aspects are important to be solved it will be
311 possible for these sets to reach their full potential as practical tools.
312
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314 **Figures and Tables**
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316 Figure 1: Outline of the study design
317
318 Table 1: Categories contained in the ICF Generic Set
319 Table 2: Results of regression methods
320 Table 3: Results of expert consultations
321 Table 4: Overview of all ICF categories contained in the ICF Rehabilitation Set and Minimal Set
322 of EFs

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Table 1: Categories contained in the ICF Generic Set

b130	Energy and drive functions
b152	Emotional functions
b280	Sensation of pain
d230	Carrying out daily routine
d450	Walking
d455	Moving around
d850	Remunerative employment

ICF = International Classification of Functioning, Disability and Health

Table 2 provides the results of both Regression techniques. The columns Random Forests and Group Lasso indicate the rank derived for each ICF category based on the two regression techniques respectively. The column overlap indicates whether an ICF category reached the cut-off point in both regression techniques of 50 % (indicated with a $) and 40 % (indicated with a #). ICF categories contained in the ICF Generic Set are indicated in italics and a (G).

		Random Forests	Group Lasso	Overlap
b126	Temperament and personality functions	13	**9.5**	N
b130	*Energy and drive functions (G)*	***6***	***4.5***	***Y***
b134	Sleep functions$^{\$}$	**3**	**2**	**Y**
b140	Attention functions	15	17	N
b144	Memory functions	17	19	N
b152	*Emotional functions (G)*	***5***	***6***	***Y***
b180	Experience of self and time functions	19	15.5	N
b210	Seeing functions	16	14	N
b230	Hearing functions	18	18	N
b280	*Sensation of pain (G)*	***1***	***1***	***Y***
b455	Exercise tolerance functions$^{\$}$	**2**	**4.5**	**Y**
b530	Weight maintenance functions$^{\#}$	**11**	**11**	**Y**
b640	Sexual functions$^{\$}$	**7**	**8**	**Y**
b710	Mobility of joint functions$^{\$}$	**8**	**7**	**Y**
b730	Muscle power functions$^{\$}$	**4**	**3**	**Y**
b740	Muscle endurance functions	**10**	15.5	N
b780	Senations related to muscles and movement functions	**9**	12	N
s750	Structure of lower extremity	14	13	N
s760	Structure of trunk	12	**9.5**	N
$^{\$}$ ***Cut off point: 50%***		**10**	**10**	
$^{\#}$ ***Cut off point: 40 %***		***11***	***11***	

d110	Watching	36	35.5	N
d115	Listening	37	35.5	N
d160	Focusing attention	33	31	N
d175	Solving problems	31	**15.5**	N
d230	*Carrying out daily routine (G)*	***14***	***18***	***Y***
d240	Handling stress and other psychological demands$^{\$}$	**3**	**7**	**Y**
d310	Communcation with - receiving - spoken messages	30	**19.5**	N
d335	Producing nonverbal messages	35	35.5	N
d410	Changing basic body position	**16**	31	N
d415	Maintaining a body position	23	31	N
d430	Lifting and carrying objects$^{\#}$	**19**	**19.5**	**Y**
d440	Fine hand use	28	**22**	N
d445	Hand and arm use	27	**22**	N
d450	*Walking (G)*	***8***	***5***	***Y***
d455	*Moving around (G)*	***6***	***3***	***Y***
d465	Moving around using equipment	29	25.5	N
d470	Using transportation$^{\$}$	**13**	**12**	**Y**
d475	Driving	33	**13.5**	N
d510	Washing oneself$^{\$}$	**2**	**4**	**Y**
d520	Caring for body parts	**20**	35.5	N
d530	Toileting	25	31	N

		Random Forests	Group Lasso	Overlap
d540	Dressing[$]	**5**	**6**	**Y**
d550	Eating	26	27.5	N
d570	Looking after one's health[$]	**11**	**9**	**Y**
d620	Acquisition of goods and services	**22**	24	N
d630	Preparting meals	**18**	27.5	N
d640	Doing housework[$]	**4**	**2**	**Y**
d660	Assisting others[$]	**8**	**8**	**Y**
d710	Basic interpersonal interactions[$]	**10**	**17**	**Y**
d760	Family relationships[#]	**21**	**13.5**	**Y**
d770	Intimate relationships[$]	**12**	**10**	**Y**
d830	Higher education	32	25.5	N
d845	Acquiring, keeping and terminating a job[#]	**17**	**22**	**Y**
d850	*Remunerative employment*	***15***	***11***	***Y***
d870	Economic self-sufficiency	24	**15.5**	N
d910	Community life	**7**	31	N
d920	Recreation and leisure[$]	**1**	**1**	**Y**
[$] ***Cut off point: 50%***		**19**	**19**	
[#] ***Cut off point: 40 %***		***22***	***22***	

