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Development of the European Organisation for Research and Treatment of Cancer quality of life questionnaire module for older people with cancer: The EORTC QLQ-ELD15

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ABSTRACT

Background and aim: There is a lack of instruments that focus on the specific health-related quality of life (HRQOL) issues that affect older people with cancer. The aim of this study was to develop a HRQOL questionnaire module to supplement the European Organisation for Research and Treatment of Cancer (EORTC) core questionnaire, the EORTC QLQ-C30 for older (>70 years) patients with cancer.

Methods: Phases 1–3 were conducted in seven countries following modified EORTC Quality of Life Group guidelines for module development. Phase 1: potentially relevant issues were identified by a systematic literature review, a questionnaire survey of 17 multi-disciplinary health professionals and two rounds of qualitative interviews. The first round included 9 patients aged >70. The second round was a comparative series of interviews with 49 patients >70 years with a range of cancer diagnoses and 40 patients aged 50–69 years matched for gender and disease site. In Phase 2 the issues were formulated into a long provisional item list. This was administered in Phase 3 together with the QLQ-C30 to two further groups of cancer patients aged >70 ($n = 97$) or 50–69 years ($n = 85$) to determine importance, relevance and acceptability of each item. Redundant and duplicate items were removed; issues specific to the older group were selected for the final questionnaire.

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Results: In Phase 1, 75 issues were identified. These were reduced in Phase 2 to create a 45 item provisional list. Phase 3 testing of the provisional list led to selection of 15 items with good range of response, and high scores of importance and relevance in the older patients. This resulted in the EORTC QLQ-ELD15, containing five conceptually coherent scales (functional independence, relationships with family and friends, worries about the future, autonomy and burden of illness).

Conclusion: The EORTC QLQ-ELD15 in combination with the EORTC QLQ-C30 is ready for large scale validation studies, and will assess HRQOL issues of most relevance and concern for older people with cancer across a wide range of cancer sites and treatment stages.

1. Introduction

Over 50% of all new cancer diagnoses and 60% of cancer deaths occur in older patients.[1] Predictions suggest that up to 2050 there will be a further 40% increase in the number of people living with cancer, of whom one-third will be aged 80 years and above.[2] Notwithstanding this, older people are under-represented in cancer trials and studies. Although it is now recognised that patients aged 70 and above may be suitable for active cancer treatment, mortality rates in this age group have changed little.[3] It is estimated that 90–95% of patients aged 80 years and above will not complete their treatment plans.[4] This raises the question how co-morbidities, frailty or social support[5,6] may restrict treatment options. These factors significantly interact with older people's health-related quality of life (HRQOL),[7] which itself may be an important outcome.[8] Therefore, treatment efficacy needs to be measured in ways that include the impact of disease and treatment on HRQOL.

HRQOL in older people is a wide concept. Bowling et al.[9] found in a study of healthy older people, that important features include adequate incomes, family and community resources (to maintain social integration and to prevent loneliness), convenient, affordable, and accessible local facilities and transport (to maintain independence), security and safety. They concluded that HRQOL for older people should focus on more than mental and physical health and functioning. A major programme of work has recently shown that HRQOL in older patient populations is not linked to any specific medical condition.[10–12]

There is contradictory evidence as to whether older people with cancer have better or worse HRQOL than younger patients. Some studies report that it is cancer rather than age which impacts upon HRQOL.[13] Other studies have shown that older people with cancer have similar[14] or better[9,15,16] HRQOL when compared to non-cancer patients. The experience of cancer itself at a younger age may affect subsequent health behaviour in older age.[9] Other studies have shown that increasing age is associated with decreasing health and HRQOL and differing expectations of HRQOL.[15] Measures such as the EUROQOL or SF-36 have demonstrated a heavy response burden and increased requirement for interview administration with advancing age.[16]

Responses to the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-C30[17] vary with age.[18] There are substantial age-related differences in responses from patients in the Cross-Cultural Analysis project of the QLQ-C30[19]: scores for HRQOL, physical function, and role function were lower in those aged >75 years; emotional function scores were slightly higher in those aged >70 years, fatigue much higher over 80 years. The fatigue scale scored substantially lower for all age bands >65 compared with <65 years (Scott and Fayers, personal communication). Wright et al.[20] found that older patients had more social difficulties and lower physical function and overall HRQOL scores than younger people. These differences in reported HRQOL in older people with cancer suggest that older people may have a different HRQOL profile, and may require an age-specific module to supplement the QLQ-C30. We have recently reported a systematic review that identified the absence of a validated age-specific HRQOL questionnaire for use in older people with cancer.[21]

Some authors have developed age-specific questionnaires for use in non-cancer subjects, focusing on domains such as autonomy, pleasure, and self-realisation.[22,23] The observer rated comprehensive geriatric assessment (CGA) scale has been applied to geriatric cancer patients because in the elderly, other co-morbidities are more likely than the cancer to adversely affect physical performance and psychological state.[24] Others have highlighted the different status of elderly people with cancer and the absence of a validated instrument has led researchers to adapt other measures for this purpose.[25,26] The CGA does not address issues related to cancer, and generic instruments such as the QLQ-C30 or SF-36 were developed primarily from studies of younger patients. There is a lack of age-specific HRQOL questionnaires.[21]

The aim of this project was to develop an age-specific questionnaire to supplement the EORTC QLQ-C30, for use in older patients with cancer. The EORTC QOL group has clear guidelines for development of modules to complement the QLQ-C30 in assessing HRQOL in specific disease sites, symptoms and/or treatment-related HRQOL issues.[27] We have modified these procedures to compare responses in older (>70 years) and younger patients to identify age-specific issues affecting HRQOL, and to develop an EORTC module for assessment of HRQOL in cancer patients aged 70 years and above.

