

## IDENTIFICATION OF THE MOST COMMON PATIENT PROBLEMS IN PATIENTS WITH CHRONIC CONDITIONS USING THE ICF CHECKLIST

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**Objective:** To identify the most common patient problems in patients with 12 different chronic conditions using the ICF checklist.

**Methods:** A multi-centre, cross-sectional study with convenient samples of patients who had received a clinical diagnosis of any of 12 different chronic conditions undergoing inpatient or outpatient rehabilitation. To describe the population, age, gender, and the SF-36 were recorded. Data for 917 patients from 33 rehabilitation centres were analysed.

**Results:** Most of the ICF-checklist categories were common to at least 1 condition. Pain was the sole category of 125 ICF-checklist categories that was common to all chronic conditions. Patients with low back pain, rheumatoid arthritis, and diabetes mellitus did not often experience the problems listed in the ICF-checklist.

**Conclusion:** The main finding, that in most conditions categories from each component were common, underscores the need to address all components when assessing functioning and health in patients with chronic conditions.

**Key words:** outcome assessment, quality of life, rehabilitation, ICF.

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### INTRODUCTION

Chronic diseases are now the major cause of death and disability worldwide. Non-communicable conditions, including cardiovascular diseases, diabetes, obesity, cancer, and respiratory diseases, now account for 59% of the 56.5 million deaths annually and 45.9% of the global burden of disease (1).

Musculoskeletal conditions, which for a long time have been under-recognized for their socioeconomic impact, are now the most frequent causes of physical disability, at least in developed countries (2). Non-communicable conditions are projected to become an even more important cause of disability-adjusted life years (3).

The recognition of the importance of systematically assessing symptoms and limitations of functioning for chronic conditions, both for clinical science and health policy and management, has led to the development and use of a large number of condition-specific and generic health-status measures.

These measures typically cover selected aspects of the whole health experience associated with a condition. Also, because of their heterogeneity regarding the items intending to measure the same concept, a direct comparison of the frequency of specific patient problems across conditions is hardly possible (4).

With the newly available International Classification of Functioning, Disability and Health (ICF) (5), it is now possible to describe the whole health experience including environmental factors and to compare the experience of patients with different conditions (6). Since the ICF is designed to record and organize a wide range of information about health and health-related states containing over 1400 categories, practical tools need to be developed for clinical practice.

In order to facilitate the use of the ICF in clinical encounters, WHO has developed the ICF checklist (7). The ICF checklist consists of a selection of 125 categories from the whole ICF classification system. It provides a relatively simple-to-use questionnaire, which can be filled out by a health professional. The checklist makes it possible to generate a profile of the patient using the most important ICF categories in clinical practice.

The objective of this study was to identify the most common problems encountered in patients with chronic conditions using the ICF checklist.

The specific aim was to examine, in convenience samples of patients with 12 conditions undergoing an inpatient or outpatient rehabilitation, the frequency of problems recorded using the checklist.

### METHODS

#### *Study design*

The study design was a multi-centre, cross-sectional study with convenience samples of patients who had received a clinical diagnosis of any of 12 different health conditions undergoing inpatient or outpatient rehabilitation. The study was approved by the Ethics Committee of the University of Munich.

The 12 conditions and the respective ICD-10 codes denoted in the brackets were: *low back pain* (LBP): (M54), *osteoporosis* (OP): (M81–M82), *rheumatoid arthritis* (RA): (M05–M06), *osteoarthritis*

(OA): (M19), *chronic ischaemic heart disease* (CIHD): (I21–I25), *chronic obstructive pulmonary diseases* (COPD): (J44, J45), *diabetes mellitus* (DM): (E10–E14), *malignant neoplasm of breast* (BC): (C 50), *obesity* (OB): (E 65–68), *pain disorders*: (M79.1, R52, F45.5), *depressive disorder*: (F32, F33), *stroke*: (I64, I69.4).

Patients were included if 1 of these conditions was the focus of the rehabilitation intervention, they were at least 18 years old, had sufficient knowledge of the German language, the purpose and reason of the study was understood, and an informed consent was signed. Patients with 2 or more health conditions, where the focus of rehabilitation intervention was 1 health condition, were analysed for their main problem.

Patients with LBP, RA, OA, and CIHD who had surgery within the previous 6 months and all patients with incomplete wound healing were excluded from the study. We did not collect any information about the stages of the patient's disease.

#### Data collection procedures

The recruitment of the patients as well as the data collection were performed by physicians and other health professionals trained in a structured 1-day workshop by researchers of the ICF of the WHO FIC Collaborating Center at the University of Munich.

The training involved familiarization with the core principles and model of the ICF as well as the practical application of the checklist.

#### Measures

To describe the population, age, gender, and the Medical Outcome Study Short Form 36 (SF-36) were recorded. The SF-36 derives from a larger battery of questions administered in the Medical Outcomes Study (8). The scales cover the dimensions of physical health, mental health, social functioning, role functioning, general health, pain, and vitality. We used the 2 summary scores, the physical component summary score (PCS) and the mental component summary score (MCS) in this study (8).

We used the SF-36 in this study to establish a generic comparison across the health conditions and to offer information to compare these patients with those from other studies.

The ICF checklist consists of a selection of 125 second-level categories from the 362 second-level categories of the whole ICF classification system. It provides a relatively simple questionnaire with guidelines and probes, which can be filled out by the physician or other health professional, and makes it possible to classify the most important ICF categories in clinical practice (7).

