

# The prevalence and nature of supportive care needs in lung cancer patients

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## ABSTRACT

**Purpose** In the present work, we set out to comprehensively describe the unmet supportive care and information needs of lung cancer patients.

**Methods** This cross-sectional study used the Supportive Care Needs Survey Short Form 34 (34 items) and an informational needs survey (8 items). Patients with primary lung cancer in any phase of survivorship were included. Demographic data and treatment details were collected from the medical charts of participants. The unmet needs were determined overall and by domain. Univariable and multivariable regression analyses were performed to determine factors associated with greater unmet needs.

**Results** From August 2013 to February 2014, 89 patients [44 (49%) men; median age: 71 years (range: 44–89 years)] were recruited. The mean number of unmet needs was 8 (range: 0–34), and 69 patients (78%) reported at least 1 unmet need. The need proportions by domain were 52% health system and information, 66% psychological, 58% physical, 24% patient care, and 20% sexuality. The top 2 unmet needs were “fears of the cancer spreading” [ $n = 44$  of 84 (52%)] and “lack of energy/tiredness” [ $n = 42$  of 88 (48%)]. On multivariable analysis, more advanced disease and higher MD Anderson Symptom Inventory scores were associated with increased unmet needs. Patients reported that the most desired information needs were those for information on managing symptoms such as fatigue (78%), shortness of breath (77%), and cough (63%).

**Conclusions** Unmet supportive care needs are common in lung cancer patients, with some patients experiencing a very high number of unmet needs. Further work is needed to develop resources to address those needs.

**Key Words** Lung cancer, supportive care, quality of life, survivorship, patient education

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## INTRODUCTION

Lung cancer is the 2nd most common cancer and the most common cause of cancer death in North America, with an estimated 224,210 cases in the United States and 26,100 cases in Canada in 2014<sup>1,2</sup>. Treatment for lung cancer can lead to physical disability, psychological distress, and increased health care needs<sup>3–5</sup>. However, with advances in surgery, chemotherapy, targeted agents, and radiation therapy, more patients are receiving curative treatment, being cured of lung cancer, and living longer after treatment<sup>6,7</sup>.

A cancer survivor can be defined as any individual with cancer from the point of diagnosis to treatment and beyond, thus comprising the entire patient journey<sup>8</sup>.

Advances in diagnosis and treatment have resulted in a growing prevalence of lung cancer survivors with potentially unique and multiple supportive care needs<sup>9</sup>.

Patients with lung cancer constitute a unique population of cancer patients who likely have disease-specific supportive care needs. Supportive care can be defined as “care that helps a person with cancer and their family cope with cancer and its treatment, from diagnosis through treatment and cure, continuing through illness or death, and bereavement”<sup>10</sup>. Examples include symptom management, assistance with transportation, provision of health information, food preparation and other activities of daily living (ADLs), and psychological support and counselling services<sup>11</sup>. An unmet supportive care need can then be

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defined as “those needs which lack the level of service or support an individual perceives is necessary to achieve optimal well-being”<sup>12</sup>. Unmet supportive care needs can occur across the supportive care domains of information, symptom management, psychosocial support, and support for daily activities<sup>12</sup>.

There is a dearth of data on the long-term needs of lung cancer survivors. A systematic review<sup>13</sup> reported that 59 studies published up to September 2012 had identified diverse needs in lung cancer patients; however, most addressed advanced lung cancer patients. In addition, most of the studies were qualitative in nature, and many of the ones that were quantitative did not use validated instruments. A recent qualitative study from Australia confirmed the complex needs of lung cancer patients and the underutilization of supportive services<sup>14</sup>, consistent with the existing literature<sup>15–17</sup>. Compared with other cancer patients, lung cancer patients have been reported to have a greater number of unmet needs<sup>18</sup>; however, the specific nature of those needs and patient priorities for assistance have not been described.

The purpose of the present study was to assess the frequency and nature of supportive care needs in patients with lung cancer and to identify characteristics that predict for unmet needs.

