

Quality of life during the course of cancer treatment in older newly diagnosed patients. Results of a prospective pilot study

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Background: The aim of this prospective study was to report the quality of life (QoL) of older cancer patients during the first year after diagnosis and factors influencing QoL.

Patients and methods: Newly diagnosed patients aged ≥ 65 years were recruited for a pilot prospective cohort study at the Jewish General Hospital, Montreal, Canada. Participants were interviewed at baseline, and at 1.5, 3, 4.5, 6, and 12 months. QoL was assessed at each interview using the European Organization for the Research and Treatment of Cancer Quality of Life Core Questionnaire with 30 items. Logistic regression was conducted to determine which sociodemographic, health, and functional status characteristics were associated with decline in global health status/QoL between baseline and 12-month follow-up.

Results: There were 112 participants at baseline (response rate 72%), median age of 74.1, and 70% were women. Between baseline and 12-month follow-up ($n = 78$), 18 participants (23.1%) declined ≥ 10 points in global health status/QoL, while 34 participants (43.6%) remained stable and 23 participants (33.3%) improved ≥ 10 points. None of the sociodemographic, health, and functional status variables were associated with decline in logistic regression analyses.

Conclusion: Almost 25% of older adults experienced clinically relevant decline in their QoL. Further research is needed on which factors influence decline in QoL in older adults.

Key words: cancer treatment, frail elderly, functional status, geriatric oncology, QoL

introduction

Cancer is a significant health problem in older persons [1, 2]. It is estimated that 43% of all incident cases and $>60\%$ of mortality due to cancer occur in persons aged ≥ 70 years [3].

Quality of life (QoL) is included as an end point in many clinical trials but only recently for older patients [4]. Older adults have reportedly given preference to maintenance or improvement of QoL rather than an increase in survival [5]. Older persons with cancer, especially frail older persons with comorbidities, are underrepresented in clinical trials [6–10]. Older adults tend to receive less aggressive treatment and less extensive staging of their disease [11–18]. With older age, the risk of complications of treatment may increase; therefore, preservation or improvement of QoL should be an important

aim of treatment of older patients, especially for older adults undergoing treatment with a non-curative approach [4].

Most of the QoL studies have not focused on newly diagnosed older patients [19]. Knowledge about what influences QoL and how it changes over time during treatment is important for the oncology treatment team and patients and may help to identify areas where interventions can be useful to improve QoL in older adults.

The aim of the analyses reported in this paper is to report on the QoL of older newly diagnosed cancer patients during the first year after diagnosis and examine which sociodemographic, health, and functional status characteristics influence QoL.

patients and methods

study sample

Patients were recruited as part of a pilot study to assess health and vulnerability in older newly diagnosed cancer patients (for more detail, see [20]). The inclusion criteria were patients aged ≥ 65 years, referred to the

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Segal Cancer Centre of the Jewish General Hospital, a new diagnosis of solid tumor (breast, colorectal, or lung cancer) or hematological malignancy (lymphoma and myeloma), and not having received cancer treatment in the previous 5 years. Exclusion criteria were not able to speak English or French, estimated life expectancy <3 months, and unable to give informed consent due to cognitive impairment.

Recruitment took place between 1 March 2007 and 31 January 2008 except for colorectal cancer recruitment which ended on 1 May 2008. Among the 156 eligible patients, 112 (71.8%) participated. Four (2.6%) patients who agreed to participate had to be excluded (already treated for interview/change in diagnosis/died before interview) and 40 (25.6%) refused to participate. More details on recruitment have been published elsewhere [21]. Of the 40 patients who refused, 16 reported that they felt overwhelmed/sad by the diagnosis, 5 patients did not feel well enough, 5 patients had no time, 2 patients felt too healthy, 10 persons were not interested, 1 patient refused due to study burden and 1 refused due to denial of the cancer diagnosis. The only statistically significant difference between those who participated and those who refused was that participants were less often married/living common law ($P = 0.006$).

The baseline interview took place before the start of treatment and the patients were followed for 1 year with face-to-face follow-up interviews at 3 and 6 months and telephone interviews at 1.5, 4.5, and 12 months. The study was approved by the Research Ethics Committee of the Jewish General Hospital, Montreal, Canada. All participants provided written consent.

sociodemographic, health, and functional status

Information on patient age, sex, marital status, and educational level was collected during the baseline interview.