For the study, we used the version of the checklist (9) based on the ICIDH-2 final draft (7). The checklist includes only categories in the first and second level of the ICF. The percentage of categories selected for the checklist for the components is different from the ICF. With respect to all categories on the second level of the ICF, the ICF checklist includes 29 (25%) categories from the component *body functions*, 16 (29%) from *body structures*, 48 (41%) from *activities and participation*, and 32 (43%) from *environmental factors*.

The qualifier for all components has the following gradation: 0 = no problem (none, absent, negligible) 0–4%, 1 = mild problem (slight, low) 5–24%, 2 = moderate problem (medium, fair) 25–49%, 3 = severe problem (high, extreme) 50–95%, 4 = complete problem (total) 96–100%.

Additionally “8” (not specified) is used when the available information does not suffice to quantify the severity of the problem, and “9” (not applicable) when a category is not applicable in a determined patient (5).

#### Analyses

Descriptive statistics are used to describe the study population as well as to examine the frequency of problems recorded by the ICF checklist. Since the variables to describe the study population are not normally distributed, (Kolmogorov-Smirnov test (10) with  $\alpha < 0.1$ ), medians are reported.

Since the qualifiers in most of the categories are not normally distributed, they were dichotomized as 0 = no problem and 1 = problem (qualifier code 1–4). The values 8 (not specified) and 9 (not applicable) were treated as missing.

The data were entered twice to ensure there were no errors on data entry. All analyses were performed with SPSS 11.0 for Windows.

## RESULTS

The data were collected from July 2001 to March 2003 by 68 health professionals working in 33 rehabilitation centres in Germany. Thirty of the centres included inpatients, 2 included outpatients, and 1 included both. The total number of inpatients was 801, and the total number of outpatients was 116 (see acknowledgements for the list of all centres).

A total of 1044 patients were included in the study. Table I shows the number of patients included in the study as well as the patients' characteristics, including the SF-36 summary scores. In all, 127 patients were excluded from the analysis because they did not fulfil the inclusion and exclusion criteria.

Tables II–IV show the ICF categories in which problems were documented with over 30% of the patients in at least 1 condition. Table V shows the ICF categories in the component *environmental factors* considered to be a barrier in at least 20% of the patients with a specific condition. Table VI shows the ICF categories in the component *environmental factors* considered to be a facilitator in at least 30% of the patients with a specific condition. The categories are presented in descending order based on the percentage across all conditions.

For the component *body structures*, 81% of the ICF categories in the checklist were mentioned at least once with a frequency over 30%. There is no category common to all conditions. In depression, no category exceeded the 30% threshold. The

Table I. Patient characteristics (n = 917)

	Condition											
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke
No. of patients (n)	163	32	37	53	72	89	67	108	52	101	50	93
Gender (female %)	41.7	100	70.3	58.5	15.3	48.8	43.9	100	65.3	82.2	64.0	49.5
Years of education (median)	12	12	11	11	12	12	13	12	11	12	13	12
Age (years, median)	52.6	66.6	61.9	59.8	54.0	61.2	49.1	53.2	42.4	52.8	50.4	58.5
SF-36 PCS (median)	41.9	42.1	39.4	39.9	44.7	40.8	47.5	45.4	42.5	36.5	41.1	41.6
SF-36 MCS (median)	40.2	43.3	43.3	41.9	40.6	43.5	41.7	40.3	42.8	36.5	32.5	43.1

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder; SF-36 PCS = physical component summary; SF-36 MCS = mental component summary.

Table II. Percentages of ICF categories in the component body structures in which at least 30% of patients with a specific condition have a problem

ICF categories	Condition											
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke
Lower extremity (leg, foot)	22.0	<b>62.5</b>	<b>94.4</b>	<b>69.2</b>	11.8	15.5	<b>45.5</b>	11.3	<b>37.0</b>	<b>39.6</b>	17.6	28.1
Trunk	<b>86.6</b>	<b>76.9</b>	28.1	<b>35.4</b>	20.9	18.8	<b>35.7</b>	25.3	<b>40.5</b>	<b>45.2</b>	14.3	14.6
Cardiovascular system	8.9	9.5	0.0	19.0	<b>97.2</b>	<b>35.6</b>	<b>41.4</b>	17.4	<b>40.0</b>	24.4	6.7	<b>38.1</b>
Upper extremity (arm, hand)	8.6	26.1	<b>91.7</b>	<b>33.3</b>	6.0	15.5	14.3	<b>31.4</b>	8.9	<b>50.5</b>	15.2	<b>34.8</b>
Metabolism and endocrine systems	9.0	20.0	12.5	13.6	27.4	17.5	<b>95.2</b>	<b>31.0</b>	22.5	<b>30.6</b>	14.3	19.8
Shoulder region	19.2	<b>40.9</b>	<b>50.0</b>	<b>37.3</b>	15.2	22.6	23.3	<b>36.3</b>	17.8	<b>44.2</b>	18.2	20.0
Pelvis	14.6	<b>54.2</b>	<b>35.5</b>	<b>48.1</b>	3.0	19.0	20.0	5.2	10.9	<b>32.6</b>	17.6	11.0
Head and neck region	23.0	<b>38.1</b>	<b>34.4</b>	15.2	12.3	15.5	15.0	13.2	17.4	<b>53.8</b>	15.6	9.0
Eye, ear and related structures	12.7	0.0	<b>30.8</b>	11.4	<b>33.3</b>	<b>32.5</b>	<b>48.0</b>	16.7	22.2	21.6	22.6	15.3
Respiratory system	4.9	5.3	6.3	2.4	8.5	<b>95.5</b>	4.2	7.0	<b>36.8</b>	6.1	3.2	8.0
Reproductive system	3.9	5.9	0.0	5.4	2.4	10.0	20.0	<b>87.7</b>	2.8	0.0	10.0	2.3
Brain	0.7	0.0	0.0	0.0	2.1	0.0	8.7	0.0	2.7	8.7	2.8	<b>97.8</b>
Spinal cord and peripheral nerves	<b>32.3</b>	0.0	0.0	4.7	6.0	0.0	22.7	0.0	2.6	18.0	2.9	1.2

