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Development of a New Questionnaire to Assess Patient Perceptions of Cancer-Related Fatigue: Item Generation and Item Reduction

Eva Baró, BSc,[1] Joan Carulla, MD,[2] Javier Cassinello, MD,[3] Ramón Colomer, MD,[4,5] Jesús García Mata, MD,[6] Pere Gascón, MD,[7] José Antonio Gasquet, PhD,[8] Michael Herdman, MSc,[1] César A. Rodríguez, MD,[9] Jordi Sánchez, BSc,[8] Vicente Valentín, MD[10]

[1]3D Health Research, Barcelona, Spain; [2]Hospital General Mateu Orfila, Menorca, Spain; [3]Hospital Universitario de Guadalajara, Guadalajara, Spain; [4]Institut Català d'Oncologia, Girona, Spain; [5]Centro Oncológico MD Anderson, Madrid, Spain; [6]Complexo Hospitalario de Ourense, Orense, Spain; [7]Hospital Clínic de Barcelona, Barcelona, Spain; [8]Amgen S.A., Barcelona, Spain; [9]Hospital Clínico Universitário de Salamanca, Salamanca, Spain; [10]Hospital Doce de Octubre, Madrid, Spain

ABSTRACT

Objectives: Existing instruments that measure the impact of cancer-related fatigue on health-related quality of life do not usually incorporate the attitudes, beliefs and perspectives of patients. This study aimed to develop an instrument to measure the impact of cancer-related fatigue on the health-related quality of life of cancer patients.

Methods: Items were generated from a literature review, focus groups of cancer patients and meetings with oncologists. Potential items were administered to cancer patients to facilitate item reduction, which was based on clinimetric and psychometric analyses and qualitative criteria. A preliminary assessment of feasibility, reliability and validity of the retained items was performed.

Results: An initial pool of 75 items was administered to 238 cancer patients. Fifty items were eliminated after statistical analysis and 13 in response to expert opinion, resulting in a provisional instrument with 12 items in 3 dimensions. These displayed acceptable internal consistency (Cronbach's alpha, 0.78–0.92) and their overall score was associated with fatigue intensity, extent of disease, intention of treatment and need of caregivers.

Conclusion: The newly developed questionnaire, which measures the impact of cancer-related fatigue on oncology patients, has shown satisfactory feasibility, reliability and validity.

Keywords: cancer, development, fatigue, quality of life, questionnaire.

Introduction

Fatigue is a frequently reported complaint in cancer patients and survivors, and has been defined as "a persistent, subjective sense of tiredness related to cancer that interferes with usual functioning" [1]. A recent survey found that 76% of patients experience fatigue for at least a few days each month during chemotherapy, 30% experience fatigue on a daily basis, 91% of those who experience fatigue report that it prevents a "normal" life and 88% report that fatigue causes changes in their daily routine [2]. The magnitude of their cancer-related fatigue is perceived to be greater than the tiredness sometimes felt by healthy individuals and is not relieved by rest [3]. One study reported that fatigue has a greater impact on the quality of life than pain or depression, symptoms also frequent in cancer patients [4].

Several questionnaires are available that measure the intensity, frequency and duration of fatigue, whereas others aim to measure the impact of fatigue on a patient's quality of life [5–10]. Fewer instruments are available that measure the patient's beliefs and attitudes about cancer-related fatigue, even though this type of information may be useful in patient management [11]. The use of patient-reported measures in the daily practice of oncology has also been shown to be helpful in improving patient–physician communication in daily clinical oncology practice [12,13], although this is a relatively new study environment in which there are many matters of interest, pending solutions, within clinical practice and research [14].

Up to now, none of the existing instruments that measure the impact of cancer-related fatigue has been developed with Spanish-speaking patients, which may be important because the usual practice of adapting existing measures for use in other languages does not guarantee the inclusion of issues relevant to patients in the target population [15,16]. Similarly, many existing instruments that measure cancer-related fatigue have been developed for use in clinical research rather than in clinical practice, and their length, content, scoring system or psychometric properties may limit their applicability to routine use with individual patients.

The aim of this study was to develop an instrument to measure patient perceptions of the cancer-related fatigue and its treatment that would be suitable for use in clinical practice.

Material and Methods

The three main phases of the project consisted of 1) item generation; 2) item reduction and testing of the structural validity and internal consistency of the instrument with the data collected in the first field study using a sample of target patients; and 3) the assessment of the psychometric properties of the final version, with the data collected from a second field study, with another sample of target patients. Because of the amount of information