The cancer diagnosis, stage, and treatment received were obtained from the medical chart. The tumor node metastasis staging system of the American Joint Committee on Cancer was used for the solid tumors [21]. For lymphoma, the Ann Arbor staging was used [22]. For multiple myeloma, the classification according to Durie and Salmon [23] was used. For the analyses, stages were grouped into two categories: early disease (stage 0–2) or advanced disease (stage 3–4). For lymphoma, stage 1 or 2 was classified as early disease and stage 3 and 4 were classified as advanced disease. For the four participants with multiple myeloma, stage 1A ($n = 2$) was classified as early disease and stage 3B ($n = 2$) was classified as advanced disease. There were no participants with multiple myeloma stage 1B, 2, or 3A.

Treatment received was classified as extensive treatment (yes/no) based on the classification of Johansson et al. [24]. For breast cancer, extensive treatment included surgery plus radiation therapy plus chemotherapy, and for colorectal cancer, extensive treatment included surgery plus chemotherapy. For lung cancer, extensive treatment included double agent chemotherapy or concurrent radiation and chemotherapy. For lymphoma, extensive treatment included a regimen consisting of multiple chemotherapy agents. For multiple myeloma, extensive treatment included therapy consisting of melphalan, thalidomide, and prednisone.

The Functional Comorbidity Index which includes 18 questions on diseases/chronic conditions with answer categories yes/no was used to assess comorbidity [25, 26].

The seven Nagi Items were used [27] to measure functional limitations and they were defined as a lot of difficulty or unable to do one or more items. Instrumental activities of daily living (IADL) were measured with the Older American Resources and Services [28] (seven items) and IADL disability was defined as needing help or unable to perform one or more activities.

Disability in activities of daily living (ADL) was measured with the Katz index [29] (six items) and ADL disability was defined as not able to do one or more activities. The Eastern Cooperative Oncology Group performance status (ECOG PS) [27] was used to describe functional status.

Mood disturbance was assessed using the Hospital Anxiety and Depression scale [30, 31] which consists of an anxiety and a depression subscale and for both scores range from 0 to 21 points. For each subscale, a score of ≥ 10 indicates probable disorder. Mood disturbance was defined as a score of ≥ 10 on either subscale.

outcome measure

QoL was measured at each interview with the European Organization for the Research and Treatment of Cancer Quality of Life Core Questionnaire with 30 items (EORTC QLQ-C30) [32]. This QoL scale includes a global health status/QoL scale, five functional scales (emotional, physical, role, cognitive, and social functioning), and symptom scales (fatigue, nausea–vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial problems). Calculation of scores was carried out according to the EORTC QLQ-C30 manual.

A difference of ≥ 10 points in each scale indicates clinically important change [33].

statistical analysis

We used means, medians, frequencies, and proportions to describe the characteristics of the sample. At each follow-up, we determined how many older adults declined or improved (a change of ≥ 10 points compared with the previous interview) in the functional scales or the global health status/QoL scale.

We compared the baseline sociodemographic, health, and functional status and QoL scores of those who were lost to follow-up and those who participated at the 12-month interviews using Mann–Whitney U tests for continuous variables and chi-square tests for categorical variables.

We grouped the global health status/QoL scale in three groups; those who declined, those who improved, or those who remained stable between baseline and 12-month follow-up in. We used one-way analysis of variance (ANOVA) and chi-square tests to compare the three groups in terms of age, sex, living situation, social support, number of comorbid conditions, diagnosis, stage of disease, extensive treatment received, and functional status.

Subsequently, we examined which sociodemographic, health, and functional status variables were associated with decline in global health status/QoL versus stable/improved between baseline and 12-month follow-up using logistic regression analysis adjusting for age and sex. Analyses were carried out with SPSS version 16.0.

results

The characteristics of the sample are shown in Table 1. The median age was 74.1 and the majority were women (69.6%). The most common diagnosis was breast cancer ($n = 44$).

Of the 112 included at baseline, 78 participants also have data on global health status/QoL at the 12-month follow-up (69.6%), 10 (8.9%) refused follow-up, 22 (19.6%) died, and 2 participants (1.8%) had missing data.