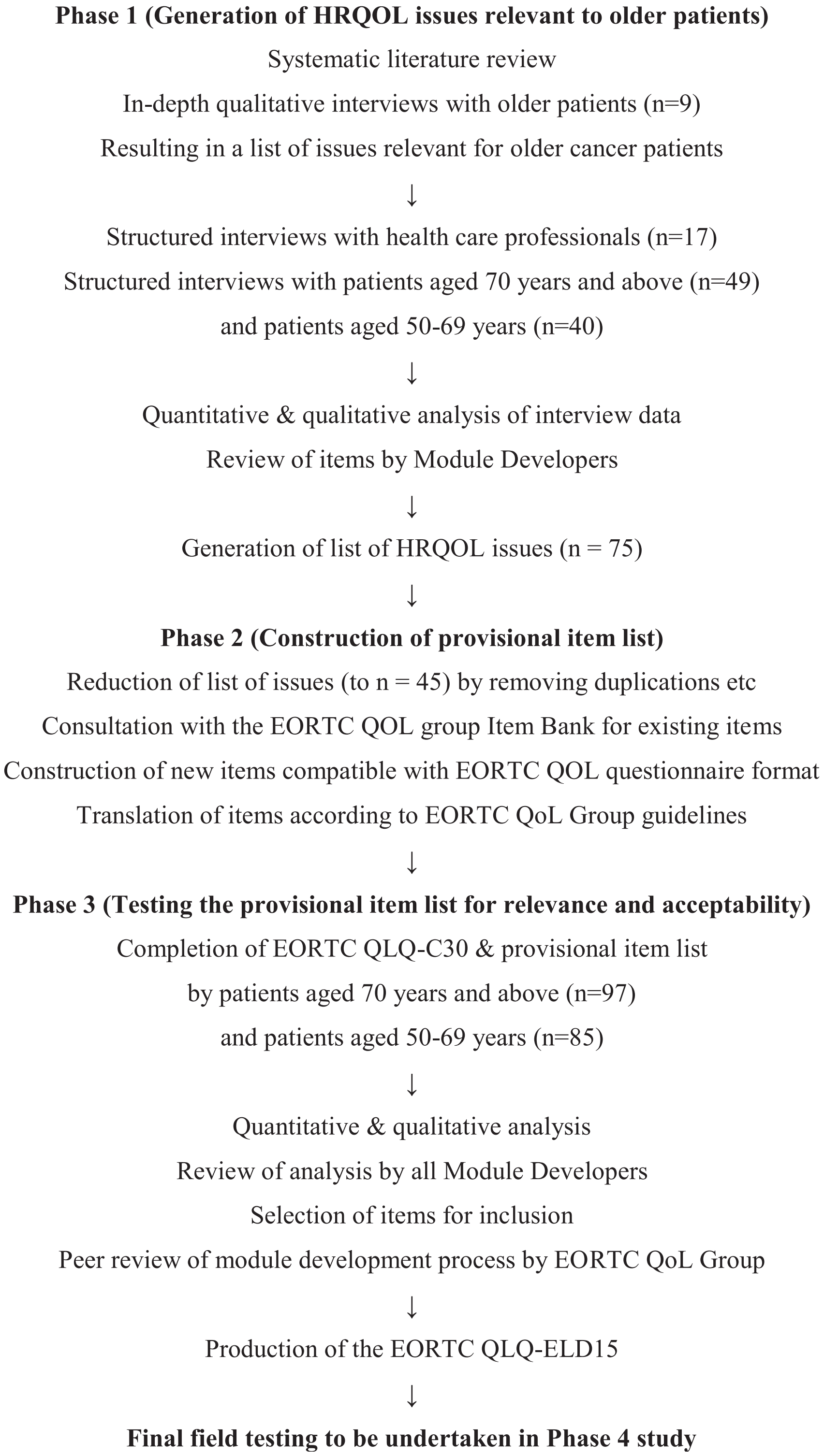
2. Materials and methods

2.1. *Study design*

The development of the provisional module was undertaken in accordance with the EORTC Quality of Life Group (QLG) guidelines for questionnaire module development[27] modified to select age-specific issues (Fig. 1). In both Phase 1 and Phase 3 of module development we included a comparative study of older and younger patients with one of six common cancers. Patients at various stages of treatment were interviewed to identify issues of concern to them, which are not included in the QLQ-C30 and the relevant cancer site-specific module (SSM). Comparison of the responses of the two age groups allowed selection of issues which were more relevant to older people and suitable for inclusion in our older-persons' module.

