

# International Classification of Functioning, Disability and Health (ICF) Core Set for patients with vertigo, dizziness and balance disorders<sup>1</sup>

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**Abstract.** Vertigo, dizziness and balance disorders have major impact on independence, employability, activities and participation. There are many measures for the assessment of the impact of vertigo, but no consensus exists on which aspects should be measured. The objective of this study was to develop international standards (ICF Core Sets) for patients with vertigo and dizziness to describe functioning.

The development of the ICF Core Sets involved a formal decision-making and consensus process, integrating evidence from preparatory studies including qualitative interviews with patients, a systematic review of the literature, a survey with health professionals, and empirical data collection from patients.

Twenty-seven experts selected 100 second level categories for the comprehensive Core Set and 29 second level categories for the Brief Core Set. The largest number of categories was selected from the ICF component Activities and Participation (40). Twenty-five categories were selected from the component Body Functions, six from Body Structures, and 29 from Environmental Factors.

The ICF Core Set for vertigo is designed for physicians, nurses, therapists and other health professionals working in inpatient or ambulatory settings. ICF Core Sets create patient-relevant outcomes that can be used as evidence for the success of treatments.

**Keywords:** Vertigo, dizziness, quality of life, activities of daily living, social participation

## 1. Introduction

Vertigo, dizziness and balance disorders are major symptoms of health conditions affecting the vestibular and central nervous system. They can have a major impact on independence, employability, activities of daily living and overall quality of life. Lifetime prevalence

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of moderate to severe vertigo symptoms in the general population is 20 to 40% [19]; many report associated disability, psychological problems, or avoidance behaviour [26]. Even without acute symptoms patients are disabled because of the worry associated with anticipating the next episode. Taking into account all relevant aspects of functioning from the patients' perspective is therefore essential to evaluate new treatments and to convey the prognosis of the disease.

There are many measures for the clinical assessment of the impact of vertigo and dizziness, but no clear consensus on which measures are the most appropriate or which aspects should be measured regularly. Existing scales have a limited spectrum, unresolved psychometric problems [15] or do not take into account all potential aspects of disability encountered with vertigo [1, 9].

Important for the optimal management of vertigo is an in-depth understanding and reliable measurement of its consequences. To meet this requirement, a comprehensive framework and classification is needed which can serve as a universal language understood by clinicians, researchers and patients alike. With the approval of the International Classification of Functioning, Disability and Health or ICF by the 54th World Health Assembly in May 2001, we have the ICF model that is accepted worldwide and describes and classifies functioning, health and disability [23]. Since the ICF is designed to record and organize a wide range of information about health and health-related states both for individuals and populations, it is applicable both for clinical practice and research. It is likely that the ICF, with its components Body Functions and Structures, Activities and Participation, and Environmental Factors, will become the universal framework in medicine. The classification, with more than 1400 categories to describe and classify functioning, has to be tailored to the needs of the prospective user, without forgoing the information needed for health statistics and health reporting. To address issues of feasibility regarding the number of categories to be assessed and the user perspective, which typically consists of a health condition and/or situation perspective, the ICF Core Set project was initiated in 2001. ICF Core Sets are selections of categories from WHO's International Classification of Functioning, Disability and Health (ICF) that describe the most relevant and the most common aspects of functioning as well as the most relevant environmental factors for persons with specific health conditions or in specific settings [10]. To date, there are more than 30 ICF Core Sets, and some of them focus on

neurological disease [11,12]. Since functioning is an important outcome in vertigo and dizziness, it would be most helpful to map this group of health conditions to salient ICF categories of functioning. Such generally agreed-on lists of ICF categories can be brief to serve as a description of the functioning of a patient in brief clinical encounters or in research, or they can be comprehensive to guide multidisciplinary assessment and treatment.

The objective of this study was to develop international standards (ICF Core Sets) for patients with vertigo and dizziness to describe functioning in research and clinical practice, integrating evidence from preparatory studies and input from experts. The ICF Core Set for patients with vertigo and dizziness is designed for physicians, nurses, therapists and other health professionals working in inpatient or ambulatory settings.