## METHODS

### Study Design

This cross-sectional study of primary lung cancer patients from August 2013 to February 2014 was conducted at the Princess Margaret Cancer Centre in Toronto, Ontario, after research ethics board approval. Participants completed a survey package that included the Supportive Care Needs Survey Short Form 34 (SCNS-SF34)<sup>19</sup>, an in-house developed information needs survey (8 items)<sup>20,21</sup>, the MD Anderson Symptom Inventory (MDASI)<sup>22</sup>, an ADLs questionnaire<sup>23</sup>, and a quality-of-life subscale from the European Organisation for Research and Treatment of Cancer's QLQ-C30 questionnaire<sup>24</sup>. Surveys were completed by participants in the outpatient lung cancer clinic. Demographic and treatment data were collected from medical charts. Patients were included if they were able to speak and read English, were 18 years or older, were able to provide informed consent, and were undergoing or had undergone treatment for primary lung cancer. Participants who had serious cognitive or psychological difficulties, who were too unwell to participate, or who presented in clinic with metastasis to the lung from a different primary site were excluded.

### Measures

#### Demographics

Marital status, level of education, primary language, and ADLs were collected from the self-administered demographic survey completed by participant. Other information such as age, sex, disease type and stage, and treatment details were obtained from the electronic medical records of the participants. The ADLs instrument covered 7 items, including use of the telephone, travel, shopping, meal preparation, housework, medication administration, and

money management, which were rated as able to be performed without help (score 1) or with some help (score 2) or were completely unable to be performed (score 3). A total score for each patient was calculated by summing the scores for each of the 7 items.

### Quality of Life and Symptom Severity

To measure overall quality of life, two standalone items from the QLQ-C30 that ask survivors to rate their overall health and overall quality of life in the preceding week on a scale from 1 (“very poor”) to 7 (“excellent”) were used. A score of 5 or higher was deemed “high” for both overall health and overall quality of life.

To measure symptom severity, the MDASI was used. The MDASI is a multi-symptom patient-reported outcome measure that includes 19 core items found to have the highest frequency and severity in patients having various cancers and receiving various treatment types<sup>22</sup>. It assesses the severity of symptoms at their worst in the preceding 24 hours on a scale from 0 (“not present”) to 10 (“as bad as you can imagine”). The MDASI severity scale is the prorated total of 13 MDASI items (pain, fatigue, nausea, disturbed sleep, distress, shortness of breath, remembering things, lack of appetite, drowsiness, dry mouth, sadness, vomiting, and numbness). The MDASI also measures the extent to which symptoms interfere with daily activities, also measured from 0 (“did not interfere”) to 10 (“interfered completely”). The mean of the interference is used to represent overall symptom distress; the MDASI interference scale is the prorated total of 6 interference items (general activity, mood, work, relations with other people, walking, and enjoyment of life).

### Supportive Care Needs

To measure the number and type of unmet supportive care needs experienced by lung cancer patients, we used the validated SCNS-SF34. For each item, respondents were asked to indicate their level of need for help during the preceding month as a result of having cancer. Each of the 34 unmet need items were scaled from 1 to 5 (1, “not applicable”; 2, “satisfied”; 3, “low need”; 4, “moderate need”; 5, “high need”). An assigned score of 3, 4, or 5 indicates that this particular item is an unmet need. For analysis purposes, each item was considered to represent “no need” (score of 1 or 2) or “some unmet need” (score of 3, 4, or 5), per the recommendation of the survey authors. The proportion of patients with unmet needs was reported for each item. In addition, for each unmet need, participants were asked to indicate if they would like help with the particular need, with the potential answers being “no,” “yes,” and “uncertain.” For each unmet need, the proportion of individuals interested in help was reported.

Items on the SCNS-SF34 are grouped into 5 domains of need: health systems and information, psychological, physical and daily living, patient care and support, and sexuality. The health systems and information domain assesses needs related to the treatment centre and to information about the disease, diagnosis, treatment, and follow-up (11 items on the survey). The psychological domain assesses needs related to emotions and coping (10 items). The physical and daily living domain assesses needs

related to coping with physical symptoms, side effects of treatment, and performance of usual tasks and activities (5 items). The patient care and support domain assesses needs related to health care providers showing sensitivity to physical and emotional needs, privacy, and choice (5 items). Finally, the sexuality domain assesses needs related to sexual relationships and changes to sexuality (3 items). The Likert summary score for the 5 domains was calculated per the instructions from the survey authors.