Address correspondence to: Eva Baró, 3D Health Research, Pl. Tetuán 40–41, 1° of. 19, 08010 Barcelona, Spain. E-mail: ebaro@3d-hr.com
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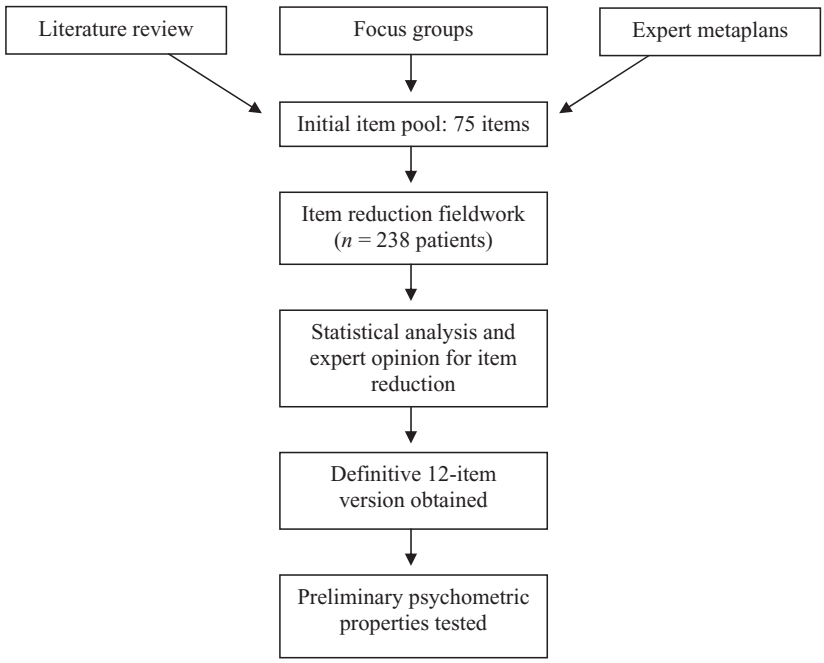

Figure 1 Overview of study procedures. This figure helps to have a general view of the main end points achieved along the project, since the initial design of item content until the obtainment of the prevalidated 12-item version of the perform questionnaire.

collected, this article reports the main results of the first two steps of the overall project. An overview of the procedures applied is shown in Figure 1.

Item Generation

The content of the questionnaire was developed from 2004 to 2005 from a literature review, focus groups and expert opinions from oncologists and experts in the development of patient-reported outcomes (PRO) measures. The literature review was performed using several electronic sources including the US National Cancer Institute Web site and the MEDLINE database (1966–2004), with the keywords: fatigue, asthenia, questionnaire, scale, instrument, oncology, cancer, assessment, measure, measurement, expectations, relief, satisfaction, perceptions and worries. The articles located were searched manually for further relevant articles. A citation was selected for review when it referred to either the use or development of PRO instruments that measured the impact of cancer-related fatigue or its treatment, or patients' expectations, beliefs and concerns about cancer-related fatigue. For each questionnaire located, the following data were reviewed: instrument's name, target population, item number, dimensions, response scale and time frame. The review of instruments was mainly intended to identify the usual questionnaire content at the domain level, and to provide information on aspects that could be useful for constructing the final version of our questionnaire, such as time frames, response options and instructions.

The initial consultation with experts took place in two meetings, one in Barcelona and one in Madrid. We used a structured brainstorming technique to establish the experts' views on the potential content, usefulness and characteristics (such as length, mode of administration and scoring) of the new questionnaire. Experts attending the meetings included clinical specialists and experts in the development and testing of PRO measures. The main areas discussed were the ways patients experienced and dealt with cancer-related fatigue, their main concerns relating to the symptoms, the possible uses of the questionnaire from the clinician's point of view and general questionnaire characteristics that would make it practicable for use in standard clinical practice.

Two focus groups were conducted of patients who had experienced cancer-related fatigue at any time during the course of their disease. A convenience sample was used with a relatively small number of participants because the concept to be measured was considered to be relatively restricted [17]. Participants were chosen to ensure a broad range of clinical and socio-demographic characteristics, and patients in both focus groups gave their consent to participation. Both sessions were led by a moderator (a member of the research team), assisted by a script developed specifically for this purpose, which included aspects identified as relevant in the literature review and during the meetings with the clinical experts. The meetings were recorded on audiocassettes and transcribed for subsequent analysis.

Transcripts from the focus groups were analysed using content analysis by two of the study team members. The results of this content analysis were used to develop an initial list of possible items for inclusion in the questionnaire. The words and phrasing used by focus group members were retained wherever possible.

The initial list of items was reviewed in a third meeting with oncologists and experts in the development of PRO measures. Items considered unsuitable for inclusion in the questionnaire because of clinical irrelevance, redundancy of item content, ambiguous content, or lack of face validity were omitted. An agreement was reached by using "the last two weeks" as the time frame for the items. This led to the creation of an item pool for quantitative item reduction.

Item Reduction

Study design and participants. Items considered as candidates for inclusion in the final version of the questionnaire were administered to oncology patients with cancer-related fatigue in an observational, cross-sectional, multicenter study performed between January and April 2005 in the oncology or palliative

care departments of 25 Spanish hospitals. Each center included consecutive patients more than 18 years of age, with a diagnosis of cancer (any site and period of disease duration, as long as they were capable of completing the study questionnaires) and self-rated cancer-related fatigue of ≥30 mm on a 100 mm visual analogue scale (VAS) at the time of the study visit [18]. All patients provided their informed consent to participation in the study. The study was conducted according to the Declaration of Helsinki.

Data were collected on the patient's sex, age, level of education and level of family care required. The clinical characteristics recorded included the primary tumor type, extent of the disease, time since diagnosis, Karnofsky or Eastern Cooperative Oncology Group score or both on inclusion, intensity of cancer-related fatigue measured on a 100 mm horizontal VAS, type of cancer treatment and presence of associated symptoms or comorbidities. Information on the mode of administration of the questionnaire (interview or self-administration) was also collected.