e110	Products or substances for personal consumption[$]	**2**	**3**	**Y**
e115	Products and technology for personal use in daily living	23	23,5	N
e120	Products and technology for personal indoor and outdoor mobility and transportation[$]	**3**	**4**	**Y**
e135	Products and technology for employment[$]	**10**	**8,5**	**Y**
e150	Design, construction and building products and technology of buildings for public use[$]	**6**	**5**	**Y**
e155	Design, construction and building products and technology of buildings for private use[$]	**4**	**10,5**	**Y**
e225	Climate[$]	**1**	**1**	**Y**
e310	Immediate family[$]	**8**	**6,5**	**Y**
e320	Friends[$]	**4**	**2**	**Y**
e325	Acquaintances, peers, colleagues, neighbours and community members[#]	**9**	**14,5**	**Y**
e330	People in positions of authority	17	**14,5**	N
e340	Personal care providers and personal assistants	20	**12**	N
e355	Health professionals	21	23,5	N
e360	Other professionals	24	18,5	N
e410	Individual attitudes of immediate family members	22	23,5	N
e420	Individual attitudes of friends	18	26	N
e425	Individual attitudes of acquaintances, peers, colleagues, neighbours and community members[#]	**9**	**14,5**	**Y**
e440	Individual attitudes of personal care providers and personal assistants	25	20	N
e450	Individual attitudes of health professionals[$]	**10**	**6,5**	**Y**
e455	Individual attitudes of health-related professionals	**15**	23,5	N
e460	Societal attitudes	**14**	17	N
e540	Transportation services, systems and policies	**14**	18,5	N
e570	Social security services, systems and policies	18	**10,5**	N
e575	General social support services, systems and policies	26	21	N

		Random Forests	Group Lasso	Overlap
e580	Health services, systems and policies[$]	**12**	**8,5**	**Y**
e590	Labour and employment services, systems and policies	18	**14,5**	N
[$] ***Cut off point: 50%***		**13**	**13**	
[#] ***Cut off point: 40 %***		***16***	***16***	

Table 3 outlines the results of the Expert consultation.
Part A shows the ICF categories which met the criteria of being relevant in the Acute Setting AND the Post-acute Setting and be named in at least 50 % (at least 4 out of 7) of the ICF Core Sets considered.
Part B provides an overview of those ICF categorie which met the criteria of being relevant in the Acute Setting AND the Post-acute Setting and reached a cut-off of 40 (at least 3 out of 7) but not 50 %.
Part C adds information about the criterias identified in the expert consultation for those ICF categories that were derived as relevant only in the regression techniques, as well as those ICF categories identified only for the ICF Generic Set.

ICF Category		ACUTE SETTING (Inpatient)			POST-ACUTE SETTING (In/Oupatient)				OVERLAP ACROSS ICF SETS	
		MSK	NEU	CaP	MSK	NEU	CaP	GER	included in both settings	percentage
Part A										
		Cut-off: 50 % (at least 4 out of 7)								
b620	Urination functions	1	0	0	1	1	0	1	Y	5 of 7
d410	Changing basic body position	1	1	1	1	1	1	1	Y	7 of 7
d415	Maintaining a body position	1	1	1	1	0	0	1	Y	5 of 7
d420	Transferring oneself	1	1	1	0	1	1	1	Y	6 of 7
d465	Moving around using equipment	0	1	0	1	1	1	1	Y	5 of 7
d510	Washing oneself	1	1	1	1	0	0	1	Y	5 of 7
d520	Caring for body parts	1	1	1	1	1	0	1	Y	6 of 7
d530	Toileting	1	1	1	1	1	0	1	Y	6 of 7
d540	Dressing	0	1	1	1	1	1	0	Y	5 of 7
d550	Eating	1	1	0	1	1	0	1	Y	5 of 7
e110	Products or substances for personal consumption	1	0	1	1	1	1	1	Y	6 of 7
e115	Products and technology for personal use in daily living	0	0	1	1	1	1	0	Y	5 of 7
e120	Products and technology for personal indoor and outdoor	0	1	1	1	1	0	0	Y	5 of 7
e355	Health professionals	1	0	0	1	1	0	1	Y	5 of 7
Part B										
		Cut-off: 40 % (at least 3 out of 7)								
b110	Consciousness functions	0	1	1	0	0	1	0	Y	3 of 7
b435	Immunological system functions	0	0	1	1	0	0	1	Y	3 of 7
b450	Additional respiratory functions	0	0	1	0	1	1	0	Y	3 of 7
b455	Exercise tolerance functions	1	0	1	0	0	0	1	Y	3 of 7

b510	Ingestion functions	0	0	1	0	1	1	0	Y	3 of 7
d240	Handling stress and other psychological demands	1	0	0	1	0	1	0	Y	3 of 7
s760	Structure of trunk	1	0	1	0	0	0	1	Y	3 of 7
e465	Social norms, practices and ideologies	0	1	0	0	0	1	1	Y	3 of 7
e570	Social security services, systems and policies	0	1	1	0	0	0	1	Y	3 of 7

