

# Which Aspects of Functioning Are Relevant for Patients with Ankylosing Spondylitis: Results of Focus Group Interviews

ANNELIES BOONEN, MONIQUE van BERKEL, ALARCOS CIEZA, GEROLD STUCKI, and DÉsirÉE van der HEIJDE

**ABSTRACT.** *Objective.* To investigate whether concepts important to patients with ankylosing spondylitis (AS) are covered by disease-specific self-report health status instruments.

*Methods.* A qualitative focus group study was conducted with AS patients on problems in daily functioning. Group sessions with 4 to 5 patients each were organized up to the point that no new information was brought forward. Group sessions were tape-recorded, transcribed, and divided into meaning units. Concepts contained in the meaning units were extracted. Self-report instruments on health status specific for AS were identified in a literature search. Using the International Classification of Functioning, Disability and Health (ICF) as a common reference, it was determined whether the concepts identified in the focus groups were covered by the instruments.

*Results.* Nineteen patients participated in 4 focus group interviews. In total, 332 unique meaning units were linked to 90 second-level ICF categories, of which 25 referred to body functions, 10 to body structures, 35 to activities and participation and 30 to environmental factors. In addition, several concepts relating to personal factors were identified. Only 47 categories were also covered by one of the self-report instruments in AS. Only a minority of concepts addressed by the AS-specific questionnaires were not revealed as relevant in the interviews.

*Conclusion.* Relevant aspects of the influence of AS are not covered by the classic disease-specific instruments. In particular, the influence of AS on socializing and leisure and the relevance of environmental and personal factors are not adequately assessed by available instruments. (First Release Oct 15 2009; J Rheumatol 2009;36:2501–11; doi:10.3899/jrheum.090156)

## Key Indexing Terms:

ANKYLOSING SPONDYLITIS      FUNCTIONING      FOCUS GROUPS  
INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH  
EXPERT PERSPECTIVE

From the Department of Internal Medicine, Division of Rheumatology, and Caphri Research Institute, Maastricht University Medical Center, Maastricht, The Netherlands; and the World Health Organization FIC Collaborating Center (DIMDI), IMBK, and Department of Physical Medicine and Rehabilitation, Ludwig Maximilians University, Munich, Germany.

A. Boonen, MD, PhD, Rheumatologist, Department of Internal Medicine, Division of Rheumatology and Caphri Research Institute, Maastricht University Medical Center; D. van der Heijde, MD, PhD, Professor of Rheumatology, Department of Internal Medicine, Division of Rheumatology and Caphri Research Institute, University Hospital Maastricht (currently, Department of Rheumatology, Leiden University Medical Center, Leiden, The Netherlands); A. Cieza, PhD, MPH, Psychologist, ICF Research Branch, WHO FIC Collaborating Center (DIMDI), IMBK, and Department of Physical Medicine and Rehabilitation, Ludwig Maximilians University; M. van Berkel, Medical Student, Faculty of Medical Sciences, University of Maastricht, Maastricht, The Netherlands; G. Stucki, MD, PhD, Professor, Department of Physical Medicine and Rehabilitation, and ICF Research Branch, WHO FIC Collaborating Center (DIMDI), IMBK, Ludwig Maximilians University.

Address correspondence to Dr. A. Boonen, Department of Internal Medicine, Division of Rheumatology, Maastricht University Medical Center, PO Box 5800, 6202 AZ Maastricht, The Netherlands.  
E-mail: a.boonen@mumc.nl

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Ankylosing spondylitis (AS) is prototypical for the group of inflammatory rheumatologic diseases referred to as the spondyloarthropathies. The prevalence in Caucasians ranges from 0.1 to 1.4 and the disease is diagnosed 3 times more often in men<sup>1,2</sup>. AS predominantly affects the axial skeleton, with inflammation of the sacroiliac joints and spine as the hallmark of the disease. In addition to the spinal inflammation, peripheral arthritis and enthesitis, uveitis, psoriasis, and inflammatory bowel disease can add to the burden of AS<sup>2</sup>. The impairments and limitations as a consequence of the disease manifestations are reflected in decreased health-related quality of life (HRQOL) including restrictions in participation in life situations<sup>3</sup>.