The characteristics of those who completed have the global health status/QoL scale at 12 months and those who did not complete the global health status/QoL scale are shown in Table 2. Those who did not complete the global health status/QoL scale at 12 months had more often advanced disease at baseline (67.6% versus 33.3%), more often lung cancer (35.3% versus 19.2%) and had more often IADL disability at baseline (50.0% versus 28.2%). There were no differences between those who completed the study and who did not complete the global health status/QoL scale in terms of age at baseline, sex, ADL disability, or extensive treatment received. With regard to the global health status/QoL, functional scales, and symptom

Table 1. Characteristics of the study sample

Characteristics of study sample	N = 112 (%)
Median age at baseline (range)	74.1 (65, 93)
65–74 years	66 (58.9)
≥75 years	46 (41.1)
Sex women	78 (69.6)
Country of birth	
Canada	65 (58.0)
Europe	28 (25.9)
Africa	6 (4.5)
South America/Caribbean	6 (4.5)
Other	7 (7.1)
Marital status	
Married/common-law	62 (55.4)
Widowed	25 (22.3)
Divorced/separated	19 (17.0)
Single	6 (5.4)
Level of education	
0–4 years	5 (4.5)
5–8 years	19 (17.0)
9–12 years	41 (36.6)
≥13 years	47 (42.0)
Living situation	
At home	108 (96.4)
Residence	3 (2.7)
Other	1 (0.9)
Living alone	45 (40.2)
Not living alone	67 (59.8)
Social support available	82 (73.2)
Who? (N = 82)	
Spouse	50 (61.0)
Child(ren)	20 (24.4)
Other	12 (14.6)
Cancer diagnosis	
Lung	27 (24.1)
Breast	44 (39.3)
Colorectal	20 (17.8)
Non-Hodgkin lymphoma	17 (15.2)
Multiple myeloma	4 (3.6)
Cancer diagnosis is	
First cancer diagnosis	101 (90.2)
Recurrence	2 (1.8)
New diagnosis, has been diagnosed in the past	9 (8.0)
Stage of disease	
Stage 0–2	63 (56.2)
Stage 3–4	49 (43.8)
Extensive treatment received	45 (40.2)
Number of comorbid conditions at baseline	
None	23 (20.5)
1	27 (24.1)
2	27 (24.1)
3	13 (11.6)
4+ (max 8)	22 (19.7)
ECOG PS at baseline	
0 Fully active	72 (64.3)
1 Restricted in physically strenuous activities	22 (19.6)

Table 1. (Continued)

Characteristics of study sample	N = 112 (%)
2 Ambulatory and capable of all self-care but unable to carry out any work activities	12 (10.7)
3 Capable of only limited self-care	6 (5.4)
4 Completely disabled	0
Presence of functional limitations at baseline	38 (33.9)
Presence of IADL disability at baseline	39 (34.8)
Presence of ADL disability at baseline	12 (10.7)
Presence of mood disturbance at baseline	26 (23.2)

ADL, activities of daily living; ECOG PS, Eastern Cooperative Oncology Group performance status; IADL, instrumental activities of daily living.

scales, there was a statistically significant difference only in terms of physical functioning and nausea–vomiting. Specifically, those who were lost to follow-up had lower physical functioning at baseline and reported nausea–vomiting more often.

In Table 3, the changes over time can be seen. Overall, there was little change in median scores of the global health status/QoL scale, the functional scales, and symptom scales over time for both the groups aged 65–74 years or for those aged 75 years and older.

Table 4 describes the number and proportion of participants who were classified as exhibiting no change, improvement, or decline over time using the cutoff for clinically relevant change. Of all the different functional scales, most changes over time occurred in global health status/QoL scale and the least change over time occurred in the physical function scale.

Between baseline and 12-month follow-up ($n = 78$), 18 participants (23.1%) declined >10 points in global health status/QoL scale, while 34 participants (43.6%) remained stable and 23 participants (33.3%) improved ≥10 points. In the age group 65–74, 11 participants declined (23.4%), 21 did not change (44.7%), and 15 (31.9%) improved, whereas in the age group ≥75, 7 declined (22.6%), 13 did not change (41.9%), and 11 improved (35.5%). When we compared the three groups with regard to health and functional status using one-way ANOVA and chi-square tests, we found no statistically significant differences in age at baseline, sex, the living situation, social support, number of comorbid conditions at baseline, the number of persons with one or more functional limitations, the number of persons with one or more ADL/IADL disabilities, the number of persons with a mood disturbance, ECOG PS (0 versus >0), the number of persons with lung cancer versus other diagnoses, or extensive treatment received (yes/no), see Table 5. The only statistically significant difference was that those who declined (6.33%) or improved (14.58%) more often had advanced disease compared with the no change group (6.17%).