### Information Needs

Currently, no validated information needs instrument has been developed for cancer survivors. A modified instrument originally designed by content experts in Patient Education and Survivorship at Princess Margaret Cancer Centre for previous work in other cancer sites was therefore used<sup>20,21</sup>. That 8-item tool was designed specifically to assess patient preferences for various potential information needs (for example, drug coverage, legal issues, sick leave from work, symptom management, etc.). Each of the 8 items asked participants how important that item was for their day-to-day lives (1, “not important”; 2, “important”; 3, “very important”; and “not applicable”). Each item was scored as “no need/no information need” (score of 1) or “some need/some information need” (score of 2 or 3).

### Statistical Analysis

Demographic data are summarized using descriptive statistics. Each instrument was scored according to the developer’s recommendations. The primary outcomes are the overall supportive care needs and the level of need by domain. The overall supportive care needs were calculated as the number of unmet needs per patient. The Likert summary scores were calculated to determine the level of the survivorship need in each domain (maximum domain scores: 55 for the health system and information domain, 50 for the psychological domain, 25 for the physical domain, 25 for the patient care domain, and 15 for the sexuality domain). To test associations of predictors with the overall supportive care need and the level of need in each domain, univariable and multivariable regression analyses were performed. Variables with *p* value if 0.25 or less on univariable analysis were included in a stepwise variable selection for the multivariable regression analysis.

## RESULTS

### Demographic Information

Between August 2013 and February 2014, 89 participants completed the study questionnaire package. The median age of participants was 71 years (range: 44–89 years), and 44 (49%) were men. At least some college education had been attained by 46 (52%), and most participants (91%) lived at home. Most participants spoke English (89%) and had adequate access to e-resources such as a computer, the Internet, or a smartphone (76%).

In 44 participants (49%), the diagnosis was adenocarcinoma; 16 (18%) had squamous cell carcinoma, and 9 (10%) had small-cell lung cancer. The overall quality of life was relatively good in this population, with 59 participants (66%) scoring 5 or greater (where 7 was “excellent”) on

the overall health scale, and 61 (69%) scoring 5 or greater (where 7 was “excellent”) on the overall quality-of-life scale. Requirement for help with ADLs varied depending on the type of activity, with “housework” and “shopping” being the activities that participants required the most help with (38% and 21% requiring help respectively), and “using the telephone” and “taking your own medicine” being the activities that they required the least amount of help with (6% and 5% requiring help respectively). The mean MDASI severity and MDASI interference scores were  $26.5 \pm 25.4$  and  $14.3 \pm 15.1$  respectively. Table 1 reports demographic characteristics and quality of life variables.

### Supportive Care Needs

The mean overall supportive care needs score was  $7.6 \pm 7.9$  unmet needs per patient. Of all participants, 69 (78%) reported at least 1 unmet supportive care need; 2 (2%) had a very high number of needs (30 and 35). Figure 1 summarizes the proportions of unmet needs for the participating patients. Table 2 presents the number of patients experiencing each unmet need and the number interested in assistance with each need, by domain. The top 3 unmet needs were “fears of the cancer spreading” [ $n = 44$  of 84 responding (52%)], “lack of energy/tiredness” [ $n = 42$  of 88 responding (48%)], and “uncertainty about the future” [ $n = 38$  of 87 responding (44%)]. The top 3 unmet needs for which patients were interested in obtaining help were “having one member of the hospital staff with whom you can talk about all aspect of your condition” [ $n = 11$  of 19 responding (58%)], “work around the home” [ $n = 11$  of 20 responding (55%)], and “being informed about things you can do to get well” [ $n = 9$  of 18 responding (50%)]. The means of the domain total scores were  $20.1 \pm 7.4$  for the health system and information domain,  $21.1 \pm 9.5$  for the psychological domain,  $10.3 \pm 5.0$  for the physical domain,  $8.3 \pm 3.5$  for the patient care domain, and  $4.0 \pm 2.0$  for the sexuality domain. The proportion of patients who reported at least 1 unmet need by domain was 52% for the health system and information domain, 66% for the psychological domain, 58% for the physical domain, 24% for the patient care domain, and 20% for the sexuality domain.

On univariable analysis, younger age, higher nodal stage, requiring assistance with ADLs, worse self-reported health, worse quality of life, and higher scores on the MDASI were associated with an increased overall number of supportive care needs. On multivariable analysis, higher nodal stage, metastatic disease, and a higher MDASI interference score were significantly associated with increased unmet needs (Table 3).