Several outcome domains and corresponding instruments have been proposed to evaluate the health status of patients with this disease for trials as well as clinical practice. Following an expert-driven consensus-building process and based on existing evidence from outcome research, the ASAS/OMERACT (ASsessments in Ankylosing Spondylitis/ Outcome Measures in Rheumatology) working group

selected a core set of domains and instruments to assess the influence of AS along intervention trials with physiotherapy or symptom-modifying drugs, with disease-modifying drugs, or for clinical record-keeping<sup>4</sup>. These core sets typically represent a minimal set of domains that are relevant to be assessed in these settings. In a broader perspective of functioning and health, other health domains are likely to be important. In particular, health domains that are relevant for patients have received little attention. It is essential to include the perspective of the patient because relevance for outcomes varies between and among patients and professionals<sup>5-8</sup>. Data allowing judgment of which aspects of functioning are important to patients with AS remain scarce.

In order to incorporate a comprehensive understanding of functioning into the assessment and management of chronic diseases, the International Classification of Functioning, Disability and Health (ICF) was endorsed by the World Health Assembly in order to enhance a universal approach to understand and classify functioning and health. The ICF framework adheres to the bio-psycho-social model of disease and recognizes that functioning and health result from a complex interplay of the health components body functions, body structures, activities and participation, and contextual factors, such as environmental and personal factors. In addition to the framework, the ICF also offers a universal and hierarchical classification of the elements (called categories) within each component that are necessary to classify functioning<sup>9,10</sup>. The framework and classification can be applied to all perspectives, including the different types of health professionals, researchers, decision makers, and also the patients.

Our aim was, first, to determine in a qualitative methodology the concepts important for functioning to patients with AS. Second, it was checked whether concepts important for patients are covered by the instruments included in the core set of outcomes of the ASAS/OMERACT working group or other disease-specific instruments. The ICF framework was used as the starting point to perform semistructured interviews with patients. The ICF universal classification was used as the interface when performing the content comparison of concepts important to patients and represented in disease-specific questionnaires.

## MATERIALS AND METHODS

A qualitative study was performed based on focus group interviews of patients with AS.

*Participants, sample size, and number of focus groups.* A list of 187 patients with AS according to the New York criteria<sup>11</sup> and registered in the rheumatology outpatient clinic of the Maastricht University Medical Center in 2006 was circulated among the rheumatologists. The treating rheumatologist confirmed whether his/her patient fulfilled modified New York criteria for AS and identified 5 patients he/she considered able to contribute in the focus group interviews. From the resulting list of 30 patients, preliminary groups of 5 patients were composed, assuring in each group diversity based on characteristics such as sex, age, disease duration, education level [primary school, secondary school, vocational (lower, middle or higher) or

university], work status (employed, work-disabled, home worker), profession (mainly manual opposed to mental workload), and AS related comorbidity. A diverse range of participants was needed to obtain the required level of rich and meaningful data<sup>12</sup>. The patients were contacted as a group and informed about the study procedures. Any patient not willing to participate was replaced by a similar patient from another group and groups were reconsidered again for diversity before patients were contacted for a new group. The number of new focus groups conducted was determined by saturation, i.e., the point at which an investigator obtained sufficient information from the field<sup>13</sup>. Saturation was defined as the point during data collection when the new focus groups revealed no additional concepts that were not obtained before.

*Interviews.* All focus groups were chaired by the same moderator (AB) with one assistant responsible for observation of the group and recording of data. Each focus group meeting was tape-recorded and transcribed verbatim by the observer. A short introduction of the purpose of the study was given in lay terms to all patients at the beginning of each focus group. Five open-ended questions were formulated around functioning in daily life based on the components of the ICF model. Patients were asked (1) which AS-related problems in the functioning of their body they were experiencing; (2) which body structures were involved; (3) which limitations of activities and restrictions in participation were significant to them; and (4) which environmental factors and (5) which personal factors were barriers or facilitators.

*Qualitative data analysis.* Qualitative data analysis followed the method of "meaning condensation"<sup>14</sup>: in the first step, the transcribed interviews were read by the first author for an overview of the collected data. Second, the data were divided into meaning units. A meaning unit was defined as a specific unit of text, either a few words or a few sentences with a common theme. Third, the concepts contained in the meaning units were identified. A meaning unit could contain more than one concept. A concept was defined as a meaningful entity distinct from other concepts. An example is the meaning unit, "due to the pain in my neck, I avoid driving long with the car," in which we identified the concepts "pain in the neck" and "driving a car." Meaning condensation was performed by AB, and to ensure validity the result was checked by a second author (MvB).

