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ORIGINAL REPORT

VALIDATION OF THE COMPREHENSIVE ICF CORE SET FOR PATIENTS IN GERIATRIC POST-ACUTE REHABILITATION FACILITIES

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Objective: **To examine the relevance and completeness of the comprehensive International Classification of Functioning, Disability and Health (ICF) Core Set for patients in geriatric post-acute rehabilitation facilities.**
Design: **Multi-centre cohort study.**
Patients: **A total of 209 patients (67% female, mean age 80.4 years) in geriatric wards of 2 Austrian and 3 German hospitals.**
Methods: **Data on functioning were collected using the respective comprehensive ICF Core Set. Data were extracted from patients' medical record sheets and interviews with health professionals and patients.**
Results: **Most of the categories of the comprehensive ICF Core Set describing impairments, limitations or restrictions occurred in a considerable proportion of the study population. The most outstanding limitations and restrictions of the patients were problems with walking and moving around, and difficulties with self-care. Fourteen aspects of functioning not previously covered by the comprehensive ICF Core Set were reported as relevant.**
Conclusion: **Most categories of the comprehensive ICF Core Set could be confirmed. Limitations in categories of intellectual and seeing functions appeared less frequently than might have been expected for a population of older hospitalized people. Some additional categories not covered by the present version of the comprehensive ICF Core Set emerged from the interviews and should be considered for inclusion in the final version.**

Key words: ICF; health services for the aged; cohort study; rehabilitation; outcome assessment; classification.

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INTRODUCTION

Age is a predominant risk factor for many medical problems. In particular, older patients may be frail and present with a various range of conditions, co-morbidities, and impairments. Frailty is commonly defined as a state of declining ability of physiological systems to respond to external stressors, resulting in vulnerability to adverse outcomes (1). The medical conditions occurring in older patients are commonly chronic, multiple and multifactorial. Years ago, Bernard Isaacs described for geriatric syndromes 4 principal i's: immobility, instability, incontinence and intellectual impairment, calling them "the giants of geriatrics" (2). He argued that if one looks closely enough, all common medical problems with older adults are attributable to one of these central syndromes. The list of frequently encountered geriatric i's could be expanded to include iatrogenesis, isolation, insomnia, or immune deficiency. Older hospitalized patients are, furthermore, at high risk of developing functional decline arising from their immobility (3, 4). Geriatric medicine therefore requires a holistic approach offering therapy in a multidisciplinary team setting, with the aim of optimizing the patients' functional status and ameliorating their quality of life and autonomy (5). Geriatric care can be provided in a variety of settings, ranging from home to acute hospital care, rehabilitation settings and long-term care institutions. To summarize the scope of the problem, one can quote the Canadian geriatricians Rockwood & Hubbard: "We have complex patients (i.e. those with multiple needs, and a multifactorially determined state) on whom we apply a complex intervention (Comprehensive Geriatric Assessment and multidisciplinary care) to achieve a variety of ends." (6).

This multifactorial approach towards geriatric care requires a multidisciplinary team, in which a common understanding of functioning, disability and health is shared by all team members. In addition, the optimal approach needs to be complemented by a common agreement on concepts for the choice of appropriate assessment instruments and outcome measures for the applied interventions. The International Classification of Functioning, Disability and Health (ICF), which was created as a framework and language for describing and classifying functioning, health and disability (7), is considered to be an adequate reference system for this task (8). In order to enhance the applicability of the ICF in clinical practice and research and to overcome practical concerns relating to the great number of categories afforded within the ICF, the development of so-

called ICF Core Sets was initiated in recent years by the ICF Core Set project. Those comprehensive ICF Core Sets were created to provide standards for multi-professional comprehensive patient assessment, and should therefore include the typical spectrum of problems in functioning encountered in different patient populations. To this end, we generated comprehensive ICF Core Sets in which we aimed to select relevant ICF categories of particular validity for patients in the acute hospital and in post-acute rehabilitation facilities (9).

In general, the ICF Core Set project defines on an empirical basis a category as relevant when it describes a problem that is frequently encountered in typical patients, measured as an end-point in clinical trials, or was otherwise identified as being relevant following discussion among health professionals. The resultant information is then summarized and implemented as part of a formalized consensus process involving expert health professionals (9). One subset of the ICF has already been developed for use in patients at geriatric post-acute rehabilitation facilities (10).

As noted above, the ICF Core Set process assured that all the relevant aspects of functioning were included, but the empirical validation of the choice of categories remains to be completed. Thus, the objective of this study was to examine the relevance and completeness of the comprehensive ICF Core Set defined previously for patients in geriatric post-acute rehabilitation facilities. Specifically, we wanted to examine which aspects of functioning included in the comprehensive ICF Core Set

- were frequent at admission to and at discharge from post-acute rehabilitation facilities, and
- changed during stay in the post-acute rehabilitation facility, and
- also to identify new relevant aspects for inclusion in the revised Set.