On univariable and multivariable analysis of the factors associated with an increased number of unmet needs across all 5 domains, an increasing MDASI interference score was indicative (Table 4).

### Information Needs

Information selected as the most desired (Table 5) was managing symptoms such as tiredness (78%), shortness of breath (77%), and cough (63%); information selected as the least desired was sick leave (12%) and returning to work (16%).

**TABLE 1** Patient and disease characteristics

Characteristic	Value
Patients (n)	89
Age (years)	
Median	71
Range	44–89
Sex [n (%)]	
Men	44 (49)
Women	45 (51)
Education [n (%)]	
≥Some college or university	46 (52)
<Some college or university	43 (48)
Living alone [n (%)]	
Yes	29 (33)
No	60 (67)
Married or common law [n (%)]	
Yes	52 (58)
No	37 (42)
Language spoken [n (%)]	
English	77 (89)
Other	10 (11)
Access to e-resources [n (%)]	
Yes	68 (76)
No	21 (24)
Overall health <sup>a</sup> [n (%)]	
≥5	59 (66)
<5	30 (34)
Overall quality of life <sup>a</sup> [n (%)]	
≥5	61 (69)
<5	28 (31)
Requires help with ADLs <sup>b</sup> [n (%)]	
Use the telephone	4 (5)
Non-walking transportation	11 (12)
Shop	18 (21)
Prepare meals	16 (18)
Do housework	33 (38)
Take own medicine	5 (6)
Handle own money	7 (8)
Mean MDASI symptom severity	26.5±25.4
Mean MDASI symptom interference	14.3±15.1
T Stage [n (%)]	
Tx–1	43 (48)
T2	32 (36)
T3	6 (7)
T4	8 (9)
N Stage [n (%)]	
Nx–1	67 (75)
N2	15 (17)
N3	7 (8)

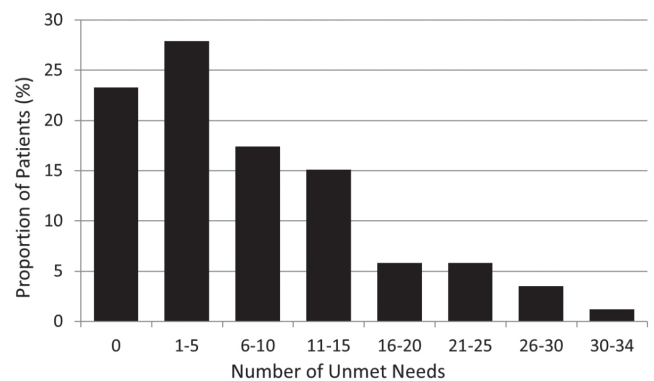
M Stage [n (%)]	
Mx–0	81 (91)
M1	8 (9)

Histology [n (%)]	
Adenocarcinoma	44 (49)
Squamous cell carcinoma	16 (18)
Large cell carcinoma	6 (7)
Small cell carcinoma	9 (10)
Mesothelioma	3 (3)
Thymoma	4 (5)
Others	7 (8)

<sup>a</sup> Scale of 1–7.

<sup>b</sup> Score of 11 or more of 21.

ADLs = activities of daily living; MDASI = MD Anderson Symptom Inventory.

**FIGURE 1** Distribution of lung cancer patients with unmet supportive care needs.

## DISCUSSION

Our study characterizes the nature of unmet supportive care and information needs in lung cancer patients and the relationships of those needs with demographic characteristics, quality of life, symptoms, and functioning. It also reports patient priorities for assistance with unmet needs.

Our data demonstrate that almost 8 of every 10 of lung cancer patients (78%) have a least 1 unmet need, and that the mean number of unmet needs is 8. The domains with the highest proportion of unmet needs are the psychological and physical domains. In a study of patients with diverse cancer diagnoses, significantly more unmet needs were reported by lung cancer patients than by patients with other cancer diagnoses within their first 6 months after diagnosis<sup>18,25</sup>. That observation is likely a result of the nature of lung cancer patients, who are more likely to have a lower socioeconomic status, to come from an ethnic minority group, and to be elderly<sup>2</sup>. Older patients often have comorbid conditions, reduced functioning, and less physical reserve to tolerate treatment<sup>26,27</sup>. Those sociodemographic factors might in part explain the nature of the unmet needs seen in lung cancer patients.

