Research

Quality of life in lung cancer patients: does socioeconomic status matter?

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Abstract

Background: As part of a prospective study on quality of life in newly diagnosed lung cancer patients an investigation was carried out to examine whether there were differences among patients' quality of life scores and their socioeconomic status.

Methods: Quality of life was measured at two points in time (baseline and three months after initial treatment) using three standard instruments; the Nottingham Health Profile (NHP), the European Organization for Research and Cancer Treatment Quality of Life Questionnaire (EORTC QLQ-C30) and its lung cancer supplement (QLQ-LC13). Socioeconomic status for each individual patient was derived using Carstairs and Morris Deprivation Category ranging from 1 (least deprived) to 7 (most deprived) on the basis of the postcode sector of their address.

Results: In all, 129 lung cancer patients entered into the study. Of these data for 82 patients were complete (at baseline and follow-up). 57% of patients were of lower socioeconomic status and they had more health problems, less functioning, and more symptoms as compared to affluent patients. Of these, physical mobility (P = 0.05), energy (P = 0.01), role functioning (P = 0.04), physical functioning (P = 0.03), and breathlessness (P = 0.02) were significant at baseline. However, at follow-up assessment there was no significant difference between patient groups nor did any consistent pattern emerge.

Conclusion: At baseline assessment patients of lower socioeconomic status showed lower health related quality of life. Since there was no clear trend at follow-up assessment this suggests that patients from different socioeconomic status responded to treatment similarly. In general, the findings suggest that quality of life is not only the outcome of the disease and its treatment, but is also highly dependent on each patients' socioeconomic characteristics.

Background

Lung cancer is one of the common cancers among males and females worldwide [1]. It is well known that lower socioeconomic background as measured by educational level, occupational status, house ownership and level of income are all associated with an increased risk of lung cancer [e.g. [2,3]]. Thus most lung cancer patients are from disadvantaged populations. On the other hand since

survival in lung cancer patients is poor, quality of life is considered to be an important outcome in patients who develop the disease [4]. Studies have shown that quality of life in lung cancer patients is a significant predictor of survival and therefore it should be considered as a clinical status that has to be established by physicians before treatment starts [5]. However, little is known about quality of life and its relationship to patients' socioeconomic status. Few studies exist that address the issue in cancer patients in general but controversial results have been reported. Some showed that cancer patients of lower socioeconomic status have lower health related quality of life [6], and others found no significant difference between affluent and deprived cancer patients with regard to their quality of life [7]. In studies of quality of life in lung cancer patients the only investigation that acknowledges the issue of patients' socioeconomic status observed a greater disruption in quality of life in patients with low income [8].

This paper reports on data from a prospective study of quality of life in lung cancer patients and examines whether there is a difference in quality of life in lung cancer patients from different socioeconomic groups.

Methods

This was a prospective study of quality of life in lung cancer patients. The design, the method of data collection and the study findings are explained elsewhere [9]. Here the focus is on quality of life and patients' socioeconomic status. In summary, patients' quality of life was assessed in two points in time: baseline and three months after initial treatment (follow-up) using three standard measures; the Nottingham Health Profile (NHP) [10], the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30) [11], and the EORTC Lung Cancer Questionnaire (EORTC QLQ-LC13) [12]. Data were collected during one complete calendar year (January to December 1995) with the intention of interviewing all new lung cancer patients attending the chest clinic of a large teaching and district general hospital (Stobhill NHS Trust) in the northern sector of Glasgow. Permission was obtained from the hospital ethics committee, clinicians, and the patients. Socio-economic status was indicated by each patient's postcode of residence using the Carstairs and Morris Deprivation Categories [13]. This is a well-established measure of socioeconomic status in Scotland and it ranges from 1 (least deprived) to 7 (most deprived). For the analysis, deprivation category was recoded into two categories, affluent/intermediate and deprived. Data on demographic characteristics of the patients and clinical information including weight loss, histology, extent of disease, and treatment were extracted from case records. Since patients' scores in most measures were not normally distributed, non-parametric tests were

applied. The Mann-Whitney test was carried out to test whether patients scored differently based on their socioeconomic status.