## 2. Methods

The development of the ICF Core Sets for vertigo and dizziness involved a decision-making and consensus process integrating evidence collected from preparatory studies. The detailed methods and their rationale have been reported elsewhere [10]. In this study, a Comprehensive ICF Core Set and a Brief ICF Core Set were established. The Brief ICF Core Set is intended to be a short list of categories and serves as the minimal standard for assessment and description of functioning and disability in clinical studies or in clinical practice, e.g., for communication across the continuum of care or for clinical documentation. The Comprehensive ICF Core Set is designed to serve as a basis for full assessment and documentation, mainly in the context of multidisciplinary care or advanced care planning.

The ICF classification is hierarchically organized with increasing levels indicating increasing degree of detail. Categories are denoted by an alphanumeric code starting with a lower case letter indicating the component, i.e., b for Body Functions, s for Body Structures, d for Activities and Participation and e for Environmental Factors. The letters are followed by a numeric code for the chapter number (one digit, first level), followed by the second level (two digits), and the third and fourth level (one digit each).

The process of developing ICF Core Sets for vertigo and dizziness included four preparatory studies and a consensus conference. The four preparatory studies collected data on functioning and disability using different perspectives:

- (1) Cross-sectional study: A quantitative study included 200 patients and represented the clinical (epidemiological) perspective. The study yielded the prevalence of impairments, limitations, and restriction of various aspects of functioning as proposed by the ICF.
- (2) Qualitative interviews: Patients were asked to talk about how their health condition affected their lives. Meaningful concepts were extracted from the interviews and linked to ICF categories. This study represented the perspective of the patient.
- (3) Systematic literature review: Outcome measures were retrieved from studies focusing on vertigo and dizziness; these outcome concepts were analyzed and then linked to the ICF. This represented the perspective of the researcher.
- (4) International expert survey: This study represented the health professionals' perspective. 188 international experts identified by authorship, recommendation and membership with an average experience of 12 years in the area of vertigo were asked to fill out an online survey regarding the most relevant aspects of functioning in vertigo. These aspects were extracted and linked to the ICF. Experts were selected to represent the WHO world regions.

The results of all studies led to a pool of 134 second level categories (i.e., codes with the component letter followed by three digits) that were potentially relevant to the affected patients. Consensus about which categories to be included in the ICF Core Sets was then reached by a structured process of group and plenary sessions.

Participants for the consensus conference were chosen based on their expertise in the management of vertigo and dizziness, representing four WHO world regions. In line with the literature on consensus building and team work, the ICF Core Set consensus conference was organized at a quiet monastery, distant from cities and distractions. After introduction and training in the concepts of the ICF, the participants identified those ICF categories considered to be relevant to patients with vertigo and dizziness.

Participants were provided with the evidence from the preparatory studies. Throughout the conference participants were advised that their decisions should be based on this evidence in combination with their personal clinical experience and expertise. The information included summary sheets of the individual studies and a list of the ICF categories identified by any study.

Methods and results of the preparatory study were also presented orally and on posters. Items from the chapter Work and Environment were presented to the participants both as individual items and as a group of items. The decision to present these items in this manner was engendered by the preparatory expert survey and by the patient interviews wherein it was common that the items in the Work and Environment chapter were identified as a group rather than only as individual items.

The decision-making process consisted of two parts. In the first part, the participants decided which categories should be included in a Comprehensive ICF Core Set. In the second part, the participants ranked the chosen categories included in the Comprehensive ICF Core Set according to relevance to persons with vertigo, resulting in the Brief ICF Core Set. In the first step of the consensus process, each participant was assigned to a working group (WG). There were three WGs. Each WG was guided by a WG coordinator (AB, JF and DZ). Votes, as well as the key arguments, were recorded online by a group assistant using a database. Group assistants were not allowed to vote. WG coordinators were asked to cast their vote after the group in order to avoid any influential voting. The experts discussed and voted for or against inclusion of the ICF categories (Vote A). The results of all three WGs were then combined and presented in a plenary session. Categories that received less than 40% of all votes were eliminated at this stage. Categories that received more than 75% of all votes were included in the ICF Core Set. After discussions in the plenary session, the participants rejoined the WGs for further discussions and a second decision (Vote B) on the ambiguous categories. The results of Vote B were again presented and discussed in a second plenary session. The final decision (Vote C) on the as yet still undecided ICF categories (40–75% in vote A and B) was then made in this plenary session. A category was included in the ICF Core Set during Vote C if it received at least 50% yes votes. Also, ICF categories not included in the initially proposed categories could be introduced, discussed and voted on at this stage.