2.2. *Definition of older patients*

An initial scoping exercise (which included a patient representative) and systematic review were undertaken.[21,28] These



Phase 1 (Generation of HRQOL issues relevant to older patients)

Systematic literature review

In-depth qualitative interviews with older patients (n=9)

Resulting in a list of issues relevant for older cancer patients

↓

Structured interviews with health care professionals (n=17)

Structured interviews with patients aged 70 years and above (n=49)

and patients aged 50-69 years (n=40)

↓

Quantitative & qualitative analysis of interview data

Review of items by Module Developers

↓

Generation of list of HRQOL issues (n = 75)

↓

Phase 2 (Construction of provisional item list)

Reduction of list of issues (to n = 45) by removing duplications etc

Consultation with the EORTC QOL group Item Bank for existing items

Construction of new items compatible with EORTC QOL questionnaire format

Translation of items according to EORTC QoL Group guidelines

↓

Phase 3 (Testing the provisional item list for relevance and acceptability)

Completion of EORTC QLQ-C30 & provisional item list

by patients aged 70 years and above (n=97)

and patients aged 50-69 years (n=85)

↓

Quantitative & qualitative analysis

Review of analysis by all Module Developers

Selection of items for inclusion

Peer review of module development process by EORTC QoL Group

↓

Production of the EORTC QLQ-ELD15

↓

Final field testing to be undertaken in Phase 4 study

Fig. 1 – Overview of module development process for the QLQ-ELD15.

demonstrated inconsistency in the definition of 'older people' within cancer research and in studies on ageing. We consulted members of the EORTC QLG and EORTC Task Force for Cancer in the Elderly on the age range of the population to be considered, using presentations to each group at the EORTC EGAM conference, March 2007. After these reviews and consultations, we adopted the age of 70 years as the threshold for 'older patients' with no upper age limit.

2.3. Phase 1 (generation of HRQOL issues)

We have previously reported a systematic review of the literature to identify the use of and validation of HRQOL instruments in older people with cancer.[21] In addition, other papers that reported the development of older people specific measures (e.g. WHOQOL-OLD[29]) and reviews of approaches to measuring HRQOL in older patient populations[30,31] were also reviewed to identify potential HRQOL issues of concern.

An initial series of in-depth qualitative interviews was completed in nine patients >70 years with various cancers in Southampton, UK, and Pamplona, Spain. Thematic content analysis was undertaken to generate a matrix of HRQOL domains and issues. This matrix was combined with the issues identified from the literature to generate an initial list of issues.

The literature review and interview data were reviewed by the module developers to remove duplications, and to combine or rationalise very similar issues. Remaining issues were listed in a paper-based questionnaire and given to 17 multidisciplinary health care professionals (HCPs) from the EORTC Task Force for Cancer in the Elderly. The HCPs were asked to rate each item's importance (one being least important, four being most important) and if they thought it to be relevant (yes or no) for older people with cancer. If more than 50% rated an item's importance as 3 or 4 and thought the issue to be relevant, it was considered for inclusion in the new module. Using information from the literature review, qualitative interviews and responses from the HCPs, a provisional list of issues was drawn up and used to formulate a structured interview for the second round of interviews.

For the second round of Phase 1 interviews, patients were recruited from UK, Spain, and France. In each centre, patients 70 years and above and younger patients (aged 50–69 years) matched as far as possible for gender and tumour site were recruited.

Patients were given a copy of the EORTC QLQ-C30 and the site-specific module (SSM) for their primary tumour site in their own language as part of a structured interview. Each patient was asked to complete the QLQ-C30 core questionnaire and comment on its content and layout, especially whether they felt any issues were missing. After this opportunity to comment, patients were shown the relevant SSM, and then asked for further comments. We have previously used this method to validate the QLQ-PAN26 in patients with chronic pancreatitis.[32] All patients were asked about their experience of illness and treatment and the most important issues that affected their quality of life. The interviews were conducted in a free 'think aloud' manner to allow patients to express their opinions without restriction as they completed the C30 or SSM. Question prompts about issues raised by the literature review, qualitative interviews and responses from the HCPs were used to structure the interview after the patient had gone through the questionnaires. The issues raised by these interviews were transcribed and tabulated and compared to those generated by the literature review and health professional interviews. Any extra issues brought up by patients that had not been considered by the review or health professionals were retained.

All issues were then reviewed by the authors to determine whether they should be included in the provisional module. The first condition for including an issue in the provisional module was that it had to be mentioned by at least 3 patients in the > 70 years group. The percentage prevalence of each issue was then also determined in both the >70 and 50–69 years control group to determine whether it was a general concern or whether it appeared to be specific to older cancer patients. The list of items was reviewed to avoid duplication with the QLQ-C30. A draft list of issues was circulated to the authors and discussed at a QLG meeting, resulting in a final agreed version of the provisional list of issues.