METHODS

Study design

A full description of the methods used in this study has been reported elsewhere (11). In brief, the study design was a prospective multicentre cohort study conducted from May 2005 to August 2008. The study population was recruited from geriatric wards and units in 3 German hospitals, and 2 Austrian hospitals; approximately 62% of the patients were recruited from the German centres. Patients were eligible for inclusion if they were over 65 years of age, and fulfilled the criteria for post-acute geriatric rehabilitation, according to their need for ongoing medical and nursing care in addition to rehabilitation (12).

Measures

For the assessment of functioning, we used the comprehensive ICF Core Set for geriatric patients in post-acute rehabilitation facilities that was developed to cover the specific situation of older patients (10). For all patients, impairments in categories of the component Body Structures were graded as present or absent. Limitations or restrictions in categories of the components Body Functions and Activities and Participation were graded as "none", "slight/moderate/severe" or "complete" limitation or restriction. The categories of the component Environmental Factors were graded either as facilitator or barrier, or both.

We reported impairments, limitations and restrictions directly associated with the need for rehabilitation, regardless of the underlying health condition. In order to validate the completeness of the comprehensive ICF Core Set, the interviewers were furthermore asked to identify any aspects of functioning relevant to the patient, but not currently covered by the comprehensive ICF Core Set. Additionally, socio-demographic (sex, age, education, living and occupation situation) and condition-specific data (underlying diagnosis, time until rehabilitation, number of co-morbidities and length of stay) were recorded.

Data collection procedures

Data were primarily collected from patients' medical record sheets, health professionals in charge of the patients, and from patients' interviews. Interviewers collecting data were trained in the application and principles of the ICF and provided with a manual. Ongoing supervision of the interviewers was ensured by periodic telephone calls.

Data collection took place within the first 24 h after admission to the geriatric ward (baseline) and within the last 36 hours before discharge or, if length of stay was longer than 6 weeks, at 6 weeks after admission (end-point). ICF categories from the component Environmental Factors were assessed only at admission, since we did not expect any change in these categories during hospital stay.

Statistical analysis

For the categories of the ICF components Body Functions, Body Structures and Activities and Participation we calculated the absolute and relative frequencies (prevalences) of impairment, limitation or restriction at baseline and end-point. For the categories of the ICF component Environmental factors, we calculated the absolute and relative frequencies (prevalences) of persons who regarded a specific category as constituting either a barrier or facilitator. Relative frequencies of persons for whom the ICF category changed during the study period were calculated, along with their 95% confidence intervals (CI). Frequencies were calculated based on all available participants; change was calculated based on participants with data at baseline and at end-point. A difference between baseline and end-point was considered as change if the percentage of change was different from null and the confidence interval did not include the null.

Aspects of functioning not covered by the comprehensive ICF Core Set but identified as relevant were extracted and translated into the best corresponding ICF category (13). Absolute and relative frequencies of occurrence of those ICF categories were reported; any such category with prevalence below 5% was considered as not relevant.

RESULTS

Sociodemographics

In total, 209 patients were included. Mean age at admission was 80.4 years (median 80.9; standard deviation (SD) 7.3). Mean length of stay was 24.1 days (median 22.0; SD 13.1). Sixty-seven percent of the patients were female. Two patients (1%) were lost to follow-up because of unplanned discharges from hospital or death. The main admitting clinical problems were fractures ($n = 52$; 25%), among which 34 were fractures of the femur. Thirteen percent of the patients were admitted to hospital because of signs and symptoms that do not point definitely to a specific diagnosis, for example, dyspnoea, abnormalities of gait and mobility, dizziness and giddiness, or syncope and collapse. Further demographics and disease-related characteristics are presented in Table I.

Functioning and disability

Tables II–IV give the prevalence of impairment, limitation or restriction both at admission and discharge as well as the frequency of change and its 95% CI.

Table I. *Characteristics of participants*

Variable	
Participants, *n*	209
Age, mean (SD)	80.4 (7.3)
Comorbidities, mean (SD)	4.8 (2.6)
Length of stay, mean (SD)	24.1 (13.1)
Female gender, %	67.0
Medical diagnosis, *n* (%)	
Diseases of the respiratory system (J00–J99)	10 (4.8)
Diseases of the circulatory system other than cerebrovascular diseases (I00–I52 and I70–I99)	26 (12.4)
Cerebrovascular diseases (I60–I69)	19 (9.1)
Diseases of the nervous system (G00–G99)	13 (6.2)
Diseases of the musculoskeletal system and connective tissue (M00–M99)	16 (7.7)
Injury, poisoning and certain other consequences of external causes (S00–T98)	59 (28.2)
Neoplasms (C00–D48)	5 (2.4)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00–R99)	28 (13.4)
Other diagnoses	33 (15.8)

SD: standard deviation.