**TABLE II** Unmet needs experienced by lung cancer patients

Item	Domain	Survey responses [n (%)]	
		Endorsed as unmet	Want help with item
1. Pain	Physical	19/89 (21)	7/19 (37)
2. Lack of energy or tiredness	Physical	42/88 (48)	15/41 (36)
3. Feeling unwell a lot of the time	Physical	26/88 (30)	12/26 (46)
4. Work around the home	Physical	20/87 (23)	11/20 (55)
5. Not being able to do the things you used to	Physical	32/86 (37)	15/32 (47)
6. Anxiety	Psychological	29/87 (33)	10/29 (35)
7. Feeling down or depressed	Psychological	27/87 (31)	10/27 (37)
8. Feelings of sadness	Psychological	19/84 (23)	4/19 (21)
9. Fears of the cancer spreading	Psychological	44/84 (52)	16/44 (36)
10. Worry that the results are out of your control	Psychological	29/86 (34)	7/29 (24)
11. Uncertainty about the future	Psychological	38/87 (44)	13/38 (34)
12. Learning to feel in control of your situation	Psychological	25/87 (29)	9/25 (36)
13. Keeping a positive outlook	Psychological	24/87 (28)	3/20 (12)
14. Feelings about death and dying	Psychological	24/85 (28)	5/24 (21)
15. Changes in sexual feelings	Sexuality	12/87 (14)	4/12 (33)
16. Changes in sexual relationships	Sexuality	13/85 (15)	3/13 (23)
17. Concerns about the worries of those close to you	Psychological	36/85 (42)	10/36 (28)
18. More choice in which cancer specialists you see	Patient care	10/85 (12)	4/10 (40)
19. More choice in which hospital you attend	Patient care	5/86 (6)	1/5 (20)
20. Reassurance that the way you feel is normal	Patient care	10/85 (12)	3/10 (30)
21. Hospital staff promptly attend to your physical needs	Patient care	14/86 (16)	3/14 (21)
22. Hospital staff acknowledging or showing sensitivity toward feelings and emotional needs	Patient care	13/85 (15)	2/13 (15)
23. Being given written information about important aspects of your care	Information	11/84 (13)	4/11 (36)
24. Being given information about aspects of managing your illness and side effects at home	Information	13/84 (16)	5/13 (39)
25. Being given explanations of those tests for which you would like explanations	Information	13/86 (15)	3/13 (23)
26. Being adequately informed about the benefits and side effects of treatment before you have to choose them	Information	12/87 (14)	5/12 (42)
27. Being informed of test results as soon as possible	Information	15/86 (17)	5/15 (33)
28. Being informed of cancer which is under control or diminishing	Information	13/84 (16)	6/13 (46)
29. Being informed about things you can do to get well	Information	18/85 (21)	9/18 (50)
30. Having access to professional counselling	Information	21/84 (25)	8/21 (38)
31. Being given information about sexual relationships	Sexuality	5/87 (6)	0/5 (0)
32. Being treated like a person, not just another case	Information	6/86 (7)	0/6 (0)
33. Being treated in a hospital or clinic that is as physically pleasant as possible	Information	4/86 (5)	0/4 (0)
34. Having one member of the hospital staff with whom you can talk about all aspects of your condition	Information	19/85 (22)	11/19 (58)

Unmet needs in lung cancer patients were most prevalent in the psychological and physical domains. In the present study, the items frequently identified as unmet in the psychological domain addressed anxiety, depression, and concerns about recurrence and death. Considering the limited survival for many patients with lung cancer, even after radical treatment<sup>28,29</sup>, those needs are understandable. Our results are similar to results obtained using the scns-SF34 instrument in an ovarian cancer population. Ovarian cancer patients with advanced disease experience unfavourable outcomes similar to those in lung cancer patients. As the their highest need, ovarian cancer

patients reported the same “fears of the cancer spreading” that was reported by our lung cancer patients. In the ovarian cancer study, the scns-SF34 instrument was repeated at various time points, finding that psychological and physical needs remained constant from baseline, but that needs in all other domains decreased over time<sup>30</sup>. Further study in lung cancer patients is needed to determine if there is a dynamic nature to supportive care needs over time and to explore potential interventions to mitigate unmet needs. In our study, “having one member of the hospital staff with whom you can talk about all aspects of your condition” was the unmet need most frequently



endorsed by patients as requiring assistance to resolve. Previous work reported an association of continuity and coordination of care with unmet needs in lung cancer

patients<sup>31</sup>. Exploring interventions to address those shortcomings in the care of lung cancer patients could be beneficial to mitigate unmet needs.