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder.

All values over 30% frequency are highlighted (**bold**). If only in 1 condition the category is over 30% the value is printed bold and *italicized*.

condition with the largest number of categories above 30% is chronic widespread pain (54%).

For the component *body functions*, 76% of the ICF categories in the checklist were mentioned at least once with a frequency over 30%. The number of categories above 30% ranges from 18% in CIHD to 55% in stroke. Pain is over 30% in all conditions.

For the component *activities and participation*, 75% of the ICF categories in the checklist were mentioned at least once with a frequency over 30%. The number of categories above 30% ranges from 0% in DM to 33% in stroke. There is no category common to all conditions in *activities and participation*. However, stroke is represented with 6 and depression with 3 single categories.

Table III. Percentages of ICF categories in the component body functions in which at least 30% of patients with a specific condition have a problem

ICF categories	Condition											
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke
Pain	<b>91.4</b>	<b>87.1</b>	<b>97.3</b>	<b>92.3</b>	<b>41.7</b>	<b>31.8</b>	<b>36.4</b>	<b>51.9</b>	<b>47.1</b>	<b>93.0</b>	<b>34.1</b>	<b>33.3</b>
Mobility of joint	<b>75.3</b>	<b>87.1</b>	<b>94.4</b>	<b>90.6</b>	15.7	<b>31.0</b>	<b>37.3</b>	<b>37.0</b>	<b>44.2</b>	<b>68.0</b>	<b>32.6</b>	<b>46.7</b>
Muscle power	<b>50.0</b>	<b>80.6</b>	<b>94.4</b>	<b>75.5</b>	14.1	<b>37.2</b>	7.5	<b>38.3</b>	<b>30.8</b>	<b>73.0</b>	<b>30.2</b>	<b>82.6</b>
Sleep	<b>47.8</b>	<b>41.9</b>	<b>56.8</b>	<b>39.6</b>	<b>33.3</b>	<b>46.4</b>	11.9	<b>52.4</b>	<b>50.0</b>	<b>88.0</b>	<b>85.7</b>	<b>33.3</b>
Energy and drive functions	21.0	<b>36.7</b>	<b>54.1</b>	22.6	26.4	<b>42.0</b>	9.0	<b>37.4</b>	<b>45.1</b>	<b>86.1</b>	<b>96.0</b>	<b>48.2</b>
Blood pressure	20.4	15.4	<b>31.4</b>	<b>35.4</b>	<b>70.4</b>	<b>32.9</b>	<b>58.2</b>	22.6	<b>54.9</b>	<b>34.1</b>	24.4	<b>63.4</b>
Muscle tone	<b>69.1</b>	<b>37.5</b>	<b>60.0</b>	<b>47.1</b>	13.6	10.8	17.9	5.6	<b>33.3</b>	<b>83.8</b>	23.3	<b>55.4</b>
Emotional functions	16.1	25.0	24.3	13.5	29.6	16.7	16.4	<b>35.7</b>	21.6	<b>68.4</b>	<b>91.8</b>	<b>45.2</b>
Weight maintenance	17.3	17.9	13.9	18.9	13.4	23.8	<b>37.3</b>	23.6	<b>69.2</b>	<b>38.0</b>	25.0	20.5
Memory	6.2	3.4	14.3	1.9	10.0	26.1	4.5	<b>41.7</b>	14.0	<b>56.8</b>	<b>74.5</b>	<b>60.3</b>
Endocrine glands (hormonal changes)	7.4	11.8	26.9	9.3	12.3	20.5	<b>92.5</b>	<b>42.1</b>	20.0	18.8	15.6	15.9
Attention	7.4	6.7	8.1	0.0	2.8	28.8	3.0	29.6	12.0	<b>51.5</b>	<b>75.5</b>	<b>53.8</b>
Respiration (breathing)	7.7	8.3	6.9	4.3	25.0	<b>93.9</b>	11.9	8.5	<b>34.7</b>	18.3	15.4	5.5
Heart	3.1	12.0	9.4	8.7	<b>92.9</b>	24.1	26.9	2.9	17.4	11.0	7.3	22.2
Seeing	11.9	3.4	27.8	12.0	21.7	<b>30.5</b>	22.4	20.0	16.3	12.9	17.5	24.7
Immunological (allergies, hypersensitivity)	2.6	7.4	10.3	6.4	11.9	<b>33.8</b>	<b>31.8</b>	28.6	<b>29.8</b>	<b>40.0</b>	11.1	0.0
Sexual functions	11.7	4.3	21.7	6.1	25.0	19.7	16.3	<b>35.2</b>	5.6	<b>32.6</b>	18.8	9.7
Digestive	7.5	24.1	20.0	3.8	13.4	8.2	7.5	2.5	14.0	<b>65.3</b>	27.9	3.3
Higher level cognitive functions	2.8	4.8	0.0	2.2	6.3	19.0	7.5	3.6	4.7	<b>44.1</b>	<b>44.4</b>	<b>42.0</b>
Perceptual function	1.2	0.0	0.0	0.0	2.8	14.9	13.4	0.0	0.0	9.9	<b>41.3</b>	28.8
Haematological (blood)	2.6	11.1	<b>35.3</b>	2.1	19.7	7.2	6.1	16.9	18.4	4.7	2.6	6.5
Language	2.0	0.0	0.0	0.0	4.2	12.9	4.5	1.8	8.7	13.3	13.2	<b>32.0</b>