All patients included in this phase of the study were asked how frequently they experienced the situation presented in each of the items and whether the item was important to them. For example, the patient might be asked both how often he or she "had been tired all day long" and how important this feeling was. Patients rated the frequency and importance of items on 5-point scales ranging from "never" to "always" and "not at all important" to "very important." Given that the patients responding to the items in the item pool would be experiencing cancer-related fatigue, the order of administration of the items was varied to ensure that responses were obtained for all items.

Statistical analysis. Item reduction involved a series of steps: 1) missing responses were analysed and items with >20% of responses missing were excluded; 2) the response distribution was analysed and items for which >50% of respondents checked the same response category were excluded; 3) the frequency and importance scores were analysed for each item. In this part of the item reduction process, the product of the frequency and importance scores (the "impact" score) was obtained for each item and then ranked according to this product, so that only the items that were reported most frequently or were important to patients were retained for further analysis; 4) exploratory factor analysis using principal component analysis with varimax rotation was used to explore the questionnaire structure and item loadings and to identify factors with Eigen values of >1; 5) the relationships between all items and their posited scales were analysed by the calculation of corrected item–scale correlations and the analysis of the impact on Cronbach's alpha values when individual items were deleted. Items with an item–scale correlation of ≤0.20 and items that reduced the Cronbach's alpha value of their scale were excluded; and 6) the results of Rasch analysis, a form of item response theory analysis [19] were used to support a final round of item elimination at a meeting of the study team.

Using the data collected in the item reduction study and with the aim to explore the potential suitability of using the measure in clinical practice, a preliminary validation of the retained items was performed. In accordance with the cross-sectional design of the study, the following analyses were done. An exploratory factor analysis, using principal component analysis without rotation, was carried out to explore the structure and item loadings, and to identify the factors with Eigen values of >1. After the recommendations set out in the literature [20,21], the overall score for the final version of the questionnaire was obtained by adding the scores from all the items, and the score for each dimension was obtained by adding the scores for the items in that dimension. For individual patients included in the study, scores for a given dimension was not calculated when the dimension had any item missing. The final score for a scale was not calculated when the dimension score could not be obtained. Feasibility was assessed using the following indicators: completion rate (percentage of respondents with no missing data) and missing patient answers per item. The distribution of the overall and dimension scores was described by calculating score range and floor/ceiling effects (the proportion of patients with the worst and the best possible score, respectively). Reliability for the overall score and dimension score was assessed in terms of internal consistency using Cronbach's alpha.

Known groups' validity was tested by determining whether the instrument was able to discriminate between patient groups likely to differ in patient perceptions of the cancer-related fatigue: cancer-related fatigue intensity, the extension (metastasis, loco regional or local) of the disease, whether patients were still having cancer treatment or in a follow-up phase, the intention (curative, adjuvant, palliative) of the treatment and having a caregiver for daily life were the tested independent variables.

Results

Item Generation

The literature review identified 35 citations that were considered potentially relevant to the study. A review of the corresponding documents identified 30 instruments (27 PRO questionnaires and 3 epidemiological survey instruments) that had been developed to measure patient-reported aspects of cancer-related fatigue. The questionnaires ranged from a single item to 40 items, and the number of dimensions ranged from 1 to 7. Almost all the instruments identified focused on aspects such as the intensity, frequency and duration of fatigue, although some also measured one or more of the following: quality of life, distress, psychological impact and impact on motivation or activity and barriers to patient–physician communication.

Nine oncologists and two experts in the development of PRO measures attended the two meta-plan sessions to generate the initial ideas for the development of the questionnaire. Asked to consider the three main issues addressed in the meta-plan sessions and the way patients cope with and experience cancer-related fatigue, the participants mentioned the following as the most relevant questions for patients: access to and the need for information about cancer-related fatigue, the impact of cancer-related fatigue on a patient's quality of life, the search for alternative therapies, fatigue as a symptom of worsening underlying illness (cancer) and patient–doctor communication. When asked to consider how they thought the questionnaire might be useful to them in clinical practice and the characteristics that it should have, the participants thought that the questionnaire should be useful in both clinical research and practice, particularly for patient follow-up, and that it might help improve the doctor–patient communication. The participants thought that the new instrument should be easy to score and use, and that it should fit onto one page and be visually attractive. Most thought it should contain no more than 10–12 items with a time frame spanning the "last two weeks" and that administration should be "flexible," i.e., suitable for both self- and interview administration.

Most participants in the focus groups were patients with breast cancer, although some patients had other types of cancer, such as head cancer, neck cancer or lung cancer. All the patients included were experiencing cancer-related fatigue at the time of the focus groups or had experienced the symptom in the recent past. The themes that emerged from the focus groups included the following. It is important to distinguish between fatigue resulting from the disease itself, fatigue resulting from treatment

and fatigue associated with the psychological aspects of dealing with the cancer (motivation to keep going despite the cancer). The questionnaire should also document the way in which patients experience the disease, particularly the fact that cancer-related fatigue makes patients too tired to do things even when they want to. Patients noted that family, friends and colleagues could not really grasp their situation, and that in addition to the considerable impact on functioning and daily activities, the psychological and cognitive aspects related to fatigue were also important. Patients would like their families, friends and colleagues, as well as medical staff, to have greater understanding of their situation. They would also like more information on their fatigue and how to deal with it.