2.4. Phase 2: construction of the provisional questionnaire

The list of issues was constructed into items that were compatible with the EORTC QLQ-C30 response categories and referred to a time frame of 1 week. Where possible, items were taken from the EORTC QOL item bank[33] to ensure uniformity with other module questions that had already been fully translated and validated. New items were translated into the required languages for Phase 3 in accordance with EORTC QLG translation guidelines.[34]

2.5. Phase 3: testing the provisional QOL item list for relevance and acceptability

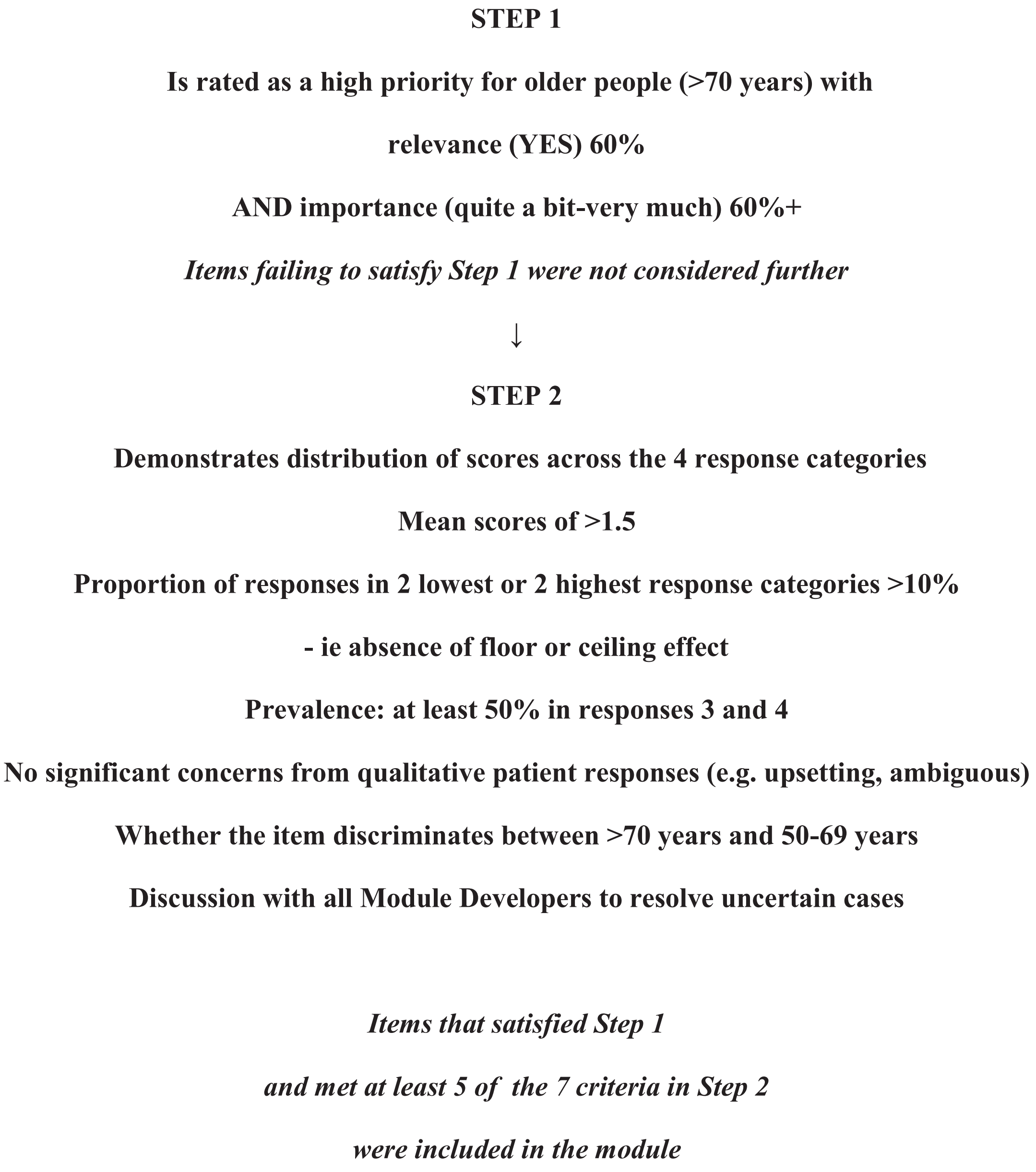
The aim of this phase was to assess the content, acceptability and relevance of the provisional item list in a large representative group of older cancer patients from different countries and languages, and to compare their responses with a similar group of patients aged 50–69 years. Sampling was monitored to ensure even distribution of patients across six tumour sites. Patients >70 years with one of the defined cancers were recruited at different stages of the disease (localised, advanced or metastatic). At each centre, researchers were asked to recruit a patient of similar tumour stage, aged 50–69 years. Patients were asked to complete the EORTC QLQ-C30 and the provisional item list in the presence of the local researcher. After scoring their own response to each item, patients also rated each item for importance on a four point scale, and relevance (yes or no). In addition, a debriefing interview was used to assess the wording of items and check for omissions, redundancy or duplications. Patients were asked to reflect on any issues affecting their HRQOL, such as symptoms, anxieties about the illness, social and family relationships, and physical capabilities. Questions used included the following examples: 'do you have any other symptoms not mentioned in the questionnaire?', 'During your illness what have been the most important problems/issues which have affected your health and quality of life?', 'Are there any other issues or comments you would like to make regarding your illness and treatment and your quality of life?', 'Regarding the questionnaire, could you comment on what changes you would suggest making (e.g. to the content, layout and length)?'. Readability, time taken to complete the questionnaire and any additional help required were also assessed in the debriefing interview.