**TABLE III** Regression analysis of overall supportive care needs

Variable	Analysis					
	Univariable			Multivariable		
	$\beta$	SE	<i>p</i> Value	$\beta$	SE	<i>p</i> Value
Age	-0.20	0.09	0.03	—	—	—
Female sex	1.52	1.72	0.38	—	—	—
Education	-0.29	1.73	0.87	—	—	—
Living alone	0.11	1.84	0.95	—	—	—
Married	0.61	1.75	0.73	—	—	—
English	-3.09	2.65	0.25	—	—	—
Access to e-resources	-2.33	2.06	0.26	—	—	—
T3/T4	4.48	2.28	0.05	—	—	—
N0/Nx	-5.57	1.70	<0.01	-3.51	1.19	<0.01
M1	5.87	3.09	0.06	7.24	2.17	<0.01
Requires help with ADLs	6.32	1.61	<0.001	—	—	—
Overall health	-6.68	1.67	<0.001	—	—	—
Overall QOL	-7.86	1.65	<0.0001	—	—	—
MDASI severity	0.17	0.03	<0.0001	—	—	—
MDASI interference	0.38	0.04	<0.0001	0.37	0.04	<0.0001

SE = standard error; ADLs = activities of daily living; QOL = quality of life; MDASI = MD Anderson Symptom Inventory.

**TABLE IV** Univariable analysis of the level of survivorship needs by domain

Variable	Domain														
	Psychological			Physical			Information			Patient care			Sexuality		
	$\beta$	SE	<i>p</i> Value	$\beta$	SE	<i>p</i> Value	$\beta$	SE	<i>p</i> Value	$\beta$	SE	<i>p</i> Value	$\beta$	SE	<i>p</i> Value
Age	-0.26	0.10	0.01	-0.15	0.05	<0.01	-0.10	0.09	0.26	-0.09	0.04	0.03	-0.08	0.02	<0.001
Female sex	4.86	1.98	0.02 <sup>a</sup>	1.15	1.06	0.28	-0.01	1.62	0.99	-0.34	0.76	0.66	-0.16	0.42	0.70
Education	0.16	2.05	0.94	-0.15	1.07	0.89	0.39	1.62	0.81	-0.47	0.76	0.54	-0.02	0.42	0.96
Living alone	-0.68	2.17	0.75	1.04	1.13	0.36	-0.01	1.72	1.00	-0.08	0.81	0.92	-0.56	0.45	0.21
Married	0.54	2.07	0.80	-0.69	1.08	0.52	-0.14	1.64	0.93	0.91	0.77	0.24	0.88	0.42	0.04 <sup>b</sup>
English	-5.47	3.12	0.08	-1.87	1.67	0.26	-1.91	2.54	0.45	-1.06	1.18	0.37	-0.38	0.66	0.57
Access to e-resources	-3.50	2.45	0.16	-0.93	1.27	0.46	1.43	1.94	0.46	0.28	0.92	0.76	0.05	0.50	0.92
T3/T4	3.43	2.76	0.22	1.81	1.45	0.21	3.40	2.16	0.12	1.96	1.01	0.06	2.40	0.51	<0.001 <sup>c</sup>
N0/Nx	-5.65	2.07	<0.01 <sup>b</sup>	-2.77	1.09	0.01 <sup>b</sup>	-2.25	1.68	0.18	-2.14	0.76	<0.01 <sup>b</sup>	-1.39	0.42	<0.01
M1	0.44	3.77	0.91	3.07	1.94	0.12 <sup>b</sup>	1.61	2.95	0.59	2.68	1.36	0.05 <sup>a</sup>	2.19	0.74	<0.01 <sup>c</sup>
Requires help with ADLs	8.12	1.88	<0.01	3.91	0.99	<0.001	4.72	1.55	<0.01	1.57	0.75	0.04	1.11	0.41	<0.01
Overall health	-9.00	1.94	<0.001	-4.54	1.01	<0.001	-3.61	1.66	0.03	-1.40	0.79	0.08	-0.93	0.43	0.03
Overall QOL	-10.5	1.90	<0.001	-4.95	1.01	<0.001	-4.30	1.68	0.01	-1.69	0.80	0.04	-1.07	0.44	0.02
MDASI severity	0.21	0.03	<0.001	0.13	0.02	<0.001 <sup>b</sup>	0.10	0.03	<0.01	0.04	0.01	<0.01	0.02	0.01	<0.01
MDASI interference	0.46	0.05	<0.001 <sup>d</sup>	0.24	0.02	<0.001 <sup>c</sup>	0.25	0.05	<0.001 <sup>c</sup>	0.11	0.02	<0.001 <sup>c</sup>	0.06	0.01	<0.001 <sup>d</sup>