In the second part of the decision-making process, the experts were asked to assign ranks from 10 to 0 (10 = most relevant category, 0 = least relevant categories) to all categories of the comprehensive ICF Core Set, separately for each component. Ranks were then summed and ordered according to rank sum. A cut-off for the Brief ICF Core Set was determined based on this ranking and on the decisions of the expert participants about the number of categories to include for each component.

Table 1

International Classification of Functioning, Disability and Health (ICF) – Categories of the component Body Functions included in the Vertigo Comprehensive Core Set. Vote A, B, C indicate the stage of the process at which a category was selected (votes A and B were made in the working groups, vote C was made in the final plenary session). The categories marked with X were included in the Brief Core Set

ICF	Category description	Vote	Brief Core Set
	<i>Chapter: Mental functions</i>		
b126	Temperament and personality functions	A	
b130	Energy and drive functions	A	
b134	Sleep functions	B	
b140	Attention functions	A	
b144	Memory functions	C	
b152	Emotional functions	A	X
b156	Perceptual functions	A	X
b180	Experience of self and time functions	C	
	<i>Chapter: Sensory functions and pain</i>		
b210	Seeing functions	A	X
b215	Functions of structures adjoining the eye	A	X
b230	Hearing functions	B	X
b235	Vestibular functions	A	X
b240	Sensations associated with hearing and vestibular function	A	X
b260	Proprioceptive function	A	X
b265	Touch function	C	
b280	Sensation of pain	A	
	<i>Chapter: Functions of the cardiovascular, haematological, immunological and respiratory systems</i>		
b410	Heart functions	C	
b420	Blood pressure functions	A	
b455	Exercise tolerance functions	A	
b460	Sensations associated with cardiovascular and respiratory functions	A	
	<i>Chapter: Neuromusculoskeletal and movement-related functions</i>		
b710	Mobility of joint functions	B	
b730	Muscle power functions	B	
b735	Muscle tone functions	C	
b760	Control of voluntary movement functions	B	
b770	Gait pattern functions	A	X

Table 2

International Classification of Functioning, Disability and Health (ICF) – Categories of the component Body Structures included in the Vertigo Comprehensive Core Set. Vote A, B, C indicate the stage of the process at which a category was selected (votes A and B were made in the working groups, vote C was made in the final plenary session). The categories marked with X were included in the Brief Core Set

ICF	Category description	Vote	Brief Core Set
	<i>Chapter: Structures of the nervous system</i>		
s110	Structure of brain	A	X
s120	Spinal cord and related structures	A	X
	<i>Chapter: The eye, ear and related structures</i>		
s260	Structure of inner ear	A	X
	<i>Chapter: Structures of the cardiovascular, immunological and respiratory systems</i>		
s410	Structure of cardiovascular system	A	X
	<i>Chapter: Structures related to movement</i>		
s710	Structure of head and neck region	A	
s750	Structure of lower extremity	B	

### 3. Results

Twenty-seven experts participated in the consensus conference, including 19 physicians, four physical therapists, one occupational therapist, one sports scientist, one psychologist, one expert in medical physics and vestibular disorders. The 19 physicians specialized in neurology, otolaryngology, audiology, psychiatry, and oto-neurology.

Preparatory studies identified 134 second level categories. The resulting Comprehensive ICF Core Set included 100 second level categories. Tables 1 to 4 show the selected categories, the chapter of the ICF to which each category belongs, and the stages of the process at which the categories were selected. The largest number of categories was selected from the ICF component Activities and Participation (40). Twenty-five categories were selected from the component Body Func-

Table 3

International Classification of Functioning, Disability and Health (ICF) – Categories of the component Activities and Participation included in the Vertigo Comprehensive Core Set. Vote indicates the stage of the process at which a category was selected (votes A and B were made in the working groups, vote C was made in the final plenary session). The categories marked with X were included in the Brief Core Set