*Instruments.* Current disease-specific self-report instruments assessing functioning in AS were identified through a Medline search (1967-2006). Part of the literature search had been done in a previous study on content comparison of self-reported instruments on physical function in patients with AS<sup>15</sup>, but concentrated on "function," "physical function," or "functioning." An additional search was done with the key words "health status" or "health state" or "quality of life" in AS. Descriptive, evaluative, and psychometric studies in AS were selected. Case reports, economic evaluations, primary prevention studies, and reviews were excluded. Articles were selected that describe the use of self-report instruments, were published in a peer-reviewed journal, existed in an English-language version, and were feasible in a clinical setting. Finally, the ASAS/OMERACT publication on the Core Outcome Set for AS<sup>4,15</sup> was checked for additional outcome instruments. Self-report disease-specific instruments were chosen because this study focused on the perspective of patients, which is likely specific to a disease.

*Procedure to verify whether a concept was covered by an instrument.* For every concept obtained from the patient focus groups, we examined whether it was covered by the instruments. To perform this step, the ICF was used as external reference. Each concept obtained in the focus group was linked to the appropriate ICF category according to published linking rules<sup>16,17</sup> that have been used in qualitative studies<sup>8,18,19</sup>. According to these linking rules, every concept is linked to the most precise ICF category. If a concept was not contained in the ICF classification, it was assigned the category "not covered" (NC), such as the concept "exercising is important" in our study. In the hierarchical system of the ICF, there are categories of the second, third, and fourth levels. Third and fourth level categories are specifications (if applicable) of the second level categories. If several sec-

In order to ensure the validity of linking to the ICF of the focus interviews, a sample of 50% of concepts linked by MvB was independently linked by a second trained ICF specialist. The sample was not chosen randomly but was based on concepts considered difficult to link by the first linker. In case of disagreement this was discussed with a third trained ICF specialist (AC) and leader of the project (AB), and a decision was made based on consensus.

*Participants and focus groups.* After the fourth focus group, interview saturation was reached. Characteristics of the 19 participating patients are presented in Table 1. Fourteen (74%) patients were male; mean age was 54 years (SD 11.5, range 31–69), mean disease duration 18.7 years (SD 10.0, range 4–36). Ten patients (53%) had achieved a higher vocational or university degree. Fourteen patients were of working age, of which 3 (21%) were work-disabled because

**Literature search and instruments.** Four questionnaires were identified in the previous literature search on physical function in AS: the BASFI<sup>20</sup>, the DFI<sup>21</sup>, the RLDQ<sup>22</sup>, and the HAQ-S<sup>23</sup>. Three additional self-report instruments to assess health were derived from the ASAS/OMERACT Core Set of outcome measures<sup>24</sup>; the Bath AS Disease Activity Index (BASDAI)<sup>25</sup>, the patient global assessment of disease activity, and the patient global pain assessment (pain at night and pain in the spine). Further search of the literature revealed the ASOoL<sup>26</sup>.

The concepts were linked to a total of 148 ICF categories, representing 90 categories of the second level categories. Thirty-nine categories (25 at the second level)

Patient	Sex, Age, yrs	Disease Duration, yrs (diagnosis)	Highest Education	Employment	Peripheral Arthritis	AS-related Comorbidity	TNF Inhibitor
1	F 60	11	Primary school	Housewife	Yes	No	No
2	M 38	17	Middle vocational	Fulltime self-employed (salesman)	No	No	Yes
3	F 31	8	Higher vocational	Fulltime (waitress)	No	Yes	Yes
4	M 36	4	Higher vocational	Fulltime (clerk)	No	No	Yes
5	M 54	34	University	Work disabled (self-employed dentist)	No	No	Yes
6	M 52	8	Middle vocational	Fulltime self-employed (manager)	No	No	No
7	M 68	30	Higher vocational	Retired (miner)	Yes	Yes	No
8	M 65	36	Higher vocational	Retired (manager)	No	Yes	Yes
9	F 52	12	Higher vocational	Part-time self-employed (beautician)	Yes	No	Yes
10	F 48	15	Secondary school	Part-time employed (clerk)	No	Yes	Yes
11	M 56	18	Middle vocational	Self-employed (café owner)	No	No	Yes
12	M 64	32	Higher vocational	Retired age (chemist)	No	No	No
13	F 69	4	Higher vocational	Housewife	Yes	No	Yes
14	M 68	18	Lower vocational	Work disabled/retired	No	No	Yes
15	M 49	18	Lower vocational	Fulltime employed (farmer)	No	Yes	Yes
16	M 49	16	Lower vocational	Work disabled	Yes	No	No
17	M 59	25	Middle vocational	Self-employed (farmer)	Yes	No	No
18	M 69	20	Higher vocational	Early retired because of AS (banker)	No	No	No
19	M 46	30	University	Fulltime employed (medical doctor)	No	Yes	Yes

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belonged to body functions (Table 3), 18 categories (10 at the second level) to body structures (Table 4), 66 categories (35 at the second level) to activities and participation (Table 5), and 25 categories (20 at the second level) to environmental factors (Table 6).