Approximately 26% of the Body Functions and Structures and the Activities and Participation categories contained in the comprehensive ICF Core Set for patients in geriatric post-acute rehabilitation facilities were reported as impaired, limited or restricted by at least one-third of the patients interviewed.

The most prevalent limitations and restrictions were found in the component Activities and Participation, specifically in *Walking and moving* (d450–d469) and *Self-care* (d510–d570), along with frequent impairments in associated categories of the component Body Functions such as *Gait pattern functions* (b770), *Muscle power functions* (b730), *Mobility of joint functions* (b710) and *Sensation of pain* (b280). Although many of the impairments, limitations and restrictions reported in these ICF categories at admission were substantially reduced at discharge, we found residual limitations and restrictions in approximately one- to two-thirds of all patients. At least 60% of the patients reported impairments at discharge in the categories *Muscle power functions* (b730) and *Gait pattern functions* (b770) and in *Walking and moving* categories.

The frequency of impairments or restrictions in geriatric patients ranged from 1% to 80% (mean 25%) at admission and from 0% to 66% (mean 18%) at discharge. There were 11 categories with prevalence below 5% at admission. The Body Functions (Table II) and Body Structures (Table III) most frequently impaired both at admission and at discharge were *Gait pattern functions* (b770) (73% at admission/66% at discharge), *Muscle power functions* (b730) (73%/60%), *Mobility of joint functions* (b710) (59%/48%), *Structure of cardiovascular system* (s410) (41%/35%), *Structure of areas of skin* (s810) (40%/33%), and *Structure of lower extremity* (s750) (35%/33%).

The ICF categories from the component Activities and Participation (Table IV) most frequently limited or restricted both at admission and at discharge were the *Walking and moving* categories *Moving around in different locations* (d460) (80% at admission/66% at discharge) and *Walking* (d450) (79%/61%) and the *Self-care* categories *Washing oneself* (d510) (75%/53%) and *Caring for body parts* (d520) (74%/55%).

The percentage of patients reporting an improvement in functioning at discharge ranged from 0% to 41% for the different ICF categories. The most frequent improvements were observed in Activities and Participation categories *Moving around using equipment* (d465) (41%), *Changing basic body position* (d410) (36%), and *Toileting* (d530) (33%). The Body Functions which improved most frequently were *Sensation of pain* (b415) (28%), *Sleep functions* (b134) (22%), and *Sensations related to muscles and movement functions* (b780) (22%). The most frequent improvement in Body Structures was found in the *Structure of areas of skin* (s810) (9%).

The percentage of patients who reported functional deterioration on the different ICF categories ranged from 0% to 5%. The most frequent decline was observed in *Handling stress and other psychological demands* (d240).

Contextual factors

Table V gives an overview of the occurrence of Environmental Factors serving as facilitators or barriers. The frequency of facilitators ranged from 21% to 92% (mean of 62%). The Environmental Factors most frequently serving as facilitators in the geriatric patients were *Health professionals* (e355) (92%), *Products and technology for personal indoor and outdoor mobility and transportation* (e120) (91%), and *Immediate family* (e310) (85%). There were no categories as facilitators with prevalence below 5%. The frequency of barriers ranged from 0% to 26% (mean of 7%). The Environmental Factors most frequently presenting barriers in these patients were *Time-related changes* (e245) (26%), *Sound* (e250) (26%), *Products and technology for culture, recreation and sport* (e140) (19%), and *Design, construction and building products and technology of buildings for public use* (e150) (17%).

Additional ICF categories

Fourteen aspects of functioning not previously covered by the comprehensive ICF Core Set for patients in geriatric post-acute rehabilitation facilities were identified as relevant. Some of these aspects were mentioned only once or twice and are therefore not representative for the whole group and the corresponding ICF Core Set. Aspects which were mentioned by at least 1% of the participants are presented in Table VI.

All newly identified aspects could be translated into corresponding ICF categories. Four aspects referred to categories of the component Body Functions, 8 to categories and chapters of the component Body Structures, and 2 to categories of the component Activities and Participation. There were no categories from the component Environmental Factors that were identified as relevant, but not covered.