ICF	Category description	Vote	Brief Core Set
	<i>Chapter: Learning and applying knowledge</i>		
d110	Watching	A	
d115	Listening	C	
d160	Focusing attention	A	
d166	Reading	A	
	<i>Chapter: General tasks and demands</i>		
d220	Undertaking multiple tasks	A	
d230	Carrying out daily routine	A	X
d240	Handling stress and other psychological demands	A	
	<i>Chapter: Communication</i>		
d350	Conversation	C	
d360	Using communication devices and techniques	B	
	<i>Chapter: Mobility</i>		
d410	Changing basic body position	A	X
d415	Maintaining a body position	A	X
d420	Transferring oneself	C	
d430	Lifting and carrying objects	B	
d445	Hand and arm use	C	
d450	Walking	A	X
d455	Moving around	A	X
d460	Moving around in different locations	A	X
d465	Moving around using equipment	A	
d469*	Walking and moving, other specified and unspecified	C	X
d470	Using transportation	A	
d475	Driving	A	X
	<i>Chapter: Self-care</i>		
d510	Washing oneself	B	
d540	Dressing	B	
	<i>Chapter: Domestic life</i>		
d620	Acquisition of goods and services	B	
d630	Preparing meals	B	
d640	Doing housework	A	X
d650	Caring for household objects	B	
d660	Assisting others	B	
	<i>Chapter: Interpersonal interactions and relationships</i>		
d740	Formal relationships	B	
d750	Informal social relationships	B	
d760	Family relationships	B	
d770	Intimate relationships	B	
	<i>Chapter: Major life areas</i>		
d825*	Vocational training	C	
d830*	Higher education	C	
(d840–d859)	<i>Chapter: Work and employment</i>	A	X
d845	Acquiring, keeping and terminating a job	A	
d850	Remunerative employment	A	
d855	Non-remunerative employment	B	
	<i>Chapter: Community, social and civic life</i>		
d910	Community life	A	
d920	Recreation and leisure	A	

\*Categories introduced in the final plenary session.

tions, six from Body Structures, and 29 from Environmental Factors. In the second plenary session (Vote C), participants proposed and voted on three additional categories to be included in the comprehensive set that had not been proposed initially by the preparatory studies (*Vocational training* d825, *Higher Education* d830,

*Walking and moving, other specified and unspecified* d469). One category had been dropped in Vote A but was reintroduced by Vote C (*Societal attitudes* e460).

The chapters with the highest number of categories selected for the Comprehensive ICF Core Set were *Mental functions* (8) and *Sensory functions* (8) from

Table 4

International Classification of Functioning, Disability and Health (ICF) – Categories of the component Environmental Factors included in the Vertigo Comprehensive Core Set. Vote indicates the stage of the process at which a category was selected (votes A and B were made in the working groups, vote C was made in the final plenary session). The categories marked with X were included in the Brief Core Set

ICF	Category description	Vote	Brief Core Set
	<i>Chapter: Products and technology</i>		
e110	Products or substances for personal consumption	A	X
e115	Products and technology for personal use in daily living	B	
e120	Products and technology for personal indoor and outdoor mobility and transportation	B	X
e125	Products and technology for communication	B	
e150	Design, construction and building products and technology of buildings for public use	B	
e155	Design, construction and building products and technology of buildings for private use	A	
	<i>Chapter: Natural environment and human-made changes to environment</i>		
e240	Light	B	X
e250	Sound	A	
e255	Vibration	C	
	<i>Chapter: Support and relationships</i>		
e310	Immediate family	A	X
e315	Extended family	B	
e320	Friends	B	
e325	Acquaintances, peers, colleagues, neighbours and community members	A	
e330	People in positions of authority	B	
e340	Personal care providers and personal assistants	C	
e355	Health professionals	A	X
	<i>Chapter: Attitudes</i>		
e410	Individual attitudes of immediate family members	A	
e415	Individual attitudes of extended family members	B	
e420	Individual attitudes of friends	B	
e430	Individual attitudes of people in positions of authority	A	
e440	Individual attitudes of personal care providers and personal assistants	C	
e445	Individual attitudes of strangers	B	
e450	Individual attitudes of health professionals	A	
e460	Societal attitudes	A	
	<i>Chapter: Services, systems and policies</i>		
e515	Architecture and construction services, systems and policies	B	
e540	Transportation services, systems and policies	A	
e570	Social security services, systems and policies	B	
e580	Health services, systems and policies	A	X
e590	Labour and employment services, systems and policies	A	

the component Body Functions, *Mobility* (12) from the component Activities and Participation, and *Attitudes* (8) from the component Environmental Factors.