Table 2. Characteristics of those who completed the global health status/QoL at 12 months and those who did not complete the global health status/QoL scale at 12 months

Characteristics	No global health status/QoL at 12 months, N = 34 (%)	Global health status/QoL at 12 months, N = 78 (%)
Median age at baseline (interquartile range)	74.6 (70.9, 78.5)	73.8 (69.1, 77.6)
Sex % women	20 (58.8)	58 (74.4)
Born in Canada	22 (64.7)	43 (55.1)
Married/common law	21 (61.8)	41 (52.6)
Level of education		
0–4 years	1 (2.9)	4 (5.1)
5–8 years	6 (17.6)	13 (16.7)
9–12 years	13 (38.2)	28 (35.9)
≥13 years	14 (41.2)	33 (42.3)
Living alone	14 (41.2)	31 (39.7)
Social support available	26 (76.5)	56 (71.8)
Cancer diagnosis		
Lung	12 (35.3)	15 (19.2)*
Breast	4 (11.8)	40 (51.3)
Colorectal	7 (20.6)	14 (17.9)
Hematological malignancy	11 (32.4)	9 (11.5)
Cancer diagnosis is:		
First cancer diagnosis	32 (94.1)	68 (87.2)
Recurrence	0	2 (2.6)
New diagnosis, has been diagnosed in the past	2 (5.9)	8 (10.3)
Advanced stage of disease (stage 3–4)	23 (67.6)	26 (33.3)*
Extensive treatment received	15 (44.1)	30 (38.5)
Median number of comorbid conditions at baseline (interquartile range)	2.0 (1, 4)	2.0 (1, 3)
ECOG PS at baseline		
0	14 (41.2)	58 (74.4)*
1	10 (29.4)	12 (15.4)
≥2	10 (29.4)	8 (10.3)
Presence of functional limitations at baseline	16 (47.1)	22 (28.2)
Presence of IADL disability at baseline	17 (50.0)	22 (28.2)*
Presence of ADL disability at baseline	6 (17.6)	6 (7.7)
Presence of mood disturbance at baseline	9 (30.0)	17 (22.1)
EORTC QLQ-C30 scores		
Global health status/QoL (interquartile range) ^a	66.7 (5, 83.3)	66.7 (58.3, 83.3)
Functional scales ^a		
Emotional functioning (interquartile range)	75 (52.1, 89.6)	83.3 (66.7, 91.7)

Table 2. (Continued)

Characteristics	No global health status/QoL at 12 months, N = 34 (%)	Global health status/QoL at 12 months, N = 78 (%)
Physical functioning (interquartile range)	80 (55, 93.3)	93.3 (76.7, 100)*
Role functioning (interquartile range)	100 (66.7, 100)	100 (83.3, 100)
Cognitive functioning (interquartile range)	83.3 (66.7, 100)	100 (83.3, 100)
Social functioning (interquartile range)	100 (66.7, 100)	100 (83.3, 100)
Symptom scales ^b		
Fatigue (interquartile range)	22.2 (0, 55.6)	22.2 (11.1, 33.3)
Nausea–vomiting (interquartile range)	0 (0, 16.7)	0 (0, 0)*
Pain (interquartile range)	16.7 (0, 50)	16.7 (0, 16.7)
Dyspnea (interquartile range)	0 (0, 33.3)	0 (0, 33.3)
Insomnia (interquartile range)	33.3 (8.3, 66.7)	33.3 (0, 33.3)
Appetite loss (interquartile range)	0 (0, 33.3)	0 (0, 33.3)
Constipation (interquartile range)	0 (0, 33.3)	0 (0, 0)
Diarrhea (interquartile range)	0 (0, 0)	0 (0, 0)
Financial problems (interquartile range)	0 (0, 0)	0 (0, 0)

ADL, activities of daily living; ECOG PS, Eastern Cooperative Oncology Group performance status; EORTC QLQ-C30, European Organization for the Research and Treatment of Cancer Quality of Life Core Questionnaire with 30 items; IADL, instrumental activities of daily living; QoL, quality of life.