Results

Patients' characteristics
Patients' characteristics are shown in Table 1. Seventy-seven patients (60%) were male, the mean age was 67.5 years (SD = 9.1), mostly married (n = 77, 60%) and from severely socioeconomic deprived areas (n = 74, 57%). The majority of the patients had intrathoracic tumours (TNM stage I-III; n = 101, 78%). Eighty-one patients (63%) had an active treatment as their initial management (chemotherapy = 36, radiotherapy = 39, surgery = 6), whereas the remaining 48 (37%) received 'best supportive care'.

At follow-up 96 (74%) patients were alive. Of these 82 (64%) agreed to be re-interviewed. Of the remaining 14 patients, 6 were terminally ill and 8 refused. Thus, only 82 patients who had complete data (baseline and three months after) were used in the analysis. The treatment modalities for those who were followed-up consisted of chemotherapy (n = 25), radiotherapy (n = 29), surgery (n = 6), and best supportive care (n = 22). However, the 82 patients who were followed up were similar to the 129 patients seen initially in terms of their baseline demographic and clinical characteristics. Further cross tabulations between patients' demographic and clinical status and deprivation category indicated that there were no significant differences between patients of different social background (data are not shown and is available from the corresponding author).

General Health
Patients' general health as measured by the NHP is shown in Table 2. Both at baseline and follow-up patients with lower socioeconomic status showed higher perceived health problems, although the difference was not significant on almost all measures except for physical mobility and energy at baseline assessment (P = 0.05, P = 0.01, respectively).

Functioning and global quality of life
Patients' functioning and global quality of life scores as measured by the EORTC QLQ-C30 are shown in Table 3. In general deprived patients had lower functioning and global quality of life at baseline. Of these, patients' role and physical functioning were significantly different (P = 0.04, P = 0.03, respectively). However, at follow-up assessment there were no significant differences between patients groups. Deprived patients scored slightly higher on three measures; cognitive, social and emotional functioning and lower on other three measures; role and physical functioning and global quality of life (the higher

Table 1: Lung cancer patients' socio-demographic and clinical characteristics

	Baseline sample (n = 129) No. (%)	Follow-up sample (n = 82) No. (%)
Gender		
Male	77 (60)	48 (58)
Female	52 (40)	34 (42)
Age (year)		
Mean (SD)	67.5 (9.1)	66.2 (8.6)
Marital status		
Married	77 (60)	50 (61)
Widowed/divorced	45 (35)	28 (34)
Single	7 (5)	4 (5)
Deprivation category		
Affluent/intermediate	55 (43)	35 (43)
Deprived	74 (57)	47 (57)
Cell type		
Small cell	27 (21)	18 (22)
Non-small cell	67 (52)	44 (54)
Unspecified	35 (27)	20 (24)
Extent of disease		
Limited	101 (78)	70 (85)
Extensive	28 (22)	12 (15)
Initial treatment		
Chemotherapy	36 (28)	25 (31)
Radiotherapy	39 (30)	29 (35)
Surgery	6 (5)	6 (7)
Best supportive care	48 (37)	22 (27)
Weight loss*		
Possible weight loss	12 (9)	7 (9)
Significant weight loss	51 (40)	33 (40)
Weight steady	40 (31)	26 (32)
No comment	26 (20)	16 (19)

* Significant weight loss = 10% weight lost during 6 months prior to diagnosis. Possible weight lost = although it was not clear whether a patient had a significant weight loss or not, the consultant commented in the case record that the patient had possible weight loss.

Table 2: Patients' baseline and follow-up scores on the NHP (the higher values indicate more perceived health problems, min.: 0, max.: 100)

	Baseline			Follow-up		
	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*
Physical mobility	17.4 (3.6)	28.5 (3.9)	0.05	29.8 (4.4)	38. 9 (4.9)	0.20
Energy	22.4 (5.5)	41.9 (5.7)	0.01	44.1 (6.4)	56.3 (5.6)	0.15
Social isolation	10.6 (3.8)	13.2 (3.4)	0.43	17.8 (4.3)	19.7 (3.9)	0.81
Emotional reactions	19.2 (3.8)	25.0 (3.6)	0.20	24.6 (4.6)	32.1 (4.4)	0.29
Pain	15.6 (3.9)	25.2 (4.4)	0.06	21.9 (4.0)	27.9 (4.3)	0.37
Sleep	31.6 (4.9)	38.9 (4.9)	0.36	29.1 (5.1)	37.6 (4.7)	0.19

SE = standard error of mean. * Mann-Whitney test.