Decisions for retaining or deleting items were made in accordance with EORTC module development guidelines. A framework for analysis was developed (see author contributions) and agreed with the module development team (all authors) (see Fig. 2). This analysis was reviewed by all authors and a final version of the questionnaire module (QLQ-ELD15) was presented to the EORTC QLG for approval.

2.6. *Sample size*

In Phase 1, patients were recruited for qualitative data collection (generation of additional issues) until no new issues were emerging. We anticipated at least 30 patients in each age group would be required. Recruitment was stopped when the researchers were satisfied that data saturation had been achieved. This occurred when at least 40 patients had been recruited in each age group.

In Phase 3, a sampling frame was constructed to define patients with localised or advanced disease and in three treatment stages (before, during or after treatment). Patients receiving palliative care only were included as a separate category. This created seven potential groups defined by disease stage and treatment. As recommended in the Quality of Life Group Guidelines, we aimed to recruit 15 patients to each



STEP 1

Is rated as a high priority for older people (>70 years) with

relevance (YES) 60%

AND importance (quite a bit-very much) 60%+

Items failing to satisfy Step 1 were not considered further

↓

STEP 2

Demonstrates distribution of scores across the 4 response categories

Mean scores of >1.5

Proportion of responses in 2 lowest or 2 highest response categories >10%

- ie absence of floor or ceiling effect

Prevalence: at least 50% in responses 3 and 4

No significant concerns from qualitative patient responses (e.g. upsetting, ambiguous)

Whether the item discriminates between >70 years and 50-69 years

Discussion with all Module Developers to resolve uncertain cases

Items that satisfied Step 1

and met at least 5 of the 7 criteria in Step 2

were included in the module

Fig. 2 – Phase 3 decision rules. Items were rejected or retained at each step according to whether they met each criterion.

disease/treatment group, creating a target of 105 patients in each age group, 210 in total. This sampling frame was revised when it became apparent that recruitment to some categories was very difficult (see Section 3).

3. Results

3.1. *Phase 1*

Our systematic review[21] identified 31 studies that reported the use of HRQOL measures in older people using a range of generic and disease-specific instruments. Fourteen studies reported the validation of selected HRQOL instruments in older cancer patients. However, the age range studied was relatively restricted to 'younger old'. Little work was reported in the 'older old' (patients aged over 80 years) and all studies exhibited methodological limitations. Content analysis of these papers and thematic analysis of the qualitative interviews with patients from Southampton (*n* = 6) and Pamplona (*n* = 3) identified 75 issues. After removal of duplications and very similar issues, 56 issues were assessed by the HCPs. Of these, 20 were removed and one item was added (willingness of the patient to undergo treatment). This resulted in a list of 37 issues for possible inclusion in an older-person specific module.

Forty-nine patients aged 70 years and over and 40 patients aged between 50 and 69 years with a solid malignancy (Table 1) were shown the list of issues and were interviewed. Median age of the older group was 76 (range 70–89) years; 27% were aged over 80 years. The interviews confirmed the potential relevance of the initial list of issues for older people. In addition, 38 additional issues were raised by the patients, leading to a list of 75 issues, grouped into eight HRQOL domains (Table 2).

3.2. *Phase 2*

A provisional list of items for testing in Phase 3 was derived by discussion of the qualitative responses and response rates for each issue. One condition for including an issue in the provisional item list was that it had to be cited by at least 1.5 times more older patients than younger (a ratio of 3:2) to be considered for inclusion in the new questionnaire. This rule was waived on four occasions however, where an issue was highlighted by a high proportion of older patients and was considered to be of overriding importance. For example, family support was raised by almost 40% of both groups of patients and was retained. Some issues were modified: issues about approaching death were clearly important to some patients, but group discussion and comments from the QLG highlighted the need to handle this issue sensitively. It was decided to keep the issue but to phrase the item differently, referring to 'approaching the end of life'.

Table 1 – Phase 1: cancer diagnosis of patients recruited to second round of interviews.

Cancer	Patients >70 years	Patients aged 50–69 years
Breast	12	19
Colorectal	14	7
Lung	3	4
Prostate	13	5
Ovarian	5	5
Upper GI	2	0
Total	49	40

Table 2 – Issues raised during the second round of Phase 1 patient interviews.