^aFor the global health status/QoL and functional scales, 0 = poor functioning and 100 = highest level of functioning.

^bSymptom scales 0 = no symptoms and 100 = maximum symptomatology. * $P < 0.05$.

The results of the logistic regression analysis showed that none of the sociodemographic, health, and functional status variables were statistically significant associated with decline in global health status/QoL scale. All models were adjusted for age and sex (results not shown but available on request).

conclusions and discussion

We examined changes in QoL in older persons diagnosed with cancer in the first year after diagnosis. Our results show that

Table 3. QoL over time and changes over time by age group^a

Median (interquartile range)	Baseline N = 112	1.5 months N = 101	3 months N = 97	4.5 months N = 93	6 months N = 91	12 months N = 78
Global health status/QoL ^b	66.7 (50–83.3)	66.7 (50–83.3)	66.7 (50.0–83.3)	66.7 (50–83.3)	75.0 (50–91.7)	75.0 (58.3–83.3)
65- to 74-year olds	75.0 (58.3–91.7)	66.7 (50.0–83.3)	66.7 (50.0–83.3)	66.7 (50–83.3)	66.7 (50.0–91.7)	75.0 (58.3–91.7)
75 and older	66.7 (50–83.3)	66.7 (50–83.3)	66.7 (50.0–83.3)	66.7 (50–83.3)	75.0 (54.2–83.3)	75.0 (58.3–83.3)
Functional scales ^b						
Emotional functioning	80.6 (66.7–91.7)	83.3 (66.7–91.7)	83.3 (66.7–100)	83.3 (66.7–100)	91.7 (66.7–100)	91.7 (75.0–100)
65- to 74-year olds	83.3 (62.5–91.7)	83.3 (66.7–91.7)	83.3 (66.7–100)	83.3 (66.7–100)	91.7 (75.0–100)	91.7 (75.0–100)
75 and older	77.8 (66.7–95.8)	83.3 (66.7–91.7)	75.0 (66.7–100)	79.2 (66.7–100)	87.5 (66.7–100)	83.3 (75.0–100)
Physical functioning	93.3 (70–100)	86.7 (66.7–93.3)	86.7 (73.3–100)	86.7 (66.7–100)	86.7 (73.3–100)	93.3 (80.0–100)
65- to 74-year olds	93.3 (80–100)	86.7 (66.7–93.3)	86.7 (78.3–95.0)	86.7 (70.0–96.7)	93.3 (73.3–100)	90 (80.0–100)
75 and older	86.7 (61.7–100)	86.7 (70.0–93.3)	86.7 (60.0–100)	86.7 (66.7–100)	86.7 (75.0–100)	93.3 (66.7–100)
Role functioning	100 (83.3–100)	83.3 (66.7–100)	100 (66.7–100)	100 (66.7–100)	100 (66.7–100)	100 (83.3–100)
65- to 74-year olds	100 (83.3–100)	83.3 (66.7–100)	100 (66.7–100)	83.3 (66.7–100)	100 (66.7–100)	100 (66.7–100)
75 and older	100 (66.7–100)	83.3 (66.7–100)	100 (66.7–100)	100 (66.7–100)	100 (83.3–100)	100 (83.3–100)
Cognitive functioning	100 (83.3–100)	83.3 (83.3–100)	91.7 (83.3–100)	100 (83.3–100)	100 (83.3–100)	100 (83.3–100)
65- to 74-year olds	100 (75.0–100)	91.7 (83.3–100)	83.3 (75.0–100)	100 (83.3–100)	100 (83.3–100)	83.3 (83.3–100)
75 and older	91.7 (83.3–100)	83.3 (66.7–100)	100 (83.3–100)	100 (83.3–100)	83.3 (83.3–100)	100 (83.3–100)