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder.

All values over 30% frequency are highlighted (**bold**). If only in 1 condition the category is over 30% the value is printed bold and *italicized*.

Table IV. Percentages of ICF categories in the component activities and participation in which at least 30% of patients with a specific condition have a problem (performance)

ICF categories	Condition												
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke	
Lifting and carrying objects	<b>90.7</b>	<b>84.4</b>	<b>91.9</b>	<b>77.4</b>	<b>32.4</b>	<b>68.5</b>	20.9	<b>68.5</b>	<b>49.0</b>	<b>86.1</b>	21.3	<b>68.5</b>	
Doing housework (cleaning house, washing dishes, laundry, ironing, etc.)	<b>54.0</b>	<b>56.3</b>	<b>81.8</b>	<b>59.2</b>	24.6	<b>54.7</b>	9.2	<b>61.3</b>	<b>33.3</b>	<b>87.6</b>	<b>63.0</b>	<b>70.8</b>	
Recreation and leisure	<b>51.6</b>	<b>53.1</b>	<b>81.1</b>	<b>51.0</b>	<b>45.7</b>	<b>41.0</b>	4.9	<b>33.7</b>	<b>37.3</b>	<b>80.0</b>	<b>72.9</b>	<b>77.0</b>	
Remunerative employment	<b>43.2</b>	28.6	<b>73.3</b>	<b>50.0</b>	<b>48.3</b>	16.7	11.5	<b>51.9</b>	18.8	<b>84.4</b>	<b>72.1</b>	<b>78.6</b>	
Acquisition of goods and services (shopping, etc.)	<b>32.7</b>	<b>59.4</b>	<b>83.8</b>	<b>47.2</b>	17.1	<b>51.7</b>	6.0	<b>58.3</b>	21.6	<b>81.4</b>	<b>44.9</b>	<b>65.1</b>	
Walking	<b>41.9</b>	<b>35.5</b>	<b>75.0</b>	<b>77.4</b>	16.9	<b>51.7</b>	18.2	8.3	<b>40.4</b>	<b>67.3</b>	14.3	<b>66.7</b>	
Caring for others	28.3	<b>31.8</b>	<b>50.0</b>	<b>30.6</b>	20.3	<b>39.5</b>	10.6	<b>43.3</b>	16.3	<b>55.6</b>	<b>53.5</b>	<b>62.5</b>	
Driving (riding bicycle and motorbike, driving car, riding animals, etc.)	28.5	<b>31.8</b>	<b>51.6</b>	<b>41.2</b>	22.9	<b>31.8</b>	10.8	5.8	20.4	<b>57.0</b>	13.6	<b>81.1</b>	
Preparation of meals (cooking etc.)	16.3	15.6	<b>67.6</b>	14.6	7.1	28.4	4.5	7.5	3.9	<b>67.0</b>	<b>47.8</b>	<b>68.7</b>	
Undertaking multiple tasks	24.3	17.2	12.9	20.8	15.9	<b>30.2</b>	12.1	9.4	6.4	<b>66.1</b>	<b>60.5</b>	<b>70.5</b>	
Intimate relationships	15.4	0.0	26.1	0.0	26.3	30.0	22.2	<b>39.1</b>	10.3	<b>60.5</b>	<b>75.9</b>	29.4	
Fine hand use (picking up, grasping)	7.5	19.4	<b>75.7</b>	<b>32.7</b>	5.6	16.9	11.9	15.7	7.7	<b>42.6</b>	10.6	<b>74.2</b>	
Community life	15.0	9.7	20.6	11.8	6.1	22.9	3.3	9.0	17.3	<b>48.4</b>	<b>77.3</b>	<b>45.3</b>	
Moving around using equipment (wheelchair, skates, etc.)	14.7	<b>69.2</b>	<b>68.4</b>	24.4	4.4	14.9	3.1	0.0	7.5	<b>35.1</b>	3.6	<b>43.8</b>	
Looking after one's health	24.1	9.7	27.0	28.3	22.2	24.7	6.0	1.9	<b>38.5</b>	<b>46.5</b>	<b>33.3</b>	<b>46.2</b>	
Dressing	23.5	12.5	<b>64.9</b>	<b>30.2</b>	0.0	26.1	6.0	1.9	23.1	24.8	18.0	<b>51.6</b>	
Complex interpersonal interactions	5.4	6.3	3.1	6.4	2.9	27.9	5.0	3.2	4.3	<b>50.6</b>	<b>82.9</b>	28.8	
Washing oneself (bathing, drying, washing hands, etc.)	14.9	16.1	<b>62.2</b>	15.1	0.0	18.0	3.0	1.9	11.5	21.8	16.0	<b>53.3</b>	
Using transport (car, bus, train, aeroplane, etc.)	26.3	<b>31.3</b>	<b>31.4</b>	26.9	19.4	25.8	6.0	0.0	15.4	27.3	6.4	<b>39.4</b>	
Family relationships	7.2	3.1	13.9	3.9	16.3	15.1	5.1	7.8	8.2	<b>40.0</b>	<b>68.0</b>	27.1	
Relating with strangers	4.5	9.4	16.7	2.1	4.1	16.5	3.1	9.2	10.4	<b>39.1</b>	<b>69.4</b>	22.1	
Caring for body parts (brushing teeth, shaving, grooming, etc.)	6.2	3.1	<b>48.6</b>	13.2	0.0	12.4	1.5	0.9	1.9	13.9	16.0	<b>50.5</b>	
Informal social relationships	5.6	9.7	3.2	7.1	0.0	15.2	6.5	1.7	8.7	25.3	<b>56.5</b>	18.8	
Solving problems	3.4	0.0	0.0	0.0	1.4	12.8	6.0	7.1	4.1	<b>39.0</b>	<b>39.5</b>	<b>50.0</b>	
Formal relationships	2.6	3.1	5.6	0.0	0.0	13.1	3.1	1.3	4.3	26.8	<b>63.6</b>	23.9	
Conversation	5.6	0.0	0.0	1.9	1.4	22.5	6.0	2.8	1.9	22.4	<b>49.0</b>	<b>32.6</b>	
Economic self-sufficiency	3.1	3.2	0.0	2.3	3.3	14.9	0.0	1.2	12.5	<b>50.5</b>	<b>31.0</b>	20.9	
Undertaking a single task	14.0	6.3	8.3	15.7	12.7	10.2	4.5	1.0	3.8	22.4	26.8	<b>33.0</b>	
Basic interpersonal interactions	3.8	3.1	13.9	5.9	2.0	12.5	3.1	1.1	2.1	26.4	<b>42.0</b>	<b>31.3</b>	
Toileting	9.3	9.4	<b>32.4</b>	7.5	0.0	7.9	1.5	0.0	0.0	6.9	6.0	<b>44.0</b>	
Eating	0.6	3.1	27.0	0.0	0.0	4.5	1.5	0.9	9.6	9.9	16.0	<b>35.2</b>	
Informal education	2.9	3.8	16.7	2.1	0.0	3.8	1.7	0.0	6.7	7.0	25.0	<b>35.1</b>	
Listening	4.4	0.0	0.0	0.0	4.2	12.4	1.5	3.7	3.9	14.1	<b>40.0</b>	14.1	
Drinking	0.0	3.1	18.9	0.0	0.0	2.2	1.5	0.0	1.9	7.9	12.0	<b>30.8</b>	
Learning to write	2.2	0.0	3.2	0.0	0.0	3.4	4.5	0.0	2.1	6.5	0.0	<b>41.0</b>	
Learning to calculate (arithmetic)	1.6	0.0	3.2	0.0	0.0	1.8	4.6	0.0	2.1	6.9	0.0	<b>39.5</b>	