Several concepts were related to the ICF component “personal factors,” which is not yet further specified in categories. In this component concepts related to accepting the disease and adapting to the disease and its wide range of consequences was a recurring theme in all groups. Overall, accepting and adapting were considered positive and helpful strategies. However, patients who currently experienced the beneficial effects of TNF inhibitors also recognized that accepting might have a negative consequence, since it could make you ignore the severity of disease and underestimate the possible benefits of more intensive treatments. Accepting and adapting are strategies patients develop when confronted with the need to adjust to the consequences of disease and specifically in these interviews included a series of positive aspects such as creating new purposes in life, adopting a healthier lifestyle, and creating time to do exercises and sports. Other strategies were efforts to keep the disease at a distance, taking regular rest, remaining optimistic, acquiring knowledge and self management skills, educating people in the direct environment about the disease, and concealing the disease from others. As well, trust in health professionals was repeatedly mentioned as important. It was also noted that those with better cognition and

those with greater financial resources had a position of advantage to deal with the consequences of the disease.

Some other concepts contained in the meaning units could not be linked to any of the ICF components (Table 2). These concepts differed from concepts that can unambiguously be linked to an ICF category because (1) they are really not covered by a specific ICF category (for example, posture) or (2) refers to a positive attitude to deal with disease (exercising is important).

*Comparison with the instruments.* Tables 4 to 6 present for each component of the ICF classification whether concepts identified in the interviews were also represented in each of the self-report instruments that assess disease-specific health status in AS. ICF categories are given in italic when the same category is represented by one of the questionnaires. When grouped at the second level, only 6 of 25 (24%) of body functions, 18 of 35 (51%) of activities and participation, and 6 of 20 (30%) of environmental factors were covered by self-report instruments. Only a limited number of second level categories were represented in the questionnaires and not mentioned in the interviews. The concepts “do you need help for eating” (d450: eating) from the HAQ-S, “can you cough or sneeze” (b450: additional respiratory functions) from the DFI, “can you turn in bed” and “can you roll over in bed” (d4201: transferring when lying) from the DFI and RLDQ, respectively, “AS limits places I can go” (d460: moving around in different locations) and “I am unable to join in activities with my

Table 2. Concepts not covered or no agreement on whether they were covered or not specified.

Concept	Best Option of Specification	Discussion
The change in my body posture	nc-s, nd	Change in body posture is the result of changes in different parts of joints and bones (vertebral column and possibly hips and knees)
Delay in diagnosis had an important influence on my life	nc-e	Points to health service delivery and medical knowledge and its implementation across professionals
Worrying about hereditary aspects	nc-a&p	“Worry” refers to an emotional function (b 152) and the total concept to d760: family relationships (creating and maintaining kinship relations)
Losing time because of disease	nc-a&p	Relates to chapter d2: general tasks and demands
Reduce the speed of activities	nc-b, nd-a&p, nc-pf	Relates to energy (b130), to chapter for general tasks and demands, but also the coping strategy (personal factor)
I need to take rest during the day	nc-b; nc-pf	Relates to energy level (b130) but also to a coping strategy (personal factor)
Resting provides new energy	nc-a&p; nc-pf	Relates to energy level but also to a coping strategy (formulated in a positive way)
Acquiring information is important	nc-pf; nc-e	Relates most closely to a coping strategy (personal factor). Relates also to health services (chapter e5)
Providing information to others is important	nc-pf; nc-e; nc-a&p	Relates most closely to a coping strategy (personal factor). Relates also to health services (Chapter e5) and relationships (Chapter d7)
Try to hide my disease from others	nc-pf; nc-a&p	Relates most closely to a coping strategy (personal factor). Points also to relationships (Chapter d7)
Exercising is important	nc-pf; nc-a&p	Relates most closely to a coping strategy (personal factor). Points also to health services (e580)
AS forces me to have a healthy lifestyle	nc-pf; nc-e	Relates most closely to a coping strategy (personal factor). Points also to health services (e580)
Feel that one misses a lot	nc-b; nc	Relates to emotional function (b152). Also points to several other concepts (energy, participation, etc.)

nc-s: not covered, structural factor; nc-e: not covered, environmental factor; nc-b: not covered, body function; nc-a&p: not covered, activity and participation. nc-pf: not covered: personal factor; nd: not defined.



Table 3. Categories in the component “Body Functions” identified after linking meaningful units reported during the focus interviews and their coverage (categories shown in *italic*) by AS-specific health status questionnaires.