Social functioning	100 (83.3–100)	83.3 (58.3–100)	100 (66.7–100)	100 (66.7–100)	100 (83.3–100)	100 (83.3–100)
65- to 74-year olds	100 (83.3–100)	83.3 (50.0–100)	100 (66.7–100)	83.3 (66.7–100)	100 (66.7–100)	100 (83.3–100)
75 and older	100 (83.3–100)	83.3 (66.7–100)	100 (66.7–100)	100 (66.7–100)	100 (83.3–100)	100 (83.3–100)
Symptom scales ^c						
Fatigue	22.2 (11.1–38.9)	33.3 (22.2–55.6)	33.3 (11.1–44.4)	22.2 (11.1–44.4)	22.2 (11.1–33.3)	22.2 (0–33.3)
65- to 74-year olds	22.2 (0–33.3)	27.8 (11.1–55.6)	33.3 (11.1–44.4)	22.2 (11.1–44.4)	22.2 (11.1–44.4)	22.2 (0–33.3)
75 and older	22.2 (11.1–44.4)	33.3 (22.2–55.6)	33.3 (22.2–44.4)	27.8 (11.1–52.8)	22.2 (11.1–33.3)	22.2 (0–44.4)
Nausea–vomiting	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
65- to 74-year olds	0 (0–0)	0 (0–16.7)	0 (0–0)	0 (0–16.7)	0 (0–0)	0 (0–0)
75 and older	0 (0–0)	0 (0–0)	0 (0–16.7)	0 (0–0)	0 (0–0)	0 (0–0)
Pain	16.7 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)	0 (0–33.3)	16.7 (0–33.3)
65- to 74-year olds	16.7 (0–25.0)	16.7 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)
75 and older	8.3 (0–33.3)	16.7 (0–33.3)	16.7 (0–33.3)	0 (0–33.3)	0 (0–29.2)	16.7 (0–33.3)
Dyspnoea	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)
65- to 74-year olds	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	33.3 (0–33.3)	0 (0–33.3)
75 and older	0 (0–33.3)	33.3 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)
Insomnia	33.3 (0–50)	33.3 (0–33.3)	33.3 (0–33.3)	33.3 (0–33.3)	0 (0–33.3)	33.3 (0–33.3)
65- to 74-year olds	33.3 (0–33.3)	33.3 (0–33.3)	33.3 (0–33.3)	33.3 (0–33.3)	33.3 (0–33.3)	33.3 (0–33.3)
75 and older	33.3 (0–66.7)	33.3 (0–33.3)	33.3 (0–66.7)	16.7 (0–33.3)	0 (0–66.7)	0 (0–33.3)
Appetite loss	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)
65- to 74-year olds	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)
75 and older	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–25.0)	0 (0–33.3)
Constipation	0 (0–33.3)	0 (0–33.3)	0 (0–0)	0 (0–33.3)	0 (0–0)	0 (0–33.3)
65- to 74-year olds	0 (0–0)	0 (0–33.3)	0 (0–0)	0 (0–33.3)	0 (0–0)	0 (0–0)
75 and older	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)	0 (0–33.3)
Diarrhea	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
65- to 74-year olds	0 (0–0)	0 (0–0)	0 (0–33.3)	0 (0–0)	0 (0–0)	0 (0–0)
75 and older	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
Financial problems	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
65- to 74-year olds	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
75 and older	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)