DISCUSSION

The results of the present multi-centre cohort study provide further insight into the course of functioning and health and its related

Table II. *International Classification of Functioning, Disability and Health (ICF) categories of the component Body Functions – percentage of participants with impairment at admission/discharge and the extent of change over time (*n = *209)*

ICF	ICF Code Description	Admission *n* (%)	Discharge *n* (%)	Change % [95% CI]
b110	Consciousness functions	209 (6)	207 (4)	4 [2–7]
b114	Orientation functions	208 (15)	206 (14)	6 [3–10]
b117	Intellectual functions	208 (3)	205 (3)	1 [0–3]
b130	Energy and drive functions	209 (24)	204 (17)	16 [11–22]
b134	Sleep functions	208 (40)	201 (22)	26 [20–32]
b140	Attention functions	209 (18)	207 (13)	12 [8–17]
b144	Memory functions	209 (22)	207 (18)	5 [2–9]
b147	Psychomotor functions	208 (14)	206 (9)	6 [3–11]
b152	Emotional functions	208 (15)	204 (11)	7 [4–12]
b156	Perceptual functions	209 (11)	205 (10)	3 [1–6]
b167	Mental functions of language	209 (8)	204 (6)	1 [0–4]
b176	Mental function of sequencing complex movements	209 (15)	206 (12)	6 [3–11]
b180	Experience of self and time functions	208 (12)	204 (10)	4 [2–8]
b210	Seeing functions	208 (3)	207 (1)	1 [0–3]
b215	Function of structures adjoining the eye	206 (2)	206 (2)	1 [0–4]
b230	Hearing functions	209 (1)	206 (0)	1 [0–3]
b240	Sensations associated with hearing and vestibular function	207 (15)	202 (5)	10 [6–15]
b260	Proprioceptive function	207 (14)	204 (9)	6 [3–11]
b265	Touch function	208 (15)	204 (12)	3 [1–6]
b270	Sensory functions related to temperature and other stimuli	205 (13)	199 (11)	6 [3–10]
b280	Sensation of pain	209 (57)	192 (33)	32 [25–39]
b320	Articulation functions	209 (8)	205 (5)	2 [1–6]
b410	Heart functions	209 (21)	206 (19)	8 [5–12]
b415	Blood vessel functions	209 (35)	205 (28)	11 [7–16]
b420	Blood pressure functions	209 (21)	207 (16)	10 [6–15]
b430	Haematological system functions	202 (13)	202 (8)	7 [4–11]
b435	Immunological system functions	196 (13)	198 (8)	9 [6–14]
b440	Respiration functions	207 (19)	205 (14)	9 [6–14]
b450	Additional respiratory functions	207 (10)	203 (8)	6 [3– 11]
b455	Exercise tolerance functions	207 (35)	204 (30)	12 [8–17]
b460	Sensations associated with cardiovascular and respiratory functions	206 (21)	203 (18)	10 [6–14]
b510	Ingestion functions	209 (13)	205 (9)	7 [4–11]
b525	Defecation functions	209 (21)	205 (13)	11 [7–16]
b530	Weight maintenance functions	201 (15)	201 (14)	9 [5–14]
b535	Sensations associated with the digestive system	207 (12)	205 (6)	8 [5–12]
b540	General metabolic functions	205 (9)	203 (7)	3 [1–6]
b545	Water, mineral and electrolyte balance functions	199 (20)	199 (9)	14 [9–20]
b620	Urination functions	209 (20)	205 (12)	10 [6–15]
b630	Sensations associated with urinary functions	208 (11)	205 (11)	5 [2–9]
b710	Mobility of joint functions	209 (59)	206 (48)	13 [9–18]
b715	Stability of joint functions	205 (47)	203 (37)	14 [9–19]
b730	Muscle power functions	209 (73)	206 (60)	19 [14–25]
b735	Muscle tone functions	209 (36)	206 (25)	17 [13–23]
b755	Involuntary movement reaction functions	208 (30)	204 (23)	9 [6–14]
b760	Control of voluntary movement functions	208 (20)	203 (15)	10 [7–15]
b765	Involuntary movement functions	208 (12)	203 (15)	3 [1–6]
b770	Gait pattern functions	207 (73)	202 (66)	18 [13–24]
b780	Sensations related to muscles and movement functions	205 (49)	198 (32)	26 [20–33]
b810	Protective functions of the skin	209 (30)	204 (14)	21 [15–27]
b820	Repair functions of the skin	206 (13)	204 (8)	10 [7–15]
b840	Sensation related to the skin	207 (15)	200 (10)	10 [6–15]

CI: confidence interval.

contextual factors in representative older patients being treated in post-acute rehabilitation settings. The present findings mainly confirm the validity of the first version of the comprehensive ICF Core Set for patients in geriatric post-acute rehabilitation facilities. We found that a large number of the categories included in the comprehensive ICF Core Set address issues considered to be important to patients in geriatric post-acute rehabilitation facilities. Generally speaking, our cohort presented with a wide range of diagnoses, severity of illness, co-morbidities and cognitive and physical functional abilities, as is typical of this age group.