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder.

All values over 30% frequency are highlighted (**bold**). If only in 1 condition the category is over 30% the value is printed bold and *italicized*.

The *environmental factors* are reported for barriers and facilitators separately. All 32 categories from the checklist were either over 20% as barrier or over 30% as facilitator. Only 3 categories were not common in barriers and facilitators (*climate, sound, and light* are pure barriers).

Forty-one percent of the ICF categories in the checklist were mentioned at least once with a frequency over 20% as barriers. The range of categories above 30% is from 0% in LBP, OA and DM to 46% in pain and depression. There is no common category for all conditions. COPD has 4 single categories with values over 30%, pain and OP have a single category with values over 30%, respectively.

Ninety-one percent of the ICF categories in the checklist were mentioned at least once with a frequency over 30% as facilitators. The range of categories above 30% is from 21% in COPD to 97% in DM. There are 4 common categories for all conditions (*health professionals, immediate family, individual attitudes of health professionals and health services and systems and policies*). DM is represented with 3 single categories over 30%.

One hundred and three out of all 125 ICF checklist categories were common to at least 1 chronic disease. Of all categories, 18.2% are above 30% at least in 8 conditions in the components *body structures, body functions, and activities and participation*,

Table V. Percentages of ICF categories in the component environmental factors in which at least 20% of patients with a specific condition have a problem (barrier)