QoL, quality of life.

^aAt baseline, there were sixty-five 65- to 74-year olds and forty-five ≥75 years, and at 12 months there were forty-eight 65- to 74-year olds and thirty-one ≥75 years.

^bFor the global health status/QoL and functional scales, 0 = poor functioning and 100 = highest level of functioning.

^cSymptom scales 0 = no symptoms and 100 = maximum symptomatology.

while almost a quarter of older persons experienced clinically relevant decline in their QoL during the first year, a third of the sample experienced a clinically relevant improvement in their

QoL despite undergoing cancer treatments. The remaining 40% experienced no clinically relevant change in their QoL. There was no difference between the younger and older participants

Table 4. Clinically relevant change in functional scales between two subsequent data collection cycles

EORTC QLQ-C30 scales ^a	0–1.5 months	1.5–3 months	3–4.5 months	4.5–6 months	6–12 months
Global health status/QoL					
Decline, <i>n</i> (%)	39 (39.4)	23 (23.7)	21 (22.6)	18 (20.0)	17 (21.5)
No change, <i>n</i> (%)	38 (38.4)	43 (44.3)	55 (81.7)	49 (54.4)	42 (53.2)
Improvement, <i>n</i> (%)	22 (22.2)	31 (32.0)	17 (18.3)	23 (25.6)	20 (25.3)
Emotional function					
Decline, <i>n</i> (%)	19 (19.2)	17 (17.5)	20 (21.5)	7 (7.8)	11 (13.9)
No change, <i>n</i> (%)	58 (58.6)	62 (63.9)	59 (63.4)	68 (75.6)	55 (69.9)
Improvement, <i>n</i> (%)	22 (22.2)	18 (18.6)	14 (15.1)	15 (16.7)	13 (16.5)
Physical function					
Decline, <i>n</i> (%)	25 (25.8)	12 (12.5)	13 (14.0)	9 (10.0)	12 (15.2)
No change, <i>n</i> (%)	61 (62.9)	68 (70.8)	72 (77.4)	70 (77.8)	59 (74.7)
Improvement, <i>n</i> (%)	11 (11.3)	16 (16.7)	8 (8.6)	11 (12.2)	8 (10.1)
Role function					
Decline, <i>n</i> (%)	40 (41.7)	16 (16.7)	29 (31.2)	20 (22.2)	16 (20.3)
No change, <i>n</i> (%)	41 (42.7)	40 (41.7)	48 (51.6)	42 (46.7)	47 (59.5)
Improvement, <i>n</i> (%)	15 (15.6)	40 (41.7)	16 (17.2)	28 (31.1)	16 (20.3)
Cognitive function					
Decline, <i>n</i> (%)	29 (29.3)	20 (20.8)	16 (17.4)	23 (25.6)	16 (20.5)
No change, <i>n</i> (%)	49 (49.5)	52 (54.8)	51 (55.4)	53 (58.9)	43 (55.1)
Improvement, <i>n</i> (%)	21 (21.2)	24 (25.0)	25 (27.2)	14 (15.6)	19 (24.4)
Social function					
Decline, <i>n</i> (%)	38 (40.0)	17 (18.1)	26 (28.0)	12 (13.3)	14 (17.2)
No change, <i>n</i> (%)	41 (43.2)	42 (44.7)	52 (55.9)	53 (58.9)	48 (60.8)
Improvement, <i>n</i> (%)	16 (16.8)	35 (37.2)	15 (16.1)	25 (27.8)	17 (21.5)

Clinically relevant decline or improvement is change >10 points compared with previous interview. EORTC QLQ-C30, European Organization for the Research and Treatment of Cancer Quality of Life Core Questionnaire with 30 items; QoL, quality of life.

^aDue to missing items, for some participants we were unable to calculate the scale score; therefore, the number of participants with no change/improvement or decline may vary for the different functional and symptom scales.

in this study. Furthermore, none of the sociodemographic, health, or functional status variables were associated with decline in QoL during the first year after diagnosis.

Our results are in agreement with the results of Esbensen et al. [34] who found that 30% of study participants deteriorated in global health status/QoL scale of >10 points in the first 6 months after diagnosis using the same measurement instrument and with only a slightly older sample (mean age 75.4 versus 74.2 in our study). When we compared our scores on the functional and symptom scales to those of a general population (the general German population aged 70 years and older [35]), the men in our study had slightly lower functional scale scores (indicating poorer functioning) and slightly higher symptom scale scores (indicating more symptoms) whereas the women in our study had slightly higher functional scale scores (indicating better functioning) and slightly lower symptom scale scores (indicating less symptoms). However, our sample is small, there were few men, and therefore, the results should be replicated in a larger study. Furthermore, there is the possibility

that a proportion of the 40% of participants we observed who neither decline nor improve was due to ceiling effects. In this study, the scores for the physical, role, social, and cognitive scales (indicating good functioning) and for most symptoms were very low (indicating few symptoms) and therefore these scores could not have improved very much. Hurria et al. [36] have reported no change in QoL during the first year in older adults with breast cancer receiving adjuvant treatment despite significant treatment toxicity using the Functional Assessment of Cancer Treatment and in a younger population (median age 68) with few women aged ≥75 years. The sample of Hurria et al. only included 49 patients, which might have led to non-significant findings. Wedding et al. [37, 38] have reported that before the start of chemotherapy depression, functional impairment and comorbid conditions were associated with poor QoL using the global health status/QoL scale of the EORTC QLQ-C30. In our study, mood impairment, functional impairment, and the number of comorbid conditions assessed before the start of treatment were not associated with decline in QoL during the course of treatment. Wedding et al. also observed no differences between elderly with cancer and without cancer; in both groups, severe disease requiring hospitalization led to a reduction in QoL. The participants in their study were all inpatients, whereas in our study they were outpatients, and thus less severely ill. This may explain the difference in findings.