Area of concern	Number of issues	Examples
Symptoms and side-effects	15	Skin changes, thinning hair
Mobility	13	Fear of falling, difficulty climbing steps
Practical support	6	Needing help with shopping
Family support	9	Worried about family coping, caregiver burden
Maintaining hope and purpose	8	Feeling life has meaning, feeling less confident
Social interaction	5	Carrying out hobbies and interests, going out with friends and family
Healthcare	11	Information about diagnosis, confidence in health care team

A final list of 45 issues was divided into eight conceptual scales (Table 3). Search of the EORTC QLG Item Bank revealed 14 relevant pre-existing questions. Remaining items (*n* = 31) were constructed in accordance with the structure and format of the QLQ-C30. New items were translated into the languages required for Phase 3 according to the EORTC QLG translation procedure.[34]

3.3. *Phase 3*

The EORTC QLQ-C3O and provisional list of 45 items was pretested in six European countries and Canada. Ninety-seven patients aged 70 years and above were recruited to represent the selected tumour types (Table 4). Eighty-five patients were recruited in the comparison (50–69 years age) group; there was a similar spread of tumour site and stage in the two groups. It became clear that recruitment was very slow in some groups (before treatment, young patients in palliative care) and recruitment was closed when adequate numbers (>15 per cell) had been recruited to a revised disease/treatment sampling frame (Table 5).

Seventeen items did not meet the criteria set out in the decision rules for patient-rated importance and relevance and were discarded, resulting in a list of 28 items to be examined for range of responses, prevalence, mean score and qualitative feedback from patients.

Adequate dispersion of scores (across at least two categories) was observed in all 28 items. Fourteen items met the criteria for prevalence. Six items had borderline scores for prevalence (45–50%). These items concerned numbness of hands or feet (32), being unsteady on feet (42), help with household chores (45) or shopping (46), worries about family

Table 3 – List of 45 HRQOL issues constructed into the provisional item list for testing in Phase 3.

Scale	Item number	Issues
Symptoms and side-effects	31–36	Skin problems, numbness in fingers and toes, weight loss, bladder control, problems with eyesight, problems with hearing
Mobility	37–43	Needing to use a wheelchair, needing to use a walking aid, difficulty moving around the house, difficulty with steps or stairs, joint pain or stiffness, gait, falls
Practical support	44–46	Needing carer support, help with shopping, worried about caring for others
Family support	47–53	Having close family relationships, difficulties with family relationships, communication and support from family, feeling a burden to the family, worries about family coping, worries about future of family members
Health worries	54–57	Worries about own future health, worries about future treatment, worries about prognosis, worries about dying
Maintaining hope and purpose	58–62	Loneliness/isolation, maintaining a positive outlook, feeling uncertain about the future, having meaning to one's life, motivation to carry on with normal interests
Social interaction	63–65	Embarrassment about illness, worries about people's reaction to illness, self-confidence
Health care	66–75	Burden of illness and treatment, adherence to prescribed treatment, support from health care team, confidence in health care team, information from health care team, difficulties in travelling to treatment appointments, difficulties in organising activities around appointments

Table 4 – Tumour site and characteristics of patients recruited in Phase 3.

	Patients aged >70 years (*n* = 97)	Patients aged 50–69 years (*n* = 85)
Median age (years)	74 (70–94)	61 (50–69)
Male/female	49/48	39/46
ECOG score		
0	41	45
1	30	24
2	13	12
3	12	3
4	1	1
Primary cancer site		
Breast	23	26
Lung	20	18
Colorectal	25	22
Prostate	17	9
Upper GI	6	5
Ovarian	6	5
Country		
United Kingdom	42	12
Spain	9	42
Sweden	9	14
France	7	8
Belgium	15	
Turkey	6	9
Canada	9	

Table 5 – Distribution of disease stage and treatment phase of patients recruited to Phase 3.

	Age 50–69	Age > 70
Local *treated for cure*	34	35
Locally advanced *unlikely to cure*	35	46
Metastatic	17	16

coping (54), and worries about end of life (57). One item 'Have you felt that your life is meaningful?' was considered by nine patients to be misleading or unclear and was rejected. A summary of the performance of each item is given in the Appendix.

Thirteen new issues were raised by one patient each during Phase 3. After discussion, it was agreed for a variety of reasons that none of these new issues should be added to the Phase 3 module.

We also reviewed whether the remaining items were specific to older people aged 70 years and above. Items concerning mobility, future health, burden of illness and treatment met our criteria for relevance and importance only in the older patient group. Items concerning family, maintaining autonomy and information and satisfaction with health care were seen as highly important (>70%) in both age groups. However,

Table 6 – Issues included in the EORTC QLQ-ELD15.

Conceptual scale	Issues
Mobility	Difficulty with steps or stairs Joint stiffness/pain Gait Help with household chores
Family support	Closeness of your family Being able to talk to family about illness
Worries about future	Worries about family coping Worries about the future of others Worries about future health Feeling uncertain about the future Worried about what happens at end of life
Autonomy and maintaining purpose	Having a positive outlook Feeling motivated to continue with normal life
Burden of illness	Burden of illness Burden of treatment

family and maintaining autonomy were rated more important/relevant by the older age group; this was supported by the ratings and comments given by health care professionals and patients during Phase 1. With the emphasis of this module on meeting the most important and relevant concerns for older people, the module developers decided to include these issues.