Table III. *International Classification of Functioning, Disability and Health (ICF) categories of the component Body Structures – percentage of participants with impairment at admission/discharge and the extent of change over time (*n = *209)*

ICF	ICF Code Description	Admission *n* (%)	Discharge *n* (%)	Change % [95% CI]
s110	Structure of brain	200 (24)	200 (24)	3 [1–6]
s120	Spinal cord and related structures	200 (2)	199 (2)	0 [0–2]
s320	Structure of mouth	206 (1)	205 (0)	1 [0–4]
s410	Structure of cardiovascular system	209 (41)	206 (35)	8 [5–12]
s430	Structure of respiratory system	208 (10)	206 (10)	2 [1–5]
s610	Structure of urinary system	204 (4)	203 (4)	1 [0–4]
s620	Structure of pelvic floor	201 (2)	202 (2)	1 [0–3]
s710	Structure of head and neck region	208 (4)	207 (3)	1 [0–3]
s720	Structure of shoulder region	209 (3)	207 (3)	2 [1–5]
s740	Structure of pelvic region	205 (13)	206 (12)	3 [1–6]
s750	Structure of lower extremity	209 (35)	207 (33)	2 [1–6]
s760	Structure of trunk	209 (11)	207 (10)	2 [1–5]
s770	Additional musculoskeletal structures related to movement	208 (24)	206 (19)	10 [6–15]
s810	Structure of areas of skin	209 (40)	207 (33)	11 [7–16]

CI: confidence interval.

Most common limitations and restrictions at admission and at discharge

The most outstanding limitations and restrictions of the patients, which were reported by more than half of the participants at admission, were problems with walking and moving around, difficulties with self-care activities, difficulties carrying out a daily routine, difficulties changing body position, lack of muscle power, limited joint mobility and pain. Thus, mobility limitations emerged as a key for these patients. This finding is in accordance with numerous previous studies concerning the

Table IV. *International Classification of Functioning, Disability and Health (ICF) categories of the component Activities and Participation – percentage of participants with limitations or restrictions at admission/discharge and the extent of change over time (*n = *209)*

ICF	ICF Code Description	Admission *n* (%)	Discharge *n* (%)	Change % [95% CI]
d130	Copying	208 (11)	204 (9)	3 [1–6]
d155	Acquiring skills	203 (20)	202 (16)	8 [4–12]
d177	Making decisions	207 (13)	202 (10)	6 [3–10]
d230	Carrying out daily routine	208 (70)	204 (50)	34 [27–41]
d240	Handling stress and other psychological demands	198 (34)	195 (29)	15 [10–21]
d310	Communicating with (receiving) spoken messages	208 (7)	203 (5)	0 [0–3]
d315	Communicating with (receiving) nonverbal messages	205 (5)	203 (5)	3 [1–6]
d330	Speaking	208 (9)	207 (7)	2 [1–6]
d335	Producing nonverbal messages	208 (8)	205 (5)	3 [1–6]
d360	Using communication devices and techniques	199 (16)	200 (16)	6 [3–11]
d410	Changing basic body position	208 (68)	205 (39)	37 [30–44]
d415	Maintaining a body position	208 (43)	206 (23)	25 [19–31]
d420	Transferring oneself	208 (40)	206 (16)	31 [24–37]
d440	Fine hand use (picking up, grasping)	208 (22)	203 (16)	8 [5–12]
d445	Hand and arm use	208 (20)	205 (13)	9 [6–14]
d450	Walking	206 (79)	205 (61)	31 [24–38]
d460	Moving around in different locations	206 (80)	204 (66)	27 [21–34]
d465	Moving around using equipment	195 (69)	199 (35)	44 [37–51]
d510	Washing oneself	208 (75)	206 (53)	25 [19–31]
d520	Caring for body parts	208 (74)	207 (55)	23 [17–29]
d530	Toileting	208 (61)	205 (30)	35 [28–42]
d540	Dressing	208 (73)	206 (47)	31 [25–38]
d550	Eating	208 (25)	206 (12)	16 [11–21]
d560	Drinking	208 (19)	206 (9)	12 [8–17]
d570	Looking after one's health	201 (23)	199 (18)	12 [8–18]
d760	Family relationships	192 (8)	194 (6)	4 [2–8]
d770	Intimate relationships	70 (9)	64 (6)	3 [0–11]
d860	Basic economic transactions	185 (21)	186 (17)	6 [3–11]
d930	Religion and spirituality	162 (21)	146 (8)	11 [6–17]
d940	Human rights	183 (5)	166 (5)	6 [3–10]

CI: confidence interval.