It is important to understand the impact of cancer and its treatment on the QoL in older adults. It has been reported previously that older cancer survivors do worse in terms of functional status and QoL compared with older adults without cancer [39–41] but there are very few published studies that have examined this. There is currently limited research on QoL in older newly diagnosed cancer patients [42]. Although QoL is considered as an important end point in clinical trials, there are few older adults enrolled in clinical trials. A quality of life module for the Assessment of QoL in the Elderly patient with Cancer (QLQ-ELD-15) has been developed and will undergo further validation http://groups.eortc.be/qol/qolg_projects.htm#elderly.

In this study, we examined a variety of sociodemographic, health, and functional status variables. Nevertheless, there may be other causes of decline in QoL in older adults, such as aging, having the disease, or complications of the disease and treatment. Further studies with larger samples are needed to evaluate which factors influence changes in QoL after the diagnosis during cancer treatment in older adults. This knowledge will aid in the development of interventions improving QoL for older cancer patients during cancer treatment.

A limitation of our study was our small relatively heterogeneous sample with regard to cancer diagnosis, stage, and treatment received as it was designed as a pilot study and recruitment took place in only one cancer treatment center. A strength of our study on the other hand is that we measured QoL every 6 weeks for the first 6 months as well as at 12 months, allowing us to examine the changes over time during the first year after diagnosis during cancer treatment. Due to the small numbers in each of the groups,

Table 5. Description of Characteristics at baseline of those who declined, stable, or improved in global health status/QoL between baseline and 12 months

Characteristics at baseline	Decline, N = 18 (%)	No change, N = 34 (%)	Improvement, N = 26 (%)
Median age at baseline (interquartile range)	73.2 (68.1, 76.2)	73.3 (69.1, 77.6)	74.5 (69.1, 78.9)
Sex % women	16 (88.9)	26 (76.5)	16 (61.5)
Living alone	8 (44.4)	11 (32.4)	12 (46.2)
Social support available	11 (61.1)	27 (79.4)	18 (71.8)
Lung cancer diagnosis versus other	2 (11.1)	6 (17.6)	7 (26.9)
Advanced stage of disease (stage 3–4)	6 (33.3)	6 (17.5)	14 (58.3)*
Extensive treatment received during first 6 months after diagnosis	8 (44.4)	9 (26.5)	13 (50.0)
Median number of comorbid conditions (interquartile range)	1.5 (0, 3)	2.0 (1, 3)	1.5 (0, 3)
ECOG PS \geq 1	2 (11.1)	8 (23.5)	10 (38.5)
Presence of functional limitations	6 (33.3)	9 (26.5)	7 (26.9)
Presence of IADL disability	3 (16.7)	8 (23.5)	11 (42.5)
Presence of ADL disability	2 (11.1)	1 (2.9)	3 (11.5)
Presence of mood disturbance	1 (5.6)	8 (24.2)	8 (30.8)

ADL, activities of daily living; ECOG PS, Eastern Cooperative Oncology Group performance status; IADL, instrumental activities of daily living; QoL, quality of life.

* $P < 0.05$.

we could not conduct statistical analysis examining if changes over time were different between groups. Due to the small sample, we could not examine the effect of each of the different modalities of cancer treatment separately and we have used a rather cruder measure to indicate who had received extensive treatment or not. Another limitation is our loss to follow-up and this loss to follow-up was mostly due to mortality. This might have led to an underestimate of the number of older cancer patients with a clinically relevant decline in QoL as they scored at baseline on the physical functioning scale.

In conclusion, almost a quarter of newly diagnosed older adults experienced clinically relevant decline in their QoL. Decline in QoL might be a consequence of aging, cancer itself, the treatment, or the complications of treatment. More research is needed on which factors influence decline in QoL in older adults undergoing cancer treatment.

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disclosure

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