Content analysis of the focus group transcripts, together with input from the literature review and the meta-plans, led to the development of an initial pool of 75 items. The items included were grouped according to their meaning within the following areas of interest: mental attitude (7 items), social and family life (15 items), psychological impact (12 items), physical functioning (12 items), daily life activities (12 items) and beliefs and attitudes (17 items). To minimize the risk of producing a bias in the item selection due to the physical location within the pool (e.g., competitive disadvantage of the items at the end of the pool accumulating more missing results or greater inconsistency in their responses), the order of presentation of the areas of interest mentioned previously by which the items were grouped differed between the patients, in the way that all the studied patients responded to the same content but with a different order of appearance.

Item Reduction

The initial pool of 75 items was administered to 238 cancer patients. The sample characteristics are shown in Table 1. The mean age of the patient sample was 57 years (standard deviation 11.7) and 56% were female. The most frequent type of cancer was breast cancer (30%), followed by lung cancer (18.1%); 30.3% of the patients had been diagnosed less than 6 months before, but 64% of patients had metastasis. Sixty-three percent of the patients presented a moderate fatigue level and the rest a severe one. Most (62.6%) of the sample were receiving palliative care, 18.5% were receiving adjuvant treatment and 10.1% curative treatment. Ninety-five percent of the sample responded to at least 85% of the items.

Sixty-three of the initial 75 items included in the item reduction phase were eliminated. The reasons for their elimination and the number of items eliminated at each stage of the item reduction process are shown in Figure 2. The greatest number of items (n = 35) was eliminated in the first stage of the item reduction process based on their "impact" scores; the 40 items with the highest "impact" scores were retained (see Table 2). Fifteen items were eliminated because of low "item–total correlations" psychometric parameter (≤0.20) in a three-step process: five items were removed initially, another two items were removed after factor analysis because they correlated only weakly with the dimensions identified by factor analysis and a further five items were removed after factor analysis because they correlated only weakly with the new, reduced version of the overall scale. In the final stage of item reduction, 13 items were eliminated either because they correlated highly with each other or because Rasch analysis indicated the existence of redundancy in terms of item difficulty. The decision about which items to retain when redundancy or high correlations occurred was based on the relative clinical relevance of the items and, in at least one case, on the potential inappropriateness of the language used (Estoy hecho polvo—I have felt "shattered").

Table 1 Demographics and disease characteristics of patients involved in quantitative item reduction

	All patients (N = 238)
Women, n (%)	133 (56)
Age (years), mean (SD)	57.2 (11.7)
Educational level (%)	
No formal education	39 (16.5)
Primary education	82 (34.7)
Secondary education	61 (25.8)
University, or similar	54 (22.9)
Time from primary diagnosis (%)	
<6 months	72 (30.3)
6 to 12 months	29 (12.2)
12 to 24 months	39 (16.4)
>24 months	78 (32.8)
Primary tumor type, n (%)	
Breast	73 (30.8)
Lung	43 (18.1)
Gastrointestinal	42 (17.7)
Ovarian	12 (5)
Prostate	10 (4.2)
Esophageal	10 (4.2)
Other	48 (20.2)
Extent of disease, n (%)	
Metastasis	154 (64.9)
Loco regional	40 (16.8)
Local	43 (18.1)
Type of cancer treatment, n (%)	
Chemotherapy	187 (78.6)
Monoclonal antibodies	13 (5.5)
Hormone therapy	13 (5.5)
Radiotherapy	21 (8.8)
No treatment	14 (5.8)
Other	78 (32.8)
Principal symptoms, n (%)	
Anemia	110 (46.2)
Pain	82 (34.5)
Anxiety or depression	81 (34)
Sleep complaints	41 (17.2)
Malnutrition	29 (12.2)
VAS fatigue level on inclusion, n (%)*	
Moderate (30–60 mm)	150 (63)
Severe (>60 mm)	87 (36.6)
Karnofsky score on inclusion, mean (SD)	72.3 (20.2)

*Fatigue was measured on a 100 mm horizontal VAS. Patients rating between 0 and 30 were not included in the study according to the inclusion criteria of the study. Patients in the study were stratified as having a moderate or severe level of fatigue based on previous recommendations [18].
SD, standard deviation; VAS, visual analogue scale.

An additional factorial analysis was done on the 12 retained items (see Table 3) that showed a unique factor that explained the 53% variance. Item loading values ranged from 0.669 to 0.806 with the exception of two items with loading values of 0.491 and 0.583. The 12 items were grouped by domains on the basis of the investigators' experience. The final instrument for preliminary validation consisted of 12 items distributed in three dimensions: physical function (items 1–4), activities of daily living (items 5–8) and beliefs or attitudes (items 9–12).