ICF Chapters or Subchapters	Concepts	ICF Categories	DFI	BASFI	RLDQ	HAQ-S	ASQoL	BASDAI	Patient Global for Pain
b110–b139: Global mental functions	Optimism	b1265							
	Energy	b1300, b1302					X	X	
	Sleep	<i>b134</i> , b1342	X		X		X		
b140–b189: Specific mental functions	Sustaining attention	b1400							
	Emotions	<i>b152</i>					X		
	Judgment and problem-solving	b1645, b1646							
b210–b229: Seeing and related functions	Seeing and sensations; eyes	b210, 2153, b220							
b230–b249: Hearing functions	Hearing sounds too sharp	b230							
b280–b289: Pain	Pain in neck, back, chest, limb, joints, abdomen	<i>b28010</i> , b28011, b28012, b28013, b28014, b28015, b28016		X (= b289)		X	X	X	X
b430–b439: Functions of the hematological and immunological systems	Vulnerable to infections and allergies	b43501, b4351							
b440–b449: Functions of the respiratory system	Respiration	<i>b4402</i>	X (& b450)		X (= b450)				
	Exercise tolerance, fatigability	b455, b4552							
b510–b539: Functions related to digestive system	Diarrhea, weight loss, abdominal cramps	b525, b5256, b530, b5352							
b540–b559: Functions related to metabolism and endocrine system	Feeling too cold or too warm	b550, b5500							
b640–b680: Genital and reproductive functions	Sexual interest and performance	b640							
b710–b729: Functions of joints and bones	Mobility of joints and bones	b7100, b7101, b720							
b750–b789: Movement functions	Muscle cramps and muscle weakness	b755, <i>b760</i>		X					
	Gait pattern	b770							
	Stiffness	<i>b780</i>				X		X	

ICF: International Classification of Functioning, Disability and Health; DFI: Dougados Functional Index; BASFI: Bath AS Functional Index; RLDQ: revised Leeds Disability Questionnaire; HAQ-S: Health Assessment Questionnaire-Spondyloarthropathies; ASQoL: AS Quality of life instrument; BASDAI: Bath AS Disability Index.

Table 4. Categories of the component “Body Structures” identified after linking the meaningful units reported during the focus interviews.

ICF Chapter	Concepts	ICF Categories
s2: Structures of the eye, ear, and related structures	Eyeball	s220
s5: Structures of digestive, metabolic, and endocrine system	Intestine	
s7: Structures related to movement	Neck	s710, s7103
	Upper limb	s720, s7302, s73021
	Pelvic region	s740, s7401
	Lower limb	s7500, s75011, s7502, s75021
	Trunk	s760, s7600, s76002, s7701
s8: Skin and related structures	Skin	s810

friends/family” (d7500: informal relationships), both from the ASQoL, were not specifically identified during the inter-

views. In general it was striking that the HAQ-S contained several categories not identified in the interviews and that

Table 5. Categories in the component “Activities and Participation” identified after linking meaningful units reported during the focus interviews and their coverage (categories shown in *italics*) by AS-specific health status questionnaires.

ICF Chapters or Subchapters	Concepts linked to ICF Categories	ICF Categories Linked to the Concepts of Previous Column	DFI	BASFI	RLDQ	HAQ-S	ASQoL	BASDAI	Patient Global for Pain
d130–d159: Basic learning	Acquiring skills	d134							
d160–d179: Applying knowledge	Reading, solving problems, making decisions	d166, d175, d177							
d2: General tasks and demands	Carrying out routine	d23001							
	Managing one’s activity level, handling stress	d2303, d2401							
d410–429: Changing and maintaining body position	Sitting, standing, bending, standing up, prolonged standing or sitting	<i>d4100, d4101, d4103, d4104, d4105, d4106, d4150, d4153, d4154</i>	X (+ d4201)	X	X (+ d4109, d4201)	X			
d430–d449: Carrying, moving and handling objects	Lifting, pushing, reaching, fine hand use	<i>d4300, d4350, d440, d445, d4452, d4453</i>	X	X	X	X			
d450–d469: Walking and moving	Walking, running, swimming	<i>d450, d4501, d4552, d4554</i>	X (= d4551)	X (= d4551)	X	X (= d4502 & d4551)	X (= d460)		
d470–d489: Moving around using transportation	Using private and public transport	d470, d4701, d4702							
	Driving a car	d475, d4750, d4751				X			
d498–d499	Mobility other, unspecified	<i>d498</i>	X		X	X			
d5: self-care	Washing oneself	<i>d510</i>							
	Caring for body parts (washing hair, caring for toenails)	d5202, d5204			X	X	X		
	Toileting, dressing, drinking	<i>d530, d540, d5401, d5402, d5403, d560</i>	X (= d5400)	X	X (+ d5404)	X	X		
	Looking after one’s health	<i>d570</i>		X (= d5709)					
610–d629: Acquisition of necessities	Shopping	<i>d6200</i>				X			
d630–d649: Household tasks	Doing housework, cleaning	<i>d640, d6402</i>	X	X		X	X (= d6409)		
d650–d669: Caring for household objects and assisting others	Maintaining objects, furnishing, taking care of animals	<i>d650, d6501, d6505, d6506</i>		X (= d6509)		X (= d6509)			
	Assisting others	d6601							
d710–d729: General interpersonal interactions	Appreciation in relationships	d7101, d7102, d7104					X (= d710)		
d730–d779: Particular interpersonal relationships	Relationships with peers, partner, children, grandchildren	d7600, d7601, d7603					X (+ d7500)		
d840–d895: Work and employment	Seeking and maintaining employment	d8450, d850, d8501	X	X					
d9: Community, social, and civic life	Recreation and hobby	d9100, d920, d9200, d9201, d9204		X (= d9209)					
	Socializing	d9205							