Table V. *International Classification of Functioning, Disability and Health (ICF) categories of the component Environmental Factors described as either facilitator or barrier at admission (*n = 209)

ICF	ICF Code Description	Specification	*n* (%)
e110	Products or substances for personal consumption	Barrier	194 (9)
		Facilitator	194 (82)
e115	Products and technology for personal use in daily living	Barrier	199 (9)
		Facilitator	199 (71)
e120	Products and technology for personal indoor and outdoor mobility and transportation	Barrier	193 (10)
		Facilitator	193 (91)
e125	Products and technology for communication	Barrier	202 (11)
		Facilitator	202 (72)
e140	Products and technology for culture, recreation and sport	Barrier	146 (19)
		Facilitator	146 (55)
e145	Products and technology for the practice of religion or spirituality	Barrier	131 (5)
		Facilitator	131 (37)
e150	Design, construction and building products and technology of buildings for public use	Barrier	181 (17)
		Facilitator	181 (71)
e240	Light	Barrier	196 (9)
		Facilitator	196 (47)
e245	Time-related changes	Barrier	188 (26)
		Facilitator	188 (21)
e250	Sound	Barrier	200 (26)
		Facilitator	200 (22)
e310	Immediate family	Barrier	190 (5)
		Facilitator	190 (85)
e315	Extended family	Barrier	153 (3)
		Facilitator	153 (67)
e320	Friends	Barrier	148 (1)
		Facilitator	148 (64)
e325	Acquaintances, peers, colleagues, neighbours and community members	Barrier	174 (3)
		Facilitator	174 (57)
e330	People in position of authority	Barrier	126 (4)
		Facilitator	126 (55)
e355	Health professionals	Barrier	201 (1)
		Facilitator	201 (92)
e360	Health-related professionals	Barrier	145 (1)
		Facilitator	145 (81)
e410	Individual attitudes of immediate family members	Barrier	182 (4)
		Facilitator	182 (81)
e415	Individual attitudes of extended family members	Barrier	147 (3)
		Facilitator	147 (59)
e420	Individual attitudes of friends	Barrier	136 (0)
		Facilitator	136 (57)
e425	Individual attitudes of acquaintances, peers, colleagues, neighbours and community members	Barrier	165 (4)
		Facilitator	165 (53)
e430	Individual attitudes of people in positions of authority	Barrier	119 (5)
		Facilitator	119 (55)
e450	Individual attitudes of health professionals	Barrier	198 (0)
		Facilitator	198 (75)
e455	Individual attitudes of other professionals	Barrier	136 (1)
		Facilitator	136 (74)
e460	Societal attitudes	Barrier	165 (11)
		Facilitator	165 (28)
e465	Social norms, practices and ideologies	Barrier	156 (13)
		Facilitator	156 (29)
e570	Social security, services, systems and policies	Barrier	182 (4)
		Facilitator	182 (69)
e580	Health services, systems and policies	Barrier	193 (2)
		Facilitator	193(81)

Table VI. *Additional International Classification of Functioning, Disability and Health (ICF) categories emerging as not yet included in the Comprehensive ICF Core Sets (*n = *209)*

ICF	ICF Code Description	*n* (%)
Body Functions		
b555	Endocrine gland functions	10 (4.8)
b310	Voice functions	4 (1.9)
b130	Energy and drive functions	2 (1.0)
b610	Urinary excretory functions	1 (0.5)
Body Structures		
s540	Structure of intestine	19 (9.0)
s730	Structure of upper extremity	19 (9.0)
s630	Structure of reproductive system	6 (2.9)
s530	Structure of stomach	4 (1.9)
s570	Structure of gall bladder and ducts	4 (1.9)
s7	CHAPTER 7 STRUCTURES RELATED TO MOVEMENT	4 (1.9)
s560	Structure of liver	2 (1.0)
s580	Structure of endocrine glands	2 (1.0)
Activities and Participation		
d455	Moving around	24 (11.5)
d650	Caring for household objects	2 (1.0)

prevalence of impairments and disability in older adults (14, 15). Physical functioning, which encompasses mobility and basic activities of daily living, is, furthermore, a main area of any geriatric assessment, and of assessments in outcome studies concerning health and disability in aged people (16, 17). Mobility and basic activities of daily living are critical aspects of functioning for older people aspiring to maintain independent living and a satisfactory quality of life.

All highly frequent restricted categories showed improvement at the end of the hospital stay. Nonetheless, problems with walking and moving around, difficulties with self-care activities, and difficulties carrying out a daily routine, were found to be the most common limitations and restrictions also at discharge being reported. These limitations and restrictions were all reported, with few exceptions, by more than one-half of the patients, along with associated Body Function impairments such as lack of muscle power and impaired gait pattern functions. Gait disorders are common in aged populations, and often prove not completely amenable to rehabilitation or treatment. While there is a tendency towards increasing prevalence of gait disorders with advancing age (15), it has been pointed out that disordered gait is not an inevitable consequence of ageing, but rather a reflection of the increased prevalence and severity of age-related diseases and disorders such as degenerative joint disease, cardiovascular disease, or impairment following orthopaedic surgery (18). Moreover, it is well known that hospitalized older persons are at high risk for functional decline as a consequence of their acute medical illness, the medical or surgical therapies initiated, or deconditioning due to forced immobility (3, 4).