Preliminary Validation

Table 4 shows the score distributions, floor/ceiling effects, completion rate and internal consistency for the 12 items retained. 22.7% of the sample had at least one item missing of the 12 retained. Floor/ceiling effects were negligible (<5%) in all dimensions and for the overall score. The highest floor/ceiling effect was seen in the "Activities of daily living" dimension, which had a ceiling effect of 3.4%. Cronbach's alpha values were more than 0.70 for the overall score and for all dimensions.

Table 5 shows the results of testing the known groups' validity of the 12-item scale. Patients with a higher level of

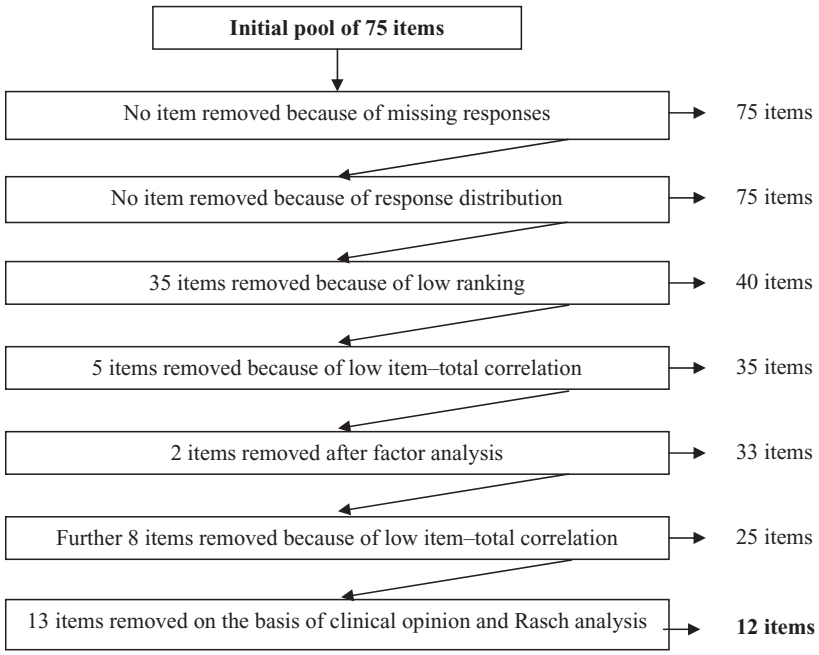

Figure 2 Items eliminated at different stages of the item reduction process. This figure helps to understand the criteria used for deleting items, and how we arrive from the initial pool of 75 until the final 12-item version of the perform questionnaire. At the same time, it shows the relevance of the criteria used.

cancer-related fatigue had statistically significant (P-value < 0.001) worse (lower) scores than did patients with a moderate level of cancer-related fatigue, both in overall score and dimension scores (dimension activities of daily living P-value < 0.05). The difference with respect to the overall scoring between patients with moderate fatigue and those with severe fatigue was >6 points on a scale with a range of 48 points, which represents a difference in scores of >10%. Clinical variables, such as extent of disease or treatment, also showed associations with the scoring on the 12-item scale. In particular, the patients with very localized cancer scored better (P-value < 0.05) in the overall scoring than did those patients with more extensive disease or metastasized disease, which was confirmed in the beliefs and attitudes dimension and showed up as a not statistically significant tendency in the physical limitations dimension. The patients not undergoing any kind of treatment scored much better (45.29) in the overall scoring than those patients undergoing some kind of treatment (36.36) (P-value < 0.01), which could also be confirmed in the physical limitations dimension (P-value < 0.05). Consistent with the aforementioned, the patients undergoing curative treatment scored almost 7 points worse (lower) in the overall scoring than did the patients undergoing adjuvant treatment, perhaps because of the aggressiveness of the curative treatment, which represents a difference of almost 15% between extreme groups. This could also be confirmed in the beliefs and attitudes dimension. Last, the 12 items retained discriminated between the patients who needed a caregiver and those who didn't, both in the overall scoring (P-value = 0.001) and in all the scale dimensions (P-value = 0.016–0.006).

Discussion

To the best of our knowledge, ours is the first study to create an instrument that measures cancer-related fatigue taking into account Spanish-speaking patient perspectives and that therefore may have specific cultural and linguistic affinities. Often, tools are originally developed in English-speaking countries and later on are translated and used in other non-English-speaking countries. On the contrary, the initial development of the present measure was done with Spanish subjects (in Spain). Because the difference between the Castilian Spanish spoken in Spain and that spoken in Latin America or even the United States are relatively small, the tool can be adapted for use in different Spanish-speaking cultural contexts, providing that a suitable cultural adaptation methodology is followed [15].

On the other hand, few, if any, of the existing instruments include items that measured both the intensity of fatigue and its impact on daily activities, as well as patient attitudes and beliefs toward cancer-related fatigue. We considered all these aspects to be important for inclusion in a measure intended primarily for use in clinical practice, because the evaluation of these aspects could help to facilitate better understanding about what aspects are relevant for the oncological patient, but which are ignored or unknown to the physician, thereby improving physician–patient communication regarding cancer-related fatigue [22]. Furthermore, a number of the existing measures are not short enough for use in clinical practice.