Part C

Criteria of expert consultation applied to the ICF categories identified only in Regression analysis										
b134	Sleep functions	0	0	0	1	0	1	1	N	3 of 7
b640	Sexual functions	0	0	0	0	0	0	0	N	0
b710	Mobility of joint functions	1	1	0	0	0	0	0	N	2 of 7
b730	Muscle power functions	0	0	0	1	0	0	0	N	1 of 7

Criteria of expert consultation applied to the ICF Categories contained only in ICF Generic Set										
b130	Energy and drive functions	1	0	1	0	1	1	0	Y	4 of 7
b152	Emotional functions	1	0	0	0	0	0	0	N	1 of 7
b280	Sensation of pain	0	0	1	1	0	0	0	Y	2 of 7
d230	Carrying out daily routine	0	0	0	1	0	0	1	N	2 of 7
d450	Walking	1	0	1	1	1	1	1	Y	6 of 7
d455	Moving around	0	0	0	0	0	0	0	N	0
d850	Remunerative employment	0	0	0	0	0	0	0	N	0

Table 4 provides an overview of all ICF Categories contained in the newly developed ICF Rehabilitation Set and Minimal Set of EFs and specifies through which method (Regression analyses or expert consultation) they were identified. ICF categories contained in the ICF Generic Set are indicated in boldt. The ICF Rehabilitation Set and Minimal Set of EFs builds upon the cut-off of 50 %. Further ICF categories, e.g. based on a cut-off of 40 % as outlined in the lower part of the Table, or existing ICF Core Sets, can be added to meet local needs.

ICF Category		Regression Methods	Expert consultation
ICF Rehabilitation Set (Cut-off: 50 %)			
b130	**Energy and drive functions**	✓	
b134	Sleep functions	✓	
b152	**Emotional functions**	✓	
b280	**Sensation of pain**	✓	
b455	Exercise tolerance functions	✓	✓
b620	Urination functions		✓
b640	Sexual functions	✓	
b710	Mobility of joint functions	✓	
b730	Muscle power functions	✓	
d230	**Carrying out daily routine**	✓	
d240	Handling stress and other psychological demands	✓	✓
d410	Changing basic body position		✓
d415	Maintaining a body position		✓
d420	Transferring oneself		✓
d450	**Walking**	✓	
d470	Using transportation	✓	
d455	**Moving around**	✓	
d465	Moving around using equipment		✓
d510	Washing oneself	✓	✓
d520	Caring for body parts		✓
d530	Toileting		✓
d540	Dressing	✓	✓
d550	Eating		✓
d570	Looking after one's health	✓	
d640	Doing housework	✓	
d660	Assisting others	✓	
d710	Basic interpersonal interactions	✓	
d770	Intimate relationships	✓	
d850	**Remunerative employment**		✓
d920	Recreation and leisure	✓	
Minimal Set of EFs (Cut-off: 50 %)			
e110	Products or substances for personal consumption	✓	✓
e115	Products and technology for personal use in daily		✓
e120	Products and technology for personal indoor and	✓	✓
e135	Products and technology for employment	✓	
e150	Design, construction and building products and technology of buildings for public use	✓	
e155	Design, construction and building products and technology of buildings for private use	✓	

ICF Category		Regression Methods	Expert consultation
e225	Climate	✓	
e310	Immediate family	✓	
e320	Friends	✓	
e355	Health professionals		✓
e450	Individual attitudes of health professionals	✓	
e580	Health services, systems and policies	✓	

*Note: some preliminar results of regression analyses in relation with the ICF Rehabilitation Set have already been published in the development of the ICF Generic Set [15].

Extension to ICF Rehabilitatin Set (Cut-off: 40 %)			
b110	Consciousness functions		✓
b435	Immunological system functions		✓
b450	Additional respiratory functions		✓
b455	Exercise tolerance functions	✓	✓
b510	Ingestion functions		✓
b530	Weight maintenance functions	✓	

d240	Handling stress and other psychological demands	✓	
d430	Lifting and carrying objects	✓	
d760	Family relationships	✓	
d845	Acquiring, keeping and terminating a job	✓	

s760	Structure of trunk	✓	

Extension to Minimal Set of EFs (Cut-off: 40 %)			
e325	Acquaintances, peers, colleagues, neighbours and community members	✓	
e425	Individual attitudes of acquaintances, peers, colleagues, neighbours and community members	✓	
e465	Social norms, practices and ideologies	✓	
e570	Social security services, systems and policies	✓	

Figure 1: Outline of the study design