Moving around using equipment (d465) and *Toileting* (d530) were the sole exceptions among *Walking and Moving* and *Self-care* categories, with notably better performance than the other categories. Both were restricted in approximately one-third of the patients at discharge. *Moving around using equipment* (d465) was, furthermore, the category with the most frequent improvement (41%) of all categories of the ICF Core Set for geriatric patients, whereas *Toileting* (d530) was the category with the most frequent improvement (33%) among all *Self-care* categories.

Hand-held walking aids, such as canes and walkers are indispensible for improving stability in older adults with gait and balance disorders, allowing them to live more independently and participate in community life. For persons who cannot walk, or who tire very easily, a wheelchair may be required. The results of our study indicate that many of the participants were provided with (more) appropriate mobility aids and equipment, including fitting and instruction, during the course of their hospital stay.

To encourage patients to improve their ability to self-care, especially with respect to toileting, is a major focus of geriatric care and rehabilitation. The capacity for independent toileting without assistance requires mobility and toileting skills, including the ability to sit down and rise from the seated to a standing position, as well as cleaning oneself. In comparison with other self-care activities, such as, for example, washing (including all body parts), improved toileting can be achieved in a shorter time. Toileting appears to be a less complex activity in terms of the number and the intricacy of demanding skills that it entails. Additionally, the availability of devices such as raised toilet seats or toilet frames enable people with rather severe disabilities to manage their toileting without assistance, plausibly accounting for the comparatively high percentage of patients with improvement in this category observed at discharge.

Residual limitation at discharge

Despite a high degree of overall functional improvement, there were several categories with residual limitation, as was noted in approximately two-thirds of patients at discharge. In particular, *Muscle power functions* (b730) and *Walking* (d450) were restricted in 60%/61% and *Gait pattern functions* (b770) and *Moving around in different locations* (d460) were limited or restricted in 66% of the participants at discharge.

With advancing age, muscle power declines, sometimes precipitously (19), which causes weakness and frailty. Loss of muscle power is linked to poor balance, gait speed, falls, and fractures, consequently contributing importantly to the decline in functional ability and independence in old age (20). Although there is evidence that exercise and muscle power-specific training can increase muscle power and improve function even in very old people, recovery of muscle power after hospitalization can be a lengthy process (21, 22). Given the brief mean length of stay in our study, substantial recovery of muscle power was not to be expected in all patients.

Contextual factors

All Environmental Factors contained in the comprehensive geriatric ICF Core Set were reported either as a barrier or as a facilitator. Notably, patients were more apt to identify these factors as facilitator than as a barrier. The most frequent facilita-

tors, which were specified by more than 85% of these patients, were *Health professionals* (e355), *Products and technology for personal indoor and outdoor mobility and transportation* (e120), and *Immediate family* (e310). The most frequently reported barriers were *Time-related changes* (e245) and *Sound* (e250), which were mentioned by one-quarter of respondents. We presume that these barriers arose from environmental changes due to hospitalization, resulting in exposure to an unfamiliar, noisy environment, which is potentially disruptive of patients' habitual circadian patterns.

The lack of family members' presence and support can be a major factor affecting the hospitalized older patients' social relationships and personal well-being. Based on a review of studies concerning family care for hospitalized aged, Li et al. (23) summarize that family care actions usually consist of provision of emotional support, or visiting and helping with daily activities. Other researchers have differentiated between directive behaviours, in which the family member acts on behalf of the older adult or as an advisor, and supportive behaviours, in which the family member motivates and stimulates the older patient (24).

The ICF defines the category e120 as "equipment… used by people in activities of moving inside and outside buildings…" (7: 174). This category received the most frequent mention as facilitator, being cited by 91% patients, thus emphasizing the importance of assistive mobility for older patients, noted above.

Infrequent notations

There were 11 categories, mostly from the component Body Structures, with prevalence below 5% at admission and discharge.

Intellectual functions

Cognitive impairment occurs frequently in older adults, but its early stages are often undiagnosed, despite the high risk of progression to dementia. Recent epidemiological studies from European countries cited prevalence rates of 10–25% for mild cognitive impairment (MCI) in patients aged 65 years and older in western industrialized nations, with a mean prevalence of approximately 16%. The incidence rates of all prodromal dementia syndromes were found to increase with age (25). Nonetheless, the percentage of patients with impaired *Intellectual functions* (b117) was relatively low in our study (3%). However, our survey did not include standardized diagnostic tests for the detection of cognitive impairment, such that it seems likely that the true prevalence of cognitive impairment was underestimated in our study population.