The strengths of our study include the use of a range of sources to generate items for inclusion in the initial item pool, and the explicit incorporation of the views of the potential users of the questionnaire (oncologists) from the start of the development process. We considered it important to incorporate the views of practicing clinicians at various stages in the development process, particularly because the instrument is intended primarily for use in clinical practice. At the same time, incorporating patient views in both the item generation and item reduction stages helped to ensure the validity of the questionnaire's content. The use of a clinimetric analysis also ensured that the most frequently occurring and/or most relevant items were included in the questionnaire, although there is no consensus with respect to which of the item reduction method processes is the most suitable [23]. The final version of the instrument contains 12 items, which clinicians participating in the development process felt was a suitable number for use in clinical practice. This measure has been developed with the belief of converting it

Table 2 Highest scoring items of the original 75 items (N = 238)

	Mean (SD) frequency	Mean (SD) importance	Mean (SD) impact score*
I have felt that I can count on my family for what I need.	1.22 (0.635)	1.23 (0.554)	1.58 (1.48)
I have noticed that my family is close to me.	1.29 (0.660)	1.25 (0.522)	1.72 (1.58)
I have been able to speak about my tiredness with relatives and friends who understand me.	1.85 (1.071)	1.88 (0.969)	3.82 (3.77)
In general, I believe that I speak sufficiently to the doctor about my tiredness.	2.05 (0.891)	1.96 (0.874)	4.24 (2.99)
My willingness to do things has helped me, in spite of the tiredness I feel.	2.10 (1.04)	1.86 (0.94)	4.27 (3.58)
In general, I believe that my tiredness is something unavoidable in my illness.	1.88 (1.03)	2.09 (1.12)	4.31 (4.04)
In general, I believe that my tiredness is associated with the treatment.	1.92 (0.97)	2.15 (1.05)	4.61 (4.00)
In general, I believe that I cope better with my tiredness.	2.63 (1.13)	2.02 (0.96)	5.39 (3.60)
My tiredness (due to my illness or its treatment) has been very different to "normal" tiredness.†	2.05 (1.24)	2.31 (1.16)	5.50 (5.40)
In general, I believe that my tiredness is associated with the illness.	2.34 (1.12)	2.14 (1.02)	5.51 (4.58)
In general, I believe my tiredness has made my life worse.†	2.34 (1.22)	2.11 (1.13)	5.75 (5.55)
I have not been able to walk quickly due to my tiredness.	2.46 (1.31)	2.14 (1.12)	5.95 (5.66)
I feel my tiredness has prevented me from living a normal life.†	2.65 (1.29)	2.09 (1.11)	6.41 (5.84)
After the medication sessions, I have been very tired and have not been able to do practically anything.	2.65 (1.26)	2.33 (1.17)	6.78 (5.44)
In general, I believe that I speak sufficiently to my nurse about my tiredness.	2.53 (1.11)	2.45 (1.14)	6.94 (5.56)
I have been very slow in performing my usual activities.†	2.55 (1.20)	2.42 (1.19)	6.94 (5.87)
I have had to sit down in situations where before I could do them standing up.	2.65 (1.16)	2.35 (1.13)	6.99 (5.82)
When I was tired, I had to interrupt what I was doing and rest to be able to continue.†	2.74 (1.21)	2.36 (1.10)	7.05 (5.41)
In general, I believe I need more information about my tiredness.	2.72 (1.23)	2.37 (1.16)	7.17 (5.70)
I have stopped doing things I liked doing because of my tiredness.†	2.98 (1.27)	2.23 (1.16)	7.32 (6.04)
Despite my tiredness, I have gone about my daily activities without problems.	3.14 (1.30)	2.31 (1.12)	7.36 (5.20)
My tiredness has concerned me.	2.71 (1.29)	2.36 (1.25)	7.48 (6.69)
Sometimes I have been more tired and at other times less tired throughout the day.	2.64 (0.93)	2.71 (1.02)	7.55 (4.46)
Going out with people/friends has helped me to forget about my tiredness.	3.03 (1.36)	2.29 (1.18)	7.63 (6.18)
I have felt shattered.	2.91 (1.27)	2.35 (1.18)	7.75 (6.36)
Going about my daily activities has been good for my tiredness.	3.17 (1.30)	2.39 (1.19)	8.01 (5.97)
The slightest effort makes me very tired.†	2.90 (1.38)	2.44 (1.27)	8.07 (7.03)
I have felt that my body does not respond, as if it was not mine.	3.08 (1.21)	2.36 (1.17)	8.14 (6.26)
I have been tired the whole day long.†	2.99 (1.22)	2.58 (1.18)	8.40 (6.16)
I have needed to have an afternoon nap.	2.59 (1.40)	2.86 (1.31)	8.43 (7.07)
I have stayed at home and have not gone out because of my tiredness.	3.08 (1.28)	2.53 (1.28)	8.54 (6.78)
I have needed help with tasks around the house because of my tiredness.†	3.09 (1.40)	2.49 (1.31)	8.57 (6.98)
I have felt too weak, because of my illness, to go on fighting, to go ahead, because of my tiredness.	3.39 (1.27)	2.34 (1.18)	8.58 (6.31)
Sometimes I have short spells of tiredness and others longer.	2.93 (1.04)	2.79 (1.08)	8.61 (5.28)
In general, I believe that receiving so much attention from my family does not help me to overcome my tiredness.	3.51 (1.34)	2.43 (1.21)	8.71 (6.04)
I have tried to do a little exercise (e.g., walking) but it is not good for my tiredness.	3.29 (1.25)	2.45 (1.15)	8.75 (6.25)
My tiredness has prevented me from doing daily tasks, for example, cooking or going shopping.	3.13 (1.34)	2.54 (1.30)	8.78 (6.93)
I have felt that I am going downhill because of my tiredness.†	3.55 (1.20)	2.31 (1.23)	8.83 (6.51)
I have spent the whole day sitting down because of my tiredness.†	3.27 (1.29)	2.49 (1.21)	8.85 (6.60)
I have felt bad about feeling tired at work.†	3.11 (1.44)	2.51 (1.36)	9.02 (7.63)