The Brief ICF Core Set contained 29 categories, nine from the component Body Functions, four from the component Body Structures, 10 from the component Activities and Participation, and six categories from the component Environmental Factors. The Brief ICF Core Set is shown in Table 5. Figures 1 a-d show the results of the ranking process for all components along with the final cut-off. The Brief ICF Core Set contained categories that accounted for 82% of the total rank score sum for the component Body Functions, 75% for Body Structures, 64% for Activities and Participation and 52% for Environmental Factors.

#### 4. Discussion

A nominal consensus process based on expert knowledge and integrating results of preparatory studies re-

sulted in the Brief and Comprehensive ICF Core Set for vertigo, dizziness and balance disorders. This approach is new insofar as it gives a comprehensive picture of the components of disability and impact of disease on functioning based on the unifying framework and model of the ICF.

From the component Body Functions, not surprisingly, categories from the chapters *Mental functions* and *Sensory functions* were emphasized. Attention, memory and perceptual deficits are likely to be associated with vestibular disease [22]. The selection of energy and drive functions and emotional functions is in accordance with the literature on psychological problems in persons with vertigo and dizziness, e.g., depression and anxiety [25,26]. The impact of the sudden onset of vertigo during the night on the quality of sleep was discussed and regarded as relevant by conference participants. Among sensory functions, the category *Functions of structures adjoining the eye* (b215) was included specifically to account for nystagmus. The

Table 5

International Classification of Functioning, Disability and Health (ICF) – Categories of the Brief Vertigo Core Set. Vote indicates the stage of the process at which a category was selected (votes A and B were made in the working groups, vote C was made in the final plenary session)

ICF	Category description	Vote
b152	Emotional functions	A
b156	Perceptual functions	A
b210	Seeing functions	A
b215	Functions of structures adjoining the eye	A
b230	Hearing functions	B
b235	Vestibular functions	A
b240	Sensations associated with hearing and vestibular function	A
b260	Proprioceptive function	A
b770	Gait pattern functions	A
d230	Carrying out daily routine	A
d410	Changing basic body position	A
d415	Maintaining a body position	A
d450	Walking	A
d455	Moving around	A
d460	Moving around in different locations	A
d469*	Walking and moving, other specified and unspecified	C
d475	Driving	A
d640	Doing housework	A
(d840–d859)	Work and employment	A
e110	Products or substances for personal consumption	A
e120	Products and technology for personal indoor and outdoor mobility and transportation	B
e240	Light	B
e310	Immediate family	A
e355	Health professionals	A
e580	Health services, systems and policies	A
s110	Structure of brain	A
s120	Spinal cord and related structures	A
s260	Structure of inner ear	A
s410	Structure of cardiovascular system	A

\*Categories introduced in the final plenary session.