Table 3: Patients' baseline and follow-up functioning and global quality of life scores on the EORTC QLQ-C30 (the higher values indicate a higher level of functioning and quality of life, min.: 0, max.: 100)

	Baseline			Follow-up		
	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*
Role functioning	72.8 (5.9)	58.5 (4.9)	0.04	52.8 (5.0)	41.5 (4.4)	0.09
Physical functioning	74.3 (3.7)	61.7 (3.8)	0.03	58.8 (4.2)	53.6 (3.6)	0.33
Cognitive functioning	85.2 (3.4)	86.9 (3.1)	0.69	77.6 (4.4)	83.0 (3.3)	0.34
Social functioning	86.6 (3.9)	85.8 (3.7)	0.96	80.9 (4.1)	82.9 (3.2)	0.77
Emotional functioning	80.0 (3.4)	78.2 (3.4)	0.84	74.5 (3.5)	76.8 (3.4)	0.41
Global quality of life	56.9 (3.3)	51.4 (3.5)	0.18	53.8 (4.3)	50.3 (3.8)	0.59

SE = standard error of mean. * Mann-Whitney test.

values indicate a higher level of functioning and quality of life).

Main Symptoms

Patients' baseline and follow-up symptom scores as measured by the EORTC QLQ-C30 and QLQ-LC13 are listed in Table 4. At baseline except on one measure (pain in other sites of the body) deprived patients showed a greater degree of symptoms (12 out of 13 measures). Of these, significant differences were observed on measures of breathlessness (P = 0.02) and peripheral neuropathy (P = 0.01). However, at follow-up assessment there was no clear trend and even in some measures such as pain, appetite loss and financial difficulties less deprived patients scored higher indicating that they had a greater degree of symptoms and difficulties (Table 4).

Discussion

This was a prospective study of quality of life in lung cancer patients. The focus here was on patients' socioeconomic status and its relationship to their quality of life. Since there were no significant differences between patients' demographic, clinical status and socioeconomic status, there was no evidence to suggest that deprived patients had more advanced disease at baseline. However, it was found that in most measures deprived patients had lower health-related quality of life. Performing more advanced analysis (regression analysis), studies have used overall health related quality of life as an outcome measure (sum of the five subscales of the Functional Assessment of Cancer Therapy-FACT-Scale) with performance status, disease site, disease stage, socioeconomic status, spiritual beliefs, gender, and other relevant variables as independent variables and found no significant effects of socioeconomic status on the reporting of overall health related quality of life [7]. However, it is worth noting that studies that perform more advanced analysis have their own limitations. The problem with more advanced analysis is that calculated overall scores were used where the

instrument did not provide such summary measures and this undermines the validity of the results reported.

There is a commonly held belief that patients of lower socioeconomic status tend to have a worse quality of life both at the time of disease diagnosis and following their cancer treatment. This has been confirmed in studies of quality of life in prostate cancer where socioeconomic status was measured by annual income [14]. In contrast when education was used as an indicator of socioeconomic status, higher education was found to be independent predictor of worse quality of life following treatment [15]. We used the Carstaris and Morris deprivation category which is a well-validated index in Scotland for indicating individuals' socioeconomic status based on place of residence. Several studies of cancer epidemiology and cancer care have used this index and showed that it is a valid measure of socioeconomic status [16]. However, it is important to notice that indicators of socioeconomic status may differ within different societies and this should be taken into account when such indexes are used to evaluate quality of life.

Our findings indicated that patients from lower socioeconomic backgrounds showed more problems with physical mobility, energy, role and physical functioning. This difference was more marked at baseline indicating that greater attention should be paid to improving those domains which are important to patients' quality of life especially those of lower social class. It has been shown that functional impairment is the most important risk factor that contributes to increased depression in lung cancer patients [17].