Questions on information giving and health care satisfaction (items 71–75) were rated highly important and relevant (>90%) in both age groups. These items also demonstrated potential ceiling effects in the responses (10–13.4% scored 1 or 2; mean scores 3.4–3.6). As there is already an information module (QLQ-INFO26) available to measure these specific aspects of HRQOL in cancer patients, we decided that these items should be omitted.

The remaining 15 items were grouped into conceptually related scales (Table 6). The development process and the final Phase 3 module were reviewed and approved by the EORTC QLG, resulting in the EORTC QLQ-ELD15.

4. Discussion

4.1. *Main findings*

Two important considerations had to be addressed in the development of this module. First, are there age-related differences in the HRQOL concerns of older and younger patients? And second: are the EORTC QLQ-C30 and currently available disease-specific modules adequate to assess the HRQOL concerns of relevance to older people with cancer? It is clear from our literature review, and from the comparison of scores and qualitative responses of older and younger patients, that the answers are yes, differences exist, and no, existing questionnaires are not adequate. There is a clear need for a specific tool to measure HRQOL in patients with cancer aged >70 years.

The EORTC QLQ-ELD15 has been developed to measure the important and relevant HRQOL concerns of older people aged 70 years and above. At all stages, comparison with a younger age group (50–69 years) enabled selection of items specifically relevant to older patients. From a list of 75 potential items, the module has been refined to 15 items conceptualised into five scales. It has been designed to be used in conjunction with the EORTC QLQ-C30. Importantly, the QLQ-ELD15 is designed for use in a specific age group of cancer patients and does not overlap with existing EORTC disease-specific modules. The QLQ-ELD15 is now ready to assess its reliability and validity alongside the EORTC QLQ-C30 in a large international population of older patients (Phase 4 validation).

4.2. *Approach to HRQOL module development*

Our module development process demonstrates the feasibility of developing a module for assessing HRQOL issues of most concern for a specific demographic group of cancer patients, rather than a module related to disease and symptom-related HRQOL issues. We designed recruitment to include patients with six common solid cancers, from several countries, and we modified the standard procedure by the inclusion of a comparator group of younger patients in both Phase 1 and Phase 3 to ensure that we captured the most specific HRQOL concerns for older patients. This approach may also be appropriate for other demographic or clinically defined groups of cancer patients requiring specific modules to supplement the QLQ-C30. The development process benefited from collaboration between the EORTC Quality of Life Group and the EORTC Task Force for Cancer in the Elderly.

Selection of items following comparison of responses in the older and younger groups ensured that the module includes only items specifically relevant and important to older people. Researchers and clinicians should be aware of differences in perceptions of HRQOL at different age points. Any proposed ‘elderly-specific’ HRQOL instrument should be justified by demonstrating what aspects of HRQOL are important to older people in comparison to younger patients.[21]

4.3. *Patient derived HRQOL measure*

The development process for this module is strongly based in patient derived data. The initial list of 37 issues was derived from a literature review, supplemented by qualitative interviews with 9 patients. Discussion with older and younger patients in Phase1 generated another 38 issues, 75 in total, for consideration. This was reduced to a list of 45 issues mainly by removing duplications and combining closely related issues. We preferred to be inclusive at this stage rather than risk losing issues that were important or relevant to the patients. Subsequent selection of the final 15 items was based on the responses obtained from patients, following decision rules agreed in advance, and widely accepted within the EORTC QLG. The primary selection criterion (step 1) in Phase 3 was demonstration of adequate importance and relevance to the older group of patients, to ensure that this module includes only items of significant concern to older patients.

We feel that this process of wide inclusion of items at the outset, with careful selection based on patient responses has produced a HRQOL measure that covers the widest possible range of issues of concern, with as few questions as possible, and which are all relevant to the HRQOL concerns of older people. Duplication with other EORTC HRQOL modules has also been avoided.

4.4. *Phase 3*

In Phase 3 the selection of items aimed to identify those that were scored highly for relevance and importance by older patients in contrast to the responses of younger patients. The responses are representative of patients having treatment or who have recently completed treatment. We found it impossible to recruit adequate numbers in both age groups before treatment (for logistical reasons), and of younger patients having palliative treatment only (very few such patients were identified). The other cells of the planned sampling frame were adequately filled (>15 patients each). It was decided to close recruitment and to redefine the sample distribution as shown in Table 5.

The selection of items during Phase 3 was planned to set a high threshold for inclusion, so that retained items would have high importance and relevance to older people, adequate response characteristics, and crucially, would be less important and relevant to the younger group of patients. By this selection, we have kept to a minimum the number of retained items, and ensured that the module is specific to the needs of older patients.