*Impact score = frequency × importance.
†Item included in the final version.
SD, standard deviation.

into a real tool for the physicians who normally manage oncological patients. For this reason, for example, two other aspects considered relevant by clinicians and that were borne in mind during the development of the measure were that the questionnaire should fit onto one page and that it should be easy to use and score. The factorial analysis done on the 12 retained items identified a unique factor, whose items were dimensionally grouped with regard to clinical criteria and the content of the retained items. In particular, the questionnaire provides three-dimension scores and an overall score, all of which are obtained by simply summing the scores of individual items in the different dimensions to produce a score ranging from 4 to 20 for the individual dimensions and from 12 to 60 for the overall score, with higher scores representing better quality of life. Although the use of transformations and standardized scores in this type of questionnaire may help in the interpretation of the scores, they also make such scales difficult for clinicians or other health-care staff to use in daily practice [24].

The results of the preliminary analysis on the psychometric properties of the new measure provide satisfactory evidence with respect to the feasibility, reliability and validity of the tool. On one hand, almost none of the patients obtained the worst or the best possible overall score and dimension score, which suggests that the questionnaire satisfactorily covers the perceptions of cancer-related fatigue presented by the target population under study. It can also be taken as an indication of whether a measure will, at least theoretically, be capable of reflecting changes for better or worse, within acceptable limits in all dimensions, with fewer than 15% of patients having either the maximum or the minimum score in any of the dimensions or the overall score [25]. On the other hand, the completion rate, understood as the rate of patients without missing responses in any of the 12 retained items, is quite satisfactory: that is to say, our study purported to administer a pool of 75 items (each of one being assessed in terms of frequency and importance) to a group of patients with cancer-related fatigue, and to selected only a small group of these items. It was estimated that the quantity of information lost during the item pool administration would be high. But, "only" 22% of the sample left 1 or more of the 12 retained items unanswered. These results indirectly support the acceptability of the content of a questionnaire of this kind within a study population.

On the other hand, the Cronbach's alpha coefficients obtained were satisfactory. The Cronbach's alpha values for all the dimensions and for the overall score exceeded the suggested minimum of 0.70 for use at the group level [21,26]. The overall

Table 3 Factor analysis for the 12 retained items for the perform questionnaire (N = 238)

	Item loading for the only factor found with an Eigen value >1
Physical limitations	
The slightest effort makes me very tired.	0.759
My tiredness (due to my illness or its treatment) has been very different to "normal" tiredness.	0.491
I've been tired the whole day long.	0.794
I've spent the whole day sitting down because of my tiredness.	0.736
Activities of daily living	
When I was tired, I've had to interrupt what I was doing and rest to be able to continue.	0.806
I've been very slow performing my usual activities.	0.785
I've needed help with tasks around the house because of my tiredness.	0.779
I've felt bad about feeling tired at work.	0.779
Beliefs and attitudes	
In general, I believe my tiredness has made my life worse.	0.669
I've felt that I'm going downhill because of my tiredness.	0.583
I feel my tiredness has prevented me from living a normal life.	0.773
I've stopped doing things I liked doing because of my tiredness.	0.767
R^2, %	53.7

score exceeded 0.90, which has been suggested to be the threshold for a questionnaire of this type when used at the individual level [25]. This is particularly important given that the aim of the study was to produce a questionnaire that can be used to assess and monitor individual patients in clinical practice. We note, however, that the values we report were obtained within the context of the item reduction study, i.e., from patients who answered 75 items twice. These values may improve when patients complete the final version of the questionnaire and are required to respond to each of the 12 items only once.

Moreover, the validity analysis of known groups showed that the new tool's scores behave coherently within the expectable, with regard to the compared and defined groups. In particular, patients suffering from greater fatigue intensity, patients with extended disease, patients having curative treatment and patients with a caregiver presented a worse overall score than those patients with less fatigue intensity, patients with very localized disease, patients not undergoing treatment or noncurative treatment and patients with no caregiver. In some cases, the difference between compared groups was almost 9 points (e.g., scores of 32.87 for patients undergoing treatment vs. 45.29 for patients not undergoing any kind of treatment), which represents a difference of almost 19% on a scale ranging from 12 to 60. These results are consistent with the findings established in previous studies [27,28].