Considering patients' symptom scores it seems that at baseline patients of lower socioeconomic status had more symptoms compared to less deprived patients and these were significant on measures of breathlessness, and peripheral neuropathy. At follow-up the difference did

Table 4: Patients' baseline and follow-up symptoms scores on the EORTC QLQ-C30 and QLQ-LC13 (the higher values indicate a greater degree of symptoms, min.: 0, max.: 100)

	Baseline			Follow-up		
	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*	Affluent/intermediate (n = 35) Mean (SE)	Deprived (n = 47) Mean (SE)	P*
Cough	44.7 (5.8)	53.9 (4.2)	0.19	33.3 (4.3)	41.1 (4.8)	0.33
Haemoptysis	9.5 (3.7)	11.3 (3.5)	0.72	1.0 (0.9)	6.4 (2.8)	0.11
Dyspnoea	27.8 (4.6)	41.6 (3.7)	0.02	30.7 (4.4)	39.5 (4.1)	0.17
Pain (overall)	23.3 (3.7)	24.8 (3.9)	0.92	25.2 (4.7)	23.7 (4.2)	0.52
Pain in chest	16.2 (4.2)	26.2 (4.4)	0.12	22.8 (4.9)	25.5 (5.0)	0.91
Pain in shoulder	17.1 (4.6)	19.8 (4.1)	0.62	28.6 (6.0))	24.1 (4.7)	0.61
Pain elsewhere	25.7 (5.1)	15.6 (4.0)	0.07	22.8 (4.9)	18.4 (4.4)	0.37
Fatigue	26.0 (4.2)	38.3 (4.3)	0.06	34.9 (4.3)	43.7 (4.0)	0.17
Nausea and vomiting	7.6 (2.3)	7.8 (2.6)	0.65	15.2 (3.9)	9.9 (2.6)	0.35
Peripheral neuropathy	3.8 (3.0)	18.4 (4.7)	0.01	19.0 (4.6)	16.3 (3.8)	0.66
Appetite loss	22.8 (4.5)	36.9 (5.4)	0.12	33.3 (5.4)	31.2 (5.0)	0.68
Sleep difficulties	27.6 (5.7)	31.2 (5.6)	0.81	24.7 (4.8)	24.8 (5.2)	0.66
Financial difficulties	6.6 (3.0)	8.5 (3.1)	0.87	11.4 (4.5)	7.1 (3.2)	0.40

SE = standard error of mean. * Mann-Whitney test.

not show a clear trend perhaps indicating that both groups of patients responded to treatment in a similar way. Similar findings have been reported in prostate cancer patients when comparing patients of lower socioeconomic status with patients of higher social class [14].

In general the difference in quality of life measures was more profound at baseline than at 3 months in patients of lower socioeconomic status compared to that of higher status patients. This might reflect the fact that baseline quality of life is a better indicator when comparing quality of life in patients with different socioeconomic backgrounds. Such observation also might explain why baseline quality of life is a significant predictor of survival among lung cancer patients and other tumor types [5,18].

We used three standard instruments to measure quality of life; a general health (NHP), a cancer-specific (QLQ-C30) and a site-specific (QLQ-LC13) questionnaire. Of these, the NHP showed a better performance in discriminating between patient groups both at baseline and follow-up assessments but the EORTC questionnaires were able to show a trend only at baseline assessment. One explanation is that the NHP was developed in the United Kingdom and thus it was a more culturally sensitive instrument. In contrast one might argue that since the EORTC QLQ-C30 and QLQ-LC13 were cancer-specific, these instruments were therefore more accurate in measuring changes that happened over time. In other words if these questionnaires did not show a clear trend at follow-up assessment this may indicate that both patient groups responded to treatment in a relatively similar fashion. This may again prove that the role of socioeconomic sta-

tus is important at baseline but not at follow-up assessments.

Conclusion
The findings indicated that patients of lower socioeconomic status had more health problems, less functioning and global quality of life, and a higher degree of symptoms at baseline assessment. However, at follow-up assessment the results were not conclusive but in general the findings suggest that quality of life is not only the outcome of the disease, but is also highly dependent on each patients' socioeconomic characteristics. The findings also indicate that there is need for more investigation on the topic as socioeconomic status plays an important role in patients' perceptions of quality of life.

List of abbreviations
NHP: the Nottingham Health Profile; EORTC QLQ-C30: the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire; EORTC QLQ-LC13: the European Organization for Research and Treatment of Cancer Lung Cancer Questionnaire; FACT: the Functional Assessment Cancer Therapy Scale; SF-36: the Short Form Health Survey; SE = Standard error of mean.

Competing interest
None.

Authors' contribution
AM was the main investigator, collected and analyzed the data, and wrote the paper. DJH contributed to analysis of the data and final draft of the paper. RM contributed to the study design, patient recruitment and data collection.

JM and CRG contributed to study design and supervised the project.

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