ICF categories	Condition											
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke
Climate	15.8	<b>46.7</b>	<b>48.6</b>	20.0	17.2	<b>61.4</b>	0.0	<b>33.7</b>	<b>34.0</b>	<b>72.2</b>	<b>23.3</b>	12.8
Societal attitudes	11.7	0.0	<b>22.6</b>	7.5	7.9	14.8	1.8	6.6	<b>47.8</b>	<b>56.0</b>	<b>41.5</b>	17.1
Social norms, practices and ideologies	12.7	0.0	19.4	8.1	3.3	11.7	0.0	5.0	<b>34.0</b>	<b>47.1</b>	<b>31.6</b>	16.1
Products of design, building and construction for public use	12.2	9.4	<b>40.0</b>	16.3	3.0	<b>43.2</b>	0.0	0.0	6.0	<b>28.7</b>	4.8	<b>20.3</b>
Sound	7.1	6.9	14.7	2.0	<b>23.5</b>	8.0	1.9	3.3	10.2	<b>45.3</b>	<b>28.9</b>	17.5
Products of design, building and construction for private use	12.3	6.3	<b>28.6</b>	18.0	5.9	<b>38.6</b>	0.0	1.8	4.0	14.9	2.4	<b>22.1</b>
Individual attitudes of immediate family members	2.1	0.0	8.3	2.2	11.6	9.1	5.3	6.7	15.2	13.3	<b>24.4</b>	13.0
People in position of authority	4.0	<b>22.2</b>	6.3	6.5	13.9	0.0	3.4	0.0	9.8	11.0	<b>23.7</b>	5.4
Health services, systems and policies	1.6	<b>23.3</b>	11.1	5.0	0.0	20.0	0.0	1.1	4.1	4.7	3.7	5.3
Social security, services, systems and policies	1.9	7.1	10.3	0.0	0.0	<b>30.4</b>	0.0	0.0	4.7	6.5	8.7	5.6
For personal indoor and outdoor mobility and transportation	6.5	0.0	5.6	5.9	4.4	<b>21.8</b>	0.0	10.0	4.0	1.1	7.5	7.3
Legal services, systems and policies	0.0	6.7	7.4	0.0	1.6	<b>28.6</b>	0.0	1.8	0.0	12.5	8.7	3.8
Light	1.3	0.0	8.6	0.0	1.4	5.7	0.0	0.0	7.8	<b>24.5</b>	9.3	5.1

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder.

All values over 20% frequency are highlighted (**bold**). If only in 1 condition the category is over 20% the value printed bold and *italicized*.

59.2% of all categories are above 30% were shared among 3 or less conditions. As barriers, there are no categories that are above 20% at least in 8 conditions in the component of *environmental factors*. Of all categories above 20%, 76.9% were shared among 3 or fewer conditions. As facilitators, 27.8% of all categories were above 30% in at least 8 conditions. In the component *environmental factors*, 39.9% of all categories above 30% were shared among 3 or fewer conditions<sup>1</sup>.

The number of missing values in the categories presented in Tables II–VI ranged from 0 to 85. The highest number of missing values was found for the category *higher education* in pain ( $n = 85$ ) and stroke ( $n = 83$ ), *school education* in pain ( $n = 83$ ), *higher education* ( $n = 76$ ) in the component *activities and participation*, and *higher-level cognitive functions* ( $n = 67$ ) in pain in the component *body functions*.

## DISCUSSION

The main finding, that in most conditions categories from each component were common, underscores the need to address all components when assessing functioning and health in patients with chronic conditions. One may therefore question the validity and usefulness for clinical assessment of many current health status measures since they typically cover only selected aspects of the whole health experience associated with a condition.

<sup>1</sup> Because we did not compute a single code for the *environmental factors*, the percentages were calculated based on the number of categories being a facilitator (over 30%) or a barrier (over 20%) in at least 1 condition. There is an overlap of 10 categories coded twice (as barrier and facilitator).

The direct comparison of the frequency of specific patient problems across all conditions demonstrates a large variation across conditions. The fact that only a small number of common categories were shared among at least 8 conditions demonstrate the necessity of a condition-oriented approach when defining practical tools for clinical practice, such as the development of ICF Core Sets for chronic conditions (11, 4). On the other hand, it may be possible to define a list of problems common to musculoskeletal conditions that shared 16 categories across all components, and showed a rather homogenous pattern of common problems.

It could be expected that there are no common categories for *body structures* since the chronic conditions examined refer to different organ systems. Remarkably, for depression there was no common structural impairment documented. Since the ICF requires that problems in structures are recorded based on observation and not inferred in a given patient, it is likely that depressed patients were not investigated for problems in body structure (i.e. the brain). Besides, the structural changes in the brain associated with depression are currently ill-defined and there have only recently been attempts to use imaging techniques including functional magnetic resonance to demonstrate the structural and functional impairments (12–14).

Not unexpectedly, pain was common to all chronic conditions. Indeed, it was the only common problem within the *body functions* component. It is telling that *sleep* and *energy and drive functions* were common to many conditions. This is consistent with a recent attempt by OMERACT to identify problems most relevant to patients with musculoskeletal conditions (15). At OMERACT IV, panels consisting of patients and clinicians identified *sleep* and *fatigue* to be of special

Table VI. Percentages of ICF categories in the component environmental factors in which at least 30% of patients with a specific condition have a facilitator