The decision rules set up before the selection of items worked well in most cases. Borderline decisions were reviewed by the module development group, and consensus was reached by discussion. A similar process of group discussion was used to agree the proposed conceptual scales of the retained items. These scales will require confirmation in the forthcoming Phase 4 validation of the psychometric properties of the module.

Decisions on which issues to keep or delete were based on standard EORTC module development criteria and decision rules. Discussion of each issue was in the context of the proposed scale structure (i.e. each scale was considered in turn as a group of issues). We considered the meaning of the issue, and how to handle this sensitively in creating a questionnaire. For example, group discussion showed difficulty with questions about carers (family members or professional?), which required clarification for accurate translation. Issues about approaching death were clearly important to some patients, but group discussion, and comments from the QLG highlighted the need to handle this issue sensitively, to avoid distress to patients. It was decided to keep the issue but to phrase the item in relation to 'approaching the end of life'. This item was acceptable to patients.

One item 'Have you felt that your life is meaningful?' was considered by nine patients to be misleading or unclear and was rejected. This item was adapted from the EORTC spirituality module, in which it is part of a multi-item scale. It is likely that this single item lacked an appropriate context in the older-person module, which could account for the lack of clarity for patients.

The QLQ-ELD15 is consistent in design and time frame with the QLQ-C30 and the cancer site-specific modules. Most questions deal with negative effects on HRQOL (higher response indicates worse HRQOL) but four items (35, 36, 42, and 43) show higher scores for better HRQOL. The scoring manual for the QLQ-ELD15 will normalise these responses in the usual way, to report HRQOL on a scale 0–100 where 100 indicates better HRQOL.

4.5. *Ease of completion*

The present study identified time required for completion as a problem for some patients, but it must be remembered that these patients were dealing with the QLQ-C30, and the 45 item provisional list. It was our intention to include in Phase 3 more items than would be retained after analysis, in order to be comprehensive. Time for completion of the final module will be determined in Phase 4, but is likely to be short, in common with other EORTC modules.

Some patients in Spain and the UK found that help was needed to respond to the SSM and provisional item list. This may reflect a cultural difference in patient choice; the questions were read out to them exactly as written, to avoid introduction of bias. Interviewer administration of HRQOL questionnaires is valid and probably did not influence the psychometric data collected. All patients undertook a debriefing interview so assessment of qualitative responses was similar for all patients.

4.6. *Co-morbidity and QOL*

Discussion of issues related to co-morbidities led to the conclusion that although these might not be specifically related to cancer or its treatment, they were important for the HRQOL of the respondents, and should be considered for the provisional module. Also, in some cases it was difficult to separate co-morbidity from the disease or treatment effects (e.g. reduced mobility, dependence on others). We noted that many EORTC SSM have included questions about non-specific issues for similar reasons (e.g. sexuality). The final or validated module (together with the C30) should address all the HRQOL aspects of cancer in older people.

4.7. *Limitations of the study*

One of the potential limitations of our module is using a chronological age of 70 years and above as our definition of 'older'. In quality of life studies in general populations 'older' people are often defined from lower ages (e.g. age 60 years).[11] When designing studies, or choosing the appropriate instrument, researchers should be clear about the age thresholds used, and should be aware of their arbitrary nature.

We designed our study to provide information relating to a range of common solid tumours. The resulting questionnaire covers HRQOL issues specific to older people with cancer. We chose this range of tumours to be representative of solid malignancies. The QLQ-ELD15 has not yet been tested in haematological malignancies; we plan to do so in combination with our Phase 4 validation study, using an additional debriefing questionnaire to identify any different issues that affect haematological malignancies, in the same way that we previously validated the QLQ-PAN26 for use in chronic pancreatitis.[32]

Every effort was made to ensure that a representative sample of patients was included in Phases 1 and 3, for example by purposive sampling for localised and advanced disease in each tumour site, and inclusion of a group receiving palliative care only. Nevertheless, the majority of patients were recruited from cancer centres undertaking cancer trials and thus many patients had been assessed as having a performance status suitable for inclusion in a trial. Therefore, we may not have captured HRQOL concerns of most importance to frail older cancer patients. Further work may be required to validate or modify the EORTC QLQ-C30 in such patients.

Similarly, the median age of our patients (74 years) suggests that there was a selection bias towards the younger end of our chosen range. Nevertheless, the upper quartile of age range of our patients was 78–93 years, so we believe that we have achieved adequate sampling from the 'oldest old' age range.

5. Conclusion

The EORTC QLQ-C30 and EORTC QLQ-ELD15 constitute an assessment system developed from patient reported data for the measurement of HRQOL in patients with cancer aged 70 years and above. The QLQ-ELD15 has undergone extensive development in a wide range of European countries and Canada, to ensure cross-cultural relevance. The questionnaire includes items of specific relevance to older people, thanks to the repeated comparisons with younger patients during development. The ELD15 is now available for psychometric validation in a large international sample. It can be used in clinical trials, but the final questionnaire may change following psychometric validation. This system will enable the collection of reliable, valid and clinically important information on HRQOL outcomes in older cancer patients.

Author contributions

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Conflict of interest statement

None declared.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ejca.2010.04.014.

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