For abbreviations, see Table 3.

refer to impairments in the function of the hands including “fine hand uses,” “twisting,” and “picking up.” A third level specification that was included in the BASFI, DFI, and

HAQ-S but that was not raised in the interviews was related to “climbing stairs” (d4551: climbing).

It is notable that in the ASQol two concepts were identi-

Table 6. Categories in the component “Environmental Factor” identified after linking meaningful units reported during the focus interviews and their coverage (categories shown in *italic*) by AS-specific health status questionnaires.

ICF Chapter	Concepts	ICF Categories	DFI	BASFI	RLDQ	HAQ-S	ASQoL	BASDAI	Patient Global Pain
e1: Products and technologies	Drugs	<i>e1101</i>				X			
	Aids and adaptations (home, work, transportation)	<i>e1151, e1201, e1351</i>	X	X		X			
	Accessibility of buildings	<i>e150, e155</i>				(+ e135)			
	Financial assets	<i>e165, e1650</i>							
e2: Natural and human made changes to the environment	Cold and humidity	<i>e225, e2250, e2251</i>							
e3: Support and relationships	From family, friends, colleagues, employer, health professionals, and society	<i>(e3), e310, e320, e325, e330, e335, e340, e355</i>	X	X (e3)		X			
e4: Attitude	From family, friends, colleagues, employer, health professionals, and society	<i>e410, e425, e460</i>							
e5: Services, systems, and policies	Health services, employment systems, and services	<i>e5800, e5801, e590, e5901</i>							

For abbreviations, see Table 3.

fied that could not be linked to any ICG category (not covered; NC) and these are not included in any of the Tables 3 to 6 — “I have to keep stopping what I’m doing to rest,” and “I feel I miss out a lot.” Both concepts were also mentioned by the patients during the interviews.

## DISCUSSION

This focus group study is the first qualitative attempt to comprehensively determine the perspective of patients with AS. The present view on outcome is largely driven by evidence-based knowledge, which usually represents the perspective of clinical researchers. Increasingly, the importance of the patient perspective in health outcomes research is recognized, and differs in several aspects from the perspective of clinicians and researchers<sup>7,27</sup>. In this quantitative research, patients came up with a large number of concepts, supporting the relevance of the ICF framework for the patients’ perspective. We also found that some concepts important to people with AS are not adequately covered by standard self-report instruments that are developed to assess health in AS. The majority of disease-specific instruments for outcome assessment in AS have definitely proven their value, but we should realize they concentrate on limited aspects of functioning and health, such as physical functioning in the BASFI, DFI, HAQ-S, and RLDQ, or pain, stiffness, and fatigue in the BASDAI and patient globals. The ASQoL instrument has the broadest view on functioning and health, but still misses some areas that were relevant to patients, such as limitations in sustaining attention or solving problems and restrictions in recreation or socializing. Patients repeatedly highlighted the role of personal factors to adjust to the disease, and optimism, accepting, adapting (i.e., finding creative solutions), gaining insight into the dis-

ease, and trust in health professionals were frequently mentioned. These areas are not considered in usual questionnaires. Although it was primarily our aim to evaluate whether aspects relevant for functioning were covered by disease-specific instruments, we also compared the categories from the focus interview by other health-related quality of life instruments (Appendix). Including these questionnaires would slightly raise the coverage of patient perspective with regard to participation issues, but at the expense of limitations in body functions and activities specific for the disease.