ICF categories	Condition											
	LBP	OP	RA	OA	CIHD	COPD	DM	BC	OB	Pain	Dep	Stroke
Health professionals	<b>62.9</b>	<b>90.3</b>	<b>97.3</b>	<b>75.0</b>	<b>50.7</b>	<b>49.4</b>	<b>92.9</b>	<b>81.4</b>	<b>54.2</b>	<b>83.8</b>	<b>80.4</b>	<b>83.8</b>
Immediate family	<b>52.3</b>	<b>46.7</b>	<b>83.8</b>	<b>56.9</b>	<b>53.1</b>	<b>32.1</b>	<b>69.4</b>	<b>84.6</b>	<b>54.2</b>	<b>80.6</b>	<b>55.3</b>	<b>77.4</b>
Individual attitudes of health professionals	<b>33.1</b>	<b>50.0</b>	<b>80.6</b>	<b>50.0</b>	<b>36.2</b>	<b>41.2</b>	<b>67.7</b>	<b>73.5</b>	<b>35.4</b>	<b>76.8</b>	<b>73.8</b>	<b>79.7</b>
Health services, systems and policies	<b>50.8</b>	<b>50.0</b>	<b>63.9</b>	<b>55.0</b>	<b>39.7</b>	<b>36.0</b>	<b>66.2</b>	<b>61.4</b>	<b>36.7</b>	<b>83.7</b>	<b>51.9</b>	<b>81.6</b>
For personal consumption (food, medicines)	<b>32.5</b>	<b>56.7</b>	<b>83.8</b>	<b>45.1</b>	<b>30.4</b>	11.8	<b>81.5</b>	<b>54.2</b>	27.5	<b>82.8</b>	<b>61.7</b>	<b>78.9</b>
Friends	<b>35.6</b>	19.4	<b>60.0</b>	<b>34.7</b>	<b>50.0</b>	21.7	<b>60.0</b>	<b>86.7</b>	<b>45.7</b>	<b>68.1</b>	<b>72.1</b>	<b>74.5</b>
Individual attitudes of immediate family members	<b>39.3</b>	<b>32.3</b>	<b>80.6</b>	<b>42.2</b>	<b>51.2</b>	26.1	<b>47.4</b>	<b>78.9</b>	<b>41.3</b>	<b>72.4</b>	<b>58.5</b>	<b>56.5</b>
Health-related professionals	28.9	<b>55.6</b>	<b>66.7</b>	25.5	28.6	<b>34.2</b>	<b>73.2</b>	<b>71.4</b>	29.8	<b>67.9</b>	<b>54.1</b>	<b>70.7</b>
Individual attitudes of friends	24.5	21.9	<b>61.8</b>	19.0	<b>42.9</b>	19.3	<b>31.3</b>	<b>78.4</b>	<b>34.0</b>	<b>65.6</b>	<b>59.5</b>	<b>64.9</b>
Individual attitudes of health related professionals	22.9	16.7	<b>53.3</b>	<b>30.8</b>	<b>33.3</b>	<b>30.1</b>	<b>67.7</b>	<b>61.0</b>	19.1	<b>60.3</b>	<b>33.3</b>	<b>77.0</b>
Acquaintances, peers, colleagues, neighbours and community members	22.1	16.1	<b>53.6</b>	19.0	<b>50.0</b>	11.3	<b>33.3</b>	<b>74.2</b>	22.2	29.3	<b>44.4</b>	<b>59.2</b>
For personal use in daily living	17.2	<b>38.7</b>	<b>56.8</b>	23.1	24.2	8.2	<b>64.6</b>	<b>36.5</b>	16.3	<b>41.8</b>	<b>31.1</b>	<b>60.8</b>
For personal indoor and outdoor mobility and transportation	22.7	28.6	<b>36.1</b>	<b>33.3</b>	14.7	17.2	<b>61.5</b>	6.7	30.0	<b>50.6</b>	22.5	<b>58.5</b>
Social security, services, systems and policies	15.1	7.1	<b>34.5</b>	21.6	<b>35.4</b>	6.5	<b>59.7</b>	28.8	18.6	<b>62.3</b>	4.3	<b>70.4</b>
Transportation services, systems and policies	7.8	26.7	25.8	7.1	22.7	8.0	<b>56.1</b>	<b>39.2</b>	12.8	<b>54.7</b>	9.1	<b>62.5</b>
Personal care providers and personal assistants	8.2	<b>46.2</b>	<b>33.3</b>	20.0	5.3	18.2	30.0	9.4	14.6	<b>32.5</b>	<b>38.1</b>	<b>62.3</b>
General social support services, systems and policies	17.5	13.3	<b>40.0</b>	19.4	4.2	6.4	<b>61.3</b>	16.7	11.1	<b>45.0</b>	9.5	<b>63.4</b>
Individual attitudes of personal care providers and personal assistants	5.1	11.8	<b>36.8</b>	3.3	23.1	11.5	<b>35.7</b>	9.1	14.6	26.3	<b>43.5</b>	<b>58.1</b>
Products for communication	7.2	10.3	25.0	0.0	18.6	13.8	<b>58.5</b>	28.0	14.3	17.0	<b>35.7</b>	<b>42.5</b>
Communication services, systems and policies	3.1	3.3	20.6	0.0	21.9	13.2	<b>56.1</b>	<b>40.7</b>	17.0	11.3	0.0	<b>51.5</b>
Labour and employment services, systems and policies	5.5	0.0	20.0	0.0	<b>33.3</b>	8.0	<b>56.5</b>	13.8	13.3	18.9	12.5	27.8
People in position of authority	3.2	0.0	12.5	3.2	<b>33.3</b>	3.6	<b>48.3</b>	23.2	4.9	11.0	26.3	16.2
Education and training services, systems and policies	1.8	4.5	14.3	6.1	19.6	2.1	<b>56.5</b>	14.0	11.4	10.4	8.7	14.3
Societal attitudes	4.7	3.2	22.6	5.0	28.9	1.2	<b>32.7</b>	16.4	4.3	3.3	9.8	<b>31.4</b>
Legal services, systems and policies	0.9	0.0	3.7	2.7	19.7	0.0	<b>57.8</b>	10.5	2.3	7.5	4.3	<b>45.3</b>
Products of design, building and construction for public use	6.1	6.3	5.7	8.2	22.7	3.4	<b>58.5</b>	1.8	14.0	6.9	2.4	23.2
Products of design, building and construction for private use	6.5	6.3	8.6	14.0	4.4	2.3	<b>58.5</b>	3.5	12.0	8.0	7.1	20.6
Housing services, systems and policies	2.4	0.0	9.4	2.6	17.7	2.9	<b>56.1</b>	14.0	0.0	2.8	4.5	<b>39.3</b>
Social norms, practices and ideologies	0.8	0.0	19.4	0.0	<b>33.3</b>	0.0	<b>30.9</b>	16.7	4.3	1.1	7.9	22.6

LBP = low back pain; OP = osteoporosis; RA = rheumatoid arthritis; OA = osteoarthritis; CIHD = chronic ischaemic heart disease; COPD = chronic obstructive pulmonary diseases; DM = diabetes mellitus; BC = malignant neoplasm of breast; OB = obesity; Pain = chronic widespread pain; Dep = depressive disorder.

All values over 30% frequency are highlighted (**bold**). If only in 1 condition the category is over 30% the value is printed bold and *italicized*.

importance to patients. These aspects are often considered to be “non-specific” and are typically not included in studies involving patients with musculoskeletal conditions. Interestingly enough, only a few generic health status instruments (including the Nottingham Health Profile NHP (16)) address sleep specifically. It is also interesting and not a surprise to rehabilitation specialists, that *muscle power* was a common problem not confined to musculoskeletal conditions. Indeed, muscle power deteriorates in the general population with ageing (17) and is highly relevant for physical function (18).

While *family relationships* and *complex interpersonal interactions* as categories from *activities and participation* may have relevance to all patients with a health condition, they seem to be of utmost importance to patients with mental health conditions,

such as those with depression. Patients with chronic conditions such as chronic widespread pain also frequently show involvement of these categories.

In diabetes, there was no single common category despite the fact that we examined patients undergoing inpatient or outpatient rehabilitation. Indeed the endorsement of *activities and participation* categories for DM by this patient group was low. However, *lifting and carrying objects* and *intimate relations* seem to be relevant. This may relate to a stage that was not described in more detail in this study. Alternatively, patients with diabetes may have a broad range of problems, but not necessarily problems common to all patients. Future studies defining subsets of patients with a detailed description of disease stage and characteristics, and possibly the use not only

of performance but capacity qualifiers are needed to clarify this issue.

As expected, the common problems for patients after a stroke represented aspects of *basic learning, self-care, and general tasks and demands*. Similarly, for depression, aspects of purposeful sensory experiences, *interpersonal interactions and relationships* were important. *Recreation and leisure* was as important as *remunerative employment*, possibly reflecting the age distribution of our patients.

In *environmental factors*, the most common barrier is *climate*, which corresponds to the subjective experience of many patients living close to the Alps. The fact that *societal attitudes and social norms, practices and ideologies* was relevant to patients with depression, obesity, and chronic widespread pain indicates that we still have to go a long way to overcome social disability.

Interestingly, in our study population, patients with low back pain, rheumatoid arthritis and diabetes mellitus did not experience barriers listed in the ICF checklist. This is not consistent with a study by Oleske et al. (19). This may be related to the fact that the data collection was focusing on the current status. Barriers may not be as important during an inpatient or outpatient rehabilitation program.

The common facilitators referred to *health professionals, their attitudes and the health system*. This underscores the interdependency of patients with chronic conditions with the environment. The finding that the *immediate family* is an important general facilitator is consistent with some (20, 21) but in disagreement with other studies (19). For patients with diabetes mellitus, it was remarkable that they did not experience barriers but facilitators.

The generalizability of this study is limited. Patients in other settings and countries or with other disease characteristics may experience problems with a different frequency or another focus. However, based on studies in Germany using the SF-36, our patients are comparable to patients with chronic conditions reported by Bullinger et al. (22). For example, the reported medians in German patients with chronic lung diseases are 43.0 for the PCS and 49.7 for the MCS. This is close to the medians of 40.8 PCS and the 43.5 MCS found in our study. Similarly, the reported medians for cancer are 41.9 for the PCS and 48.7 for the MCS, which is again close to medians of 45.4 PCS and 40.3 MCS found in our study.

A potential limitation of our study is the selection of the conditions, including only depression as a mental health condition. To identify common patient problems across all conditions, more chronic mental health conditions, which carry a high burden of disease, may need to be taken into account. Furthermore, this study did not report systematically problems of co-morbidity, which, when present, remains a factor in determining the relative contribution to problems in function.

Since the aim of our study was to identify potentially common categories contained in the ICF-checklist, we could not systematically identify categories not listed. However, for some conditions, additional categories were noted to be important by the physicians and health professionals performing the study.

For example, in COPD *additional respiratory functions* would have been common. Similarly, *handling stress and other psychological demands* was missing for patients with low back pain. The currently developed ICF Core Sets will allow identification of categories that are relevant for a specific condition but are not included in the checklist.

This study is a first step towards identifying a Core Set of ICF categories that can be used across chronic health conditions. This parsimonious set of items will enable busy clinicians to rapidly evaluate functioning and disability across different health conditions in order to measure their impact. Further studies to improve the reliability and generalizability of these results are in progress. Nonetheless, this study has highlighted the fact that problems in functioning are common and, with training, easily identified by health professionals.

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