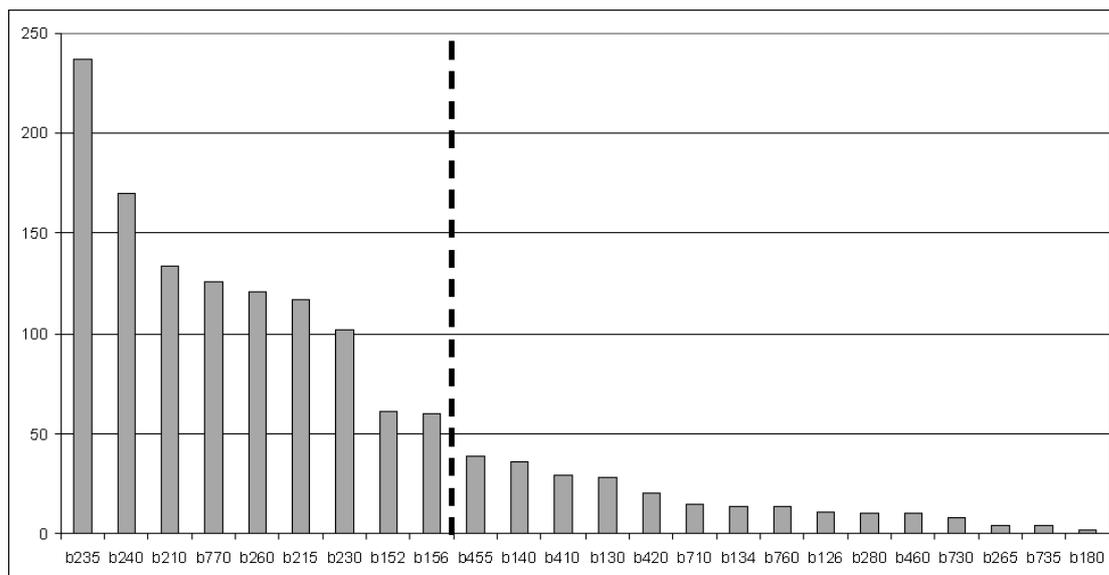


Fig. 1A. Ranking results of the component Body Functions. The Y-Axis indicates the sum of ranks assigned to the respective category. The dashed line indicates the final cut-off for the Brief ICF Core Set. Categories that received no ranks are not shown (b144).

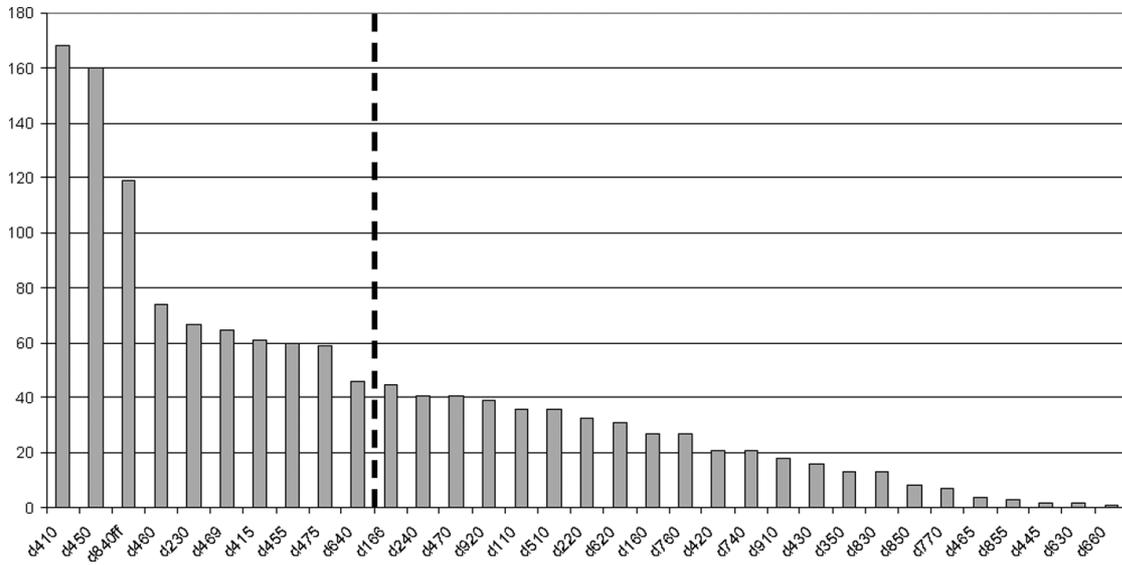


Fig. 1B. Ranking results of the component Body Structures. The Y-Axis indicates the sum of ranks assigned to the respective category. The dashed line indicates the final cut-off for the Brief ICF Core Set.