<sup>a</sup> In multivariable analysis,  $p < 0.01$ .

<sup>b</sup> In multivariable analysis,  $p < 0.05$ .

<sup>c</sup> In multivariable analysis,  $p < 0.001$ .

<sup>d</sup> In multivariable analysis,  $p < 0.0001$ .

SE = standard error; ADLs = activities of daily living; QOL = quality of life; MDASI = MD Anderson Symptom Inventory.

**TABLE V** Summary of patient-reported information needs

Item	Response [n (%)]
Is it important to have information about how to manage feeling tired	
No	6 (7)
Yes	68 (78)
Not applicable	13 (15)
Is it important to have information about how to deal with shortness of breath	
No	8 (9)
Yes	67 (77)
Not applicable	12 (14)
Is it important to have information about how to manage cough	
No	8 (9)
Yes	55 (63)
Not applicable	24 (28)
Is it important to have information about drug coverage options	
No	17 (20)
Yes	50 (57)
Not applicable	20 (23)
Is it important to have information about legal issues	
No	19 (22)
Yes	40 (46)
Not applicable	28 (32)
Is it important to have information about how to connect with people with cancer	
No	32 (37)
Yes	32 (37)
Not applicable	23 (26)
Is it important to have information about returning to work	
No	8 (9)
Yes	14 (16)
Not applicable	65 (75)
Is it important to have information about going on sick leave from work	
No	14 (16)
Yes	10 (12)
Not applicable	63 (72)

Our data demonstrate that patients who were younger, who had more advanced disease, and who had worse quality of life also had a greater number of unmet needs. That finding is similar to data obtained using the scns-SF34 in a colorectal cancer population. The median age of patients in the latter study was 74. The authors reported that younger patients had significantly greater unmet needs; however, the unmet needs of older patients appeared to be more persistent over time<sup>32</sup>. The increased unmet needs in the younger patients could be related to their own higher expectations to continue performing various tasks, including employment. However, the persistent nature of unmet needs in older patients might indicate that the needs in that patient population are more challenging to address. Compared

with younger cancer patients, older patients might have less physical reserve, fewer social supports, and a greater number of comorbid conditions. Our data were not able to explore the nature of unmet needs over time in lung cancer patients; that aspect should be explored in future studies.

In addition to reporting the nature of unmet supportive care needs, we have identified patient needs for information about common symptoms, including fatigue, shortness of breath, and cough. In a study that used a similar informational needs instrument in patients with gynecologic cancer, information about topics in the medical domain were rated most important<sup>21</sup>. To address the information needs reported in the present study, patient education resources addressing fatigue, shortness of breath, and cough should be available for all lung cancer patients and should be prepared using best practices, including structured and culturally appropriate content<sup>33</sup>.

Our study has several limitations. First, the data reflect a subset of lung cancer survivors—specifically, those well enough to participate and able to speak and read English. Future work with translated materials should be conducted to assess the needs of patients without English proficiency. In addition, the patient-reported quality-of-life score in the present study is relatively high. That result might be attributable to patients with worse symptoms or quality of life declining to participate, which could potentially affect the generalizability of the results.

Despite the limitations, our data help to fill a knowledge gap in caring for patients with lung cancer and could be useful in directly