One limitation of our study is that only a limited number of focus groups were used for the item generation phase. Nevertheless, we did not believe it was necessary to include a larger number because the concept to be measured (cancer-related fatigue) is a reasonably limited concept. The lack of patients with intense fatigue in the item reduction sample might be a more serious limitation. Nevertheless, we felt it was both impractical and ethically dubious to include such patients given the task required of them in the item reduction phase. Concerns related to the potential quality of responses from fatigued patients answering a series of 75 double items were dealt with by varying the order of item administration (as previously explained) and by allowing patients to rest if necessary. Last, further studies should evaluate psychometric properties such as test–retest reliability or sensitivity to change, which were not able to be evaluated in the present study because of cross-sectional design of the field study done.

Conclusions

We have constructed a questionnaire to assess the attitudes and beliefs about cancer-related fatigue and its treatment in clinical practice that is feasible, reliable and valid and whose characteristics and content are likely to make it highly practicable for use in clinical practice in different Spanish-speaking cultures and target populations. Nevertheless, before the questionnaire can be used in clinical practice or in clinical or epidemiological research, additional psychometric properties must be tested. A validated study of the questionnaire is currently underway.

Supplementary Materials

Supplementary material for this article can be found at: http://www.ispor.org/publications/value/ViHsupplementary.asp

Table 4 Score distributions, floor/ceiling effects, missing data, interscale correlations and internal consistency of the 12 retained items of the perform questionnaire (N = 238)

	Overall	PL	ADL	BA
Items (n)	12	4	4	4
Mean	37.05	11.76	13.20	11.95
SD	9.23	3.36	4.02	3.49
Theoretical range*	12–60	4–20	4–20	4–20
Observed range	14–55	5–20	4–20	4–19
Floor† (%)	0	0	1.7	1.7
Ceiling‡ (%)	0	0.4	3.4	0
Completion rate§ (%)	77.3	94.5	93.7	85.3
Missing answers per item	1–27	2–11	2–27	1–9
CA	0.92	0.78	0.85	0.81
Interscale correlation range	0.81 (BA) to 0.91 (ADL)	0.52 (BA) to 0.68 (ADL)	0.58 (BA) to 0.68 (PL)	0.52 (PL) to 0.58 (ADL)

*Overall score range from 12 (greatest impact) to 60 (no impact). Dimension score range from 4 (greatest impact) to 20 (no impact).
†Percentage of patients with the worst possible score.
‡Percentage of patients with the best possible score.
§Percentage of respondents with no missing data in any of the 12 items.
ADL, activities of daily living; BA, beliefs and attitudes; PL, physical limitations; SD, standard deviation.

Table 5 Preliminary known-groups' validity of the 12 retained items of the Perform questionnaire (*), based on intensity of cancer-related fatigue, extent of the disease, cancer treatment and need of caregiver (N = 238)

	Overall score	Physical limitations	Activities of daily living	Beliefs and attitudes
VAS fatigue level on inclusion†				
Moderate (n = 150)	39.02 (8.81)	12.45 (3.30)	13.69 (4)	12.59 (3.21)
Severe (n = 87)	32.92 (8.54)	10.53 (3.09)	12.30 (3.90)	10.60 (3.63)
P-value	0.000	0.000	0.013	0.000
Extent of disease				
Metastasis (n = 154)	36.19 (8.96)	11.57 (3.27)	12.99 (4.05)	11.74 (3.45)
Loco regional (n = 40)	36.07 (8.74)	11.27 (3.40)	12.92 (4.11)	11.31 (3.11)
Local (n = 43)	40.80 (9.95)	12.84 (3.52)	14.28 (3.80)	13.21 (3.77)
P-value	0.028	0.059	0.184	0.039
Treatment				
Patient on treatment (n = 213)	36.36 (8.83)	11.54 (3.26)	13 (3.99)	11.80 (3.42)
Patient on follow-up (n = 11)	45.29 (7.39)	13.80 (3.52)	15.11 (3.10)	13 (3.77)
P-value	0.009	0.034	0.118	0.286
Curative (n = 24)	32.87 (9.36)	10.59 (3.33)	11.96 (3.56)	9.76 (3.29)
Palliative (n = 149)	36 (8.75)	11.56 (3.20)	13 (4.04)	11.67 (3.42)
Adjuvant (n = 44)	39.79 (8.99)	12.10 (3.40)	14.24 (4.06)	13.03 (3.30)
P-value	0.018	0.216	0.071	0.004
Caregiver				
Patient doesn't have caregiver (n = 148)	38.77 (8.66)	12.20 (3.36)	13.99 (3.85)	12.49 (3.29)
Patient have caregiver (n = 86)	34.39 (9.14)	11.09 (3.14)	12.14 (4.06)	11.11 (3.61)
P-value	0.001	0.016	0.002	0.006

*Overall score ranges from 12 (greatest impact) to 60 (no impact), while dimension score ranges from 4 (greatest impact) to 20 (no impact).
†Fatigue was measured on a 100 mm horizontal VAS. Patients rating between 0 and 30 were not included in the study according to the inclusion criteria of the study. Patients in the study were stratified as having a moderate or severe level of fatigue based on previous recommendations [18].
ADL, activities of daily living; BA, beliefs and attitudes; PL, physical limitations; VAS, visual analogue scale.

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