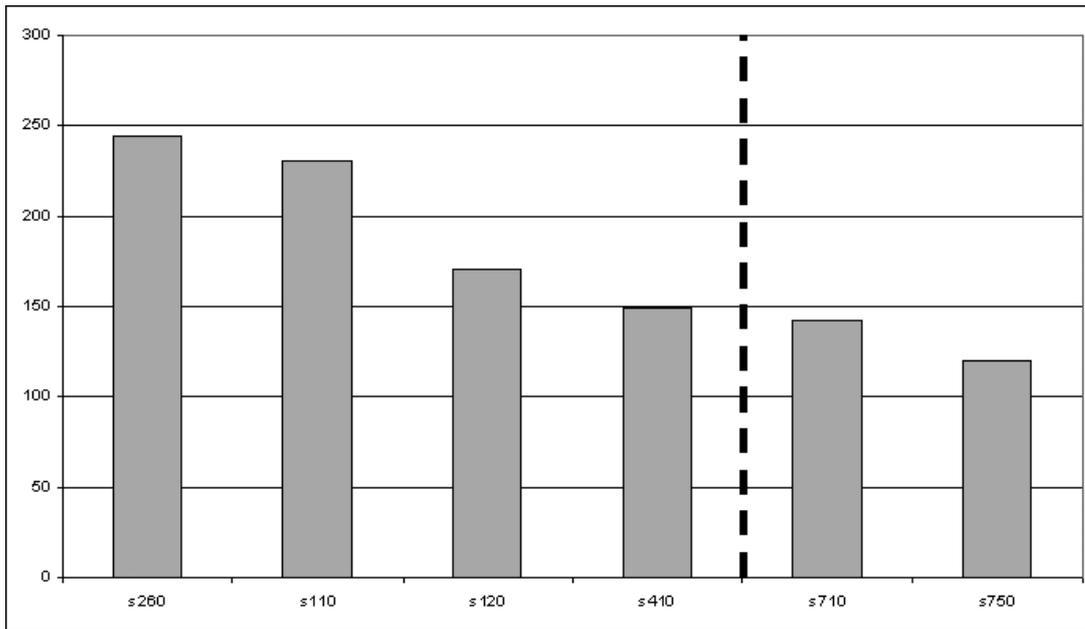


Fig. 1C. Ranking results of the component Activities and Participation. The Y-Axis indicates the sum of ranks assigned to the respective category. The dashed line indicates the final cut-off for the Brief ICF Core Set. Categories that received no ranks are not shown (d115, d360, d540, d650, d750, d825, d845).

category *sensation of pain* was included to address neck pain. *Touch functions* were interpreted as relating to proprioception and balance and therefore included.

The selected categories of the component Body Structures refer to peripheral vestibular, central nervous system and cardiovascular origin of disease. The high

agreement about many Body Functions and most Body Structures already given in Vote A supports the face validity of those categories.

The broad coverage of categories from the component Activities and Participation demonstrates the importance given to this component by most health pro-

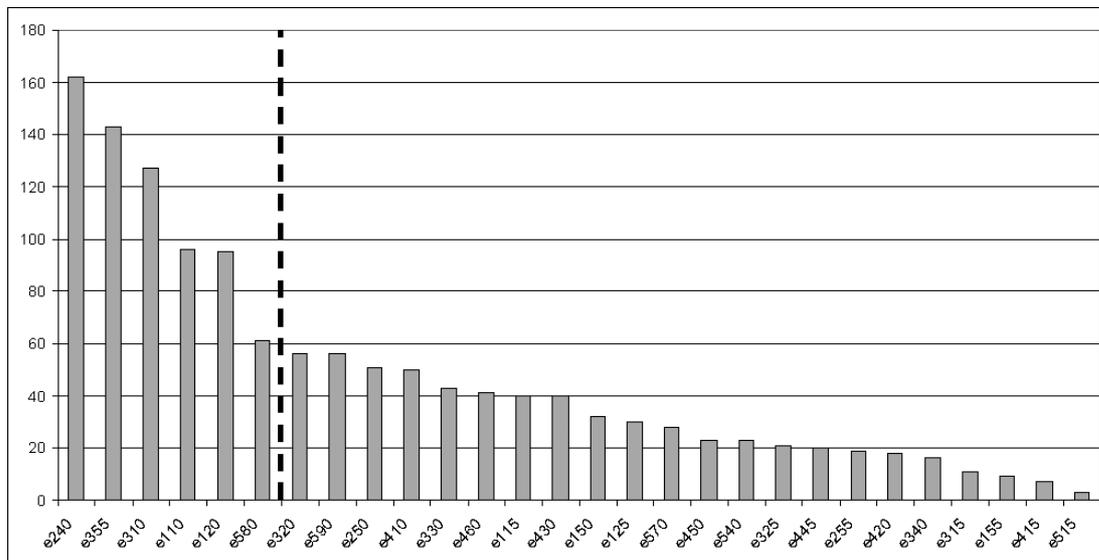


Fig. 1D. Ranking results of the component Environmental Factors. The Y-Axis indicates the sum of ranks assigned to the respective category. The dashed line indicates the final cut-off for the Brief ICF Core Set. Categories that received no ranks are not shown (e440).

professionals. Specifically, the impact of vertigo on activities of daily living is well described in the literature [6, 24], showing considerable consequence for social participation and work [5]. To give an example, in a representative study, up to 20% of persons with vertigo reported avoiding leaving the house [18].