Seeing and Hearing functions

Although hearing and vision impairments are common in older adults (26) and of increasing incidence with age (27), few patients in our sample population reported these impairments. Appropriate use of properly adjusted glasses and/or hearing aids might well explain this discrepancy, such that the patients do not perceive themselves to be impaired with respect to these senses. Nonetheless, Wallhagen et al. (28) have shown that hearing and vision impairments have strong independent impacts on subsequent physical, mental and social functioning. Impairments in either of these senses have the potential to disrupt interpersonal relations and severely constrain social participation of the persons affected. Thus, Lupsakko et al. (29) found an association between combined hearing and visual impairment and depressive symptoms in an aged population. Visual impairment is, furthermore, a risk factor for falls and fall injuries in older adults (30). For these reasons, *Seeing functions* (b210) and *Hearing functions* (b230) are an essential part of an ICF Core Set, with particular relevance to the clinical framework for comprehensive assessment of functioning in elderly persons.

Body Structures

In comparison with the other comprehensive ICF Core Sets for patients in post-acute rehabilitation facilities (31–33), the ICF Core Set for older patients contains relatively many Body Structure categories. This reflects the wide range of medical diagnoses and comorbidities commonly found among older patients, even though not equal importance is attributed to every category. While impairments of the cardiovascular system, structure of lower extremity and structure of areas of skin were present in more than one-third of the aged patients participating in our study, several Body Structure categories were mentioned as being impaired by only few patients. Arguably, the particular categories must depend on the case mix of patients being investigated, such that Body Structure categories might be not be optimal candidates for an ICF Core Set.

Human rights

The Activities and Participation category *Human rights* (d940) implies, among other things, the right to self-determination or autonomy and the right to control over one's destiny (7). In the present context, it refers to the potential for restriction of privacy and dignity of geriatric inpatients. Indeed, a key component of human rights in the hospital setting is the maintenance of patient integrity and dignity, which implicates that patients are treated and cared for with respect. Human rights issues can arise in diverse contexts in the hospital setting, potentially encompassing, for example, the right to protect one's personal information as confidential, the right to expect treatment which respects one's dignity, or the right to control one's personal sphere and territory (34). During the 2003 ICF Core Set Consensus Conference, the category *Human rights* (d940) provoked extensive discussions between the participating experts. The question whether or not *Human rights* (d940) should actually be included in the ICF Core Set for aged patients was decided only after the third and last vote (10). Among the patients participating in our current study, only 5% complained of disregard for their human rights. However, consideration of ethical issues must always be a central aspect of clinical practice, especially for older persons, whose

autonomy may be particularly vulnerable. Recent studies have shown that enhancing dignified care in hospital practice is still an essential concern for older patients (35, 36).

Additional topics

While some particular categories were of lesser importance, other issues emerged from the interviews that are so far not covered by the comprehensive ICF Core Set for patients in geriatric post-acute rehabilitation facilities. These aspects of functioning comprised 14 additional ICF categories, most of which were mentioned by less than 5% of the participants. Of the additional ICF categories, more than one-half belong to the component Body Structures, of which *Structure of intestine* (s540) and *Structure of upper extremity* (s730) were the most frequently named, each with 19 mentions (9%). *Structure of upper extremity* (s730) is the only *Structure related to movement* identified in the present study that is not yet been contained in the comprehensive ICF Core Set for aged patients.

While the categories *Walking* (d450), *Moving around in different locations* (d460), and *Moving around using equipment* (d465) are already part of the comprehensive ICF Core Set for aged patients, climbing stairs came up so frequently in our interviews as to be a candidate for inclusion. Climbing stairs can be linked to the Activities and Participation category *Moving around* (d455), which is the only *Walking and moving* (d450–d469) category not yet covered by the ICF Core Set for aged patients. In general, these findings once again demonstrate the importance of mobility-related Body Structures, Body Functions and Activities and Participation in the study of functioning of older adults.

Some limitations of our study need mentioning. The sample included only patients from two German-speaking countries, with comparable healthcare systems, and may not be generalizable. Novel results might be obtained with data collection elsewhere in Europe, or around the world. This raises the need for additional validation studies with patients from other countries and cultures. In general, impairments, limitations and restrictions may be a direct consequence of the underlying diagnoses leading to hospitalization. We are, however, confident that the current sample of older patients is representative of the spectrum of diagnoses typical for a geriatric population. Nevertheless, complete validation for comprehensive ICF Core Set requires the implementation in as many different settings as possible.

The relatively low prevalence of cognitive and sensory impairment in our study indicates that there has been a selection of participants. Potentially this is another drawback for generalizability. However, it has to be kept in mind that it is difficult to elicit information from non-responsive patients, thus studies relying on the patient perspective, like our study will usually have to face this problem.

In conclusion, most categories of the comprehensive ICF Core Set for patients in geriatric post-acute rehabilitation facilities were confirmed. Some additional categories not covered by the Set in its present version emerged from the interviews and should be considered for inclusion in a finalized version.

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