Although qualitative research has evident advantages, there are also limitations. When we prepared the focus group interviews, care was taken to cover the entire spectrum of patients with AS, by selecting patients with a broad range of demographic and disease characteristics. Some concepts that were revealed were the individual experience of an individual patient. For example, “hearing sounds too sharp” was mentioned by one patient, who experienced this phenomenon systematically when experiencing fatigue in episodes of flare. Other concepts that were mentioned were clearly linked to typical AS-related comorbidities such as difficulties because of bowel problems, visual functions, and structures of the skin in patients with inflammatory bowel disease, uveitis, or psoriasis, respectively. It is recognized that these comorbidities occur only in subgroups of patients, but these should not be neglected as they can add considerably to the impact of the disease on functioning. Also, all patients were recruited from one center, which would challenge the generalizability and especially the transferability of findings across cultures. Specifically for participation, differences of environment and personal factors across cultures can be expected. In future research on

patients' perspectives, transferability across cultures should receive more attention. An ICF classification that is specific for a disease does not imply that it is necessary to assess all

categories in every patient. Therefore, in addition to the qualitative study, more quantitative data are needed. Also, new techniques such as item response theory (IRT) and

**APPENDIX.** Categories identified during the interviews and coverage by generic health-related quality of life instruments.  
**Appendix Ia.** Categories of the components *Body Functions* identified in the focus group interviews and coverage by generic health-related quality of life instruments.

ICF chapters or subchapters	Concepts identified in the interviews	ICF categories linked to the concepts	SF-36	EQ-5D	NHP	WHO-DASII
b110-b139: global mental functions	Optimism	b1265				
	Energy	b1300, b1302	X		X	
	Sleep	b134, b1342			X	
b140-b189: specific mental functions	Sustaining attention	b1400				x
	Emotions	b152	X	X	X	X
	Judgement and problem solving	b1645, b1646				
b210-b229: seeing and related functions	Seeing and sensations eyes	b210, 2153, b220				
b230-b249: hearing functions	Hearing sounds too sharp	b230				
b280-b289: pain	Pain in neck, back, chest, limb, joints, abdomen	b28010, b28011, b28012, b28012, b28013, b28014, b28015, b28016	X	X	X	
b430-b439: functions of the haematological and immunological systems	Vulnerable to infections and allergies	b43501, b4351				
b440-b449: functions of the respiratory system	Respiration	b4402			X (b450*)	
	Exercise tolerance, fatiguability	b455, b4552				
b510-b539 : functions related to the digestive sytem	Diarrhea, weight loss, abdominal cramps	b525, b5256, b530, b5352				
b540-b559: functions related to metabolism and the endocrine system	Feeling too cold or too warm	b550, b5500				
b640-b680: genital and reproductive functions	Sexual interest and performance	b640				
b710-b729: functions of the joints and bones	Mobility of joints and bones	b7100, b7101, b720				
b750-b789: movement functions	Muscle cramps and muscle weakness	b755, b760				
	Gait pattern	b770				
	Stiffness	b780				

SF-36: Short Form 36 items; EQ-5D: EuroQol 5 dimensions; NHP: Nottingham Health Profile; WHO-DAS: WHO Disability Assessment Schedule; \*b450; additional respiratory functions.

**Appendix Ib.** Categories of the components *Activities and Participation* identified after linking the meaningful units reported during the focus interviews and inclusion in other self-reported generic health related quality of life instruments.

ICF chapter or subchapters	Concepts identified in the interviews	ICF categories linked to the concepts	SF-36	EQ-5D	NHP	WHO-DASII
d130-d159: basic learning	Acquiring skills	d134				X
d160-d179: applying knowledge	Reading, solving problems, making decisions	d166, d175, d177				X
d2: general tasks and demands	Carrying out routine,	d23001	X	X		X
	managing one's activity level, handling stress	d2303, d2401				
d410-429: changing and maintaining body position	Sitting, standing, bending, standing up, prolonged standing or sitting	d4100, d4101, d4103, d4104, d4105, d4106, d4150, d4153, d4154	X	d4 (mobility)	x	
d430-d449: carrying, moving and handling objects	Lifting, pushing, reaching, fine hand use	d4300, d4350, d440, d445, d4452, d4453	X		X	



d450-d469: walking and moving	Walking, running, swimming	d450, d4501, d4552, d4554	X	X	X	
d470-d489: moving around using transportation	Using private and public transport,	d470, d4701, d4702				
	driving a car	d475, d4750, d4751				
d498 – d499	Mobility other-unspecified	d498				
d5: self-care	Washing oneself	d510		x		
	Caring for body parts (washing hair, caring for toenails)	d5202, d5204,				
	Toileting, dressing, drinking	d530, d540, d5401, d5402, d5403, d560	X		X	X
	Looking after one's health	d570				
d610-d629: acquisition of necessities	Shopping	d6200				
d630-d649: household tasks	Doing housework, cleaning	d640, d6402	X	X (unspecified)	X	X
d650-d669: caring for household objects and assisting others	Maintaining objects, furnishing, taking care of animals	d650, d6501, d6505, d6506,			X	
	Assisting others	d6601				
d710-d729: general interpersonal interactions	Appreciation in relationships	d7101, d7102, d7104				
d730-d779: particular interpersonal relationships	Relationships with peers, partner, children, grandchildren	d7600, d7601, d7603			d7	X
d840-d895: work and employment	Seeking and maintaining employment	d8450, d850, d8501	X	X (unspecified)	X	X
d9: community social and civic life	Recreation and hobby	d9100, d920, d9200, d9201, d9204	X	X (unspecified)	X	X
	Socializing	d9205	X			

SF-36: Short Form 36 items; EQ-5D: EuroQol 5 dimensions; NHP: Nottingham Health Profile; WHO-DAS: WHO disability Assessment Schedule; \*b450; additional respiratory functions.

**Appendix Ic.** Categories of the components *environmental factor* identified after linking the meaningful units reported during the focus interviews and inclusion in other self-reported generic health related quality of life instruments.

ICF chapter	Concepts identified in the interviews	ICF categories linked to the concepts	SF-36	EQ-5D	NHP	WHO-DASII
e1: products and technologies	Drugs	e1101			X	
	Aids and adaptations (home, work, transportation)	e1151, e1201, e1351				
	Accessibility of buildings	e150, e155				
	financial assets	e165, e1650				
e2 natural and human made changes to the environment	Cold and humidity	e225, e2250, e2251				
e3 support and relationships	From family, friends, colleagues, employer, health professionals and society	(e3), e310, e320, e325, e330, e335, e340, e355			X	
e4 attitude	From family, friends, colleagues, employer, health professionals and society	e410, e425, e460				X
e5 Services, systems and policies	Health services, employment systems and services	e5800, e5801, e590, e5901				

SF-36: Short Form 36 items; EQ-5D: EuroQol 5 dimensions; NHP: Nottingham Health Profile; WHO-DAS: WHO Disability Assessment Schedule; \*b450; additional respiratory functions.

computer adaptive testing (CAT) can help to identify categories that are redundant, give no additional information, or

are only relevant in some patient groups, and can help to identify a more limited number of ICF categories relevant

for particular patients<sup>28</sup>. Preliminary data on IRT in interviews with the preliminary ICF checklist in AS showed that only 3 items showed a negative misfit — d560: drinking, d6200: shopping, and d830: higher education. This means that these categories give no additional information (local dependency or redundancy) when measuring the level of difficulty on the measure “functioning”<sup>28</sup>. However, it does not mean these items cannot have importance in individual patients and does not exclude that remaining items are inter-related or dependent on each other. Graphically represented statistics offer possibilities to see how items/categories are related. It is clear that many concepts, i.e., those referring to participation and environmental and personal factors, are not unique for patients with AS. Comparison in the future of the concepts/categories that are common across musculoskeletal diseases can allow development of common instruments to assess these aspects and common strategies to improve them. This kind of approach could at the same time explore possible differences across cultures.

It must be emphasized that this qualitative research is intended to identify “what is important” for patients, and does not aim to create a new instrument. The ICF classification was found to be fairly complete in covering the concepts raised by the patients. The notable concepts that could not be linked to the ICF were the impairments as a consequence of postural changes and the influence of late diagnosis on the course of the disease, which could not be covered at that level of specification<sup>8,19,29</sup>.

The findings of our study are not only of interest for clinical researchers that develop and improve instruments to assess functioning, but also for clinicians when assessing patients in clinical practice: it is important to recognize and discuss all limitations and restrictions experienced by the individual patient. Physicians likely tend to concentrate on their own perspective and ignore problems important to patients, particularly the effects of AS on socializing and leisure and the relevance of environmental and personal factors. Therefore, the list of ICF categories important for patients might help to broaden the scope of problems in functioning with AS for researchers and for physicians. The main challenge is to determine which aspects revealed in this study and not covered in AS-specific or general-use HRQOL instruments — including which subgroups of patients (sex-specific, working age, stage of disease) and which settings (clinical practice, educational programs, observational studies, non-drug intervention trials) — should now receive attention.

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