In total, 12 categories referring to mobility were included; the category *Walking and moving, other specified and unspecified* (d469) was included after an animated discussion. This category encompasses the complex action of walking while turning the head, which was mentioned as a triggering situation. Driving [8, 20], household activities and shopping [2] were included as essential activities most likely limited in persons with vertigo. Categories from the chapters *Mobility* and *Work and employment* were mostly accepted with Vote A on the level of the working groups. The block *Work and employment* (d840–d859) was unanimously included along with three of the categories contained in that chapter. *Vocational training* (d825) and *Higher education* (d830) were proposed and included in Vote C.

Although the environment itself is not amenable to change by therapy, the Environmental Factors component was considered as most important, either as a facilitating factor (e.g., products and technologies such as walking aids) or as triggers or barriers. The construction of buildings or the characteristics of natural surroundings [3] creating disorienting visual clues [21] or the movement of large objects, disorienting lights or sounds [4] were mentioned as examples.

The consensus process used here has potential limitations. One concern in the beginning of the consensus process was that a dissident opinion of one working group would not survive the plenary session. This, however, proved to be one of the strengths of the process. An argument of a group that was strong and provided enough evidence was able to turn around the decision of the other participants. To give an example, *Sensations associated with the digestive system*, specifically nausea (b535) received 62% affirming votes in Vote A with two working groups being strongly in favour. After discussion this category fell to 7% affirmation in Vote B, because this category was seen to represent the gastrointestinal rather than the vestibular aspects of nausea and vomiting. Another potential limitation may have been the choice of experts. The organizers of the conference took care in the selection of experts. Nevertheless, not all world regions could be represented, and some areas of expertise may have been underrepresented. Although the results have high face validity, the ICF Core Set requires further testing and validation. Creating a Brief ICF Core Set was straightforward concerning Body Functions and Body Structures, but decision on a reduction of the number of categories of the components Activities and Participation was more difficult. This is illustrated in Figs 1a, b, c, d. While the participants agreed in assigning high ranks to a few categories from Body Functions, the ranks for Activities and Participation and Environmental Factors were more widespread. It remains to be determined empiri-

cally if this Brief ICF Core Set captures the most salient issues of vertigo and dizziness.

Other scales examining functioning in vertigo and dizziness are available [5,7,13,14,16,17,25]. Recently, a scale based on the Activities and Participation component of the ICF was proposed [1]. These measures are usually more restricted in their aims and scope than the effort of the ICF Core Set development reported here. However, it has to be kept in mind that ICF Core Sets are not measures. They are list of codes indicating what to measure but not how to measure. How to select appropriate measurement instruments based on ICF Core Sets requires several decisions, e.g. on the level of detail (single item or item battery), on the addressee (self-report by patient or clinical assessment by health professional), or on the desired psychometric qualities (sensitivity for change, discrimination). New measures can be created by modifying or adding items to existing measures. New items can be written based on ICF categories. Some categories, e.g., from the component Body Functions, will have to be expanded for more detailed assessment; some will have to be compressed for reasons of feasibility. For the purpose of item writing, the participants of this consensus conference recommended creation of blocks of important but similar categories such as the categories from the chapter *Attitudes*. Despite content validity, new items and new scales based on the ICF Core Set for vertigo still have to undergo extensive testing to prove their reliability and validity clinically.

In conclusion, the ICF Core Set for vertigo and dizziness provides health professionals with a framework to assess patients comprehensively in inpatient and ambulatory settings. We envision that the ICF Core Set will be used to evaluate the contents of existing measures and to create new measures of functioning. ICF Core Sets create patient-relevant measures and outcomes that can be used as evidence for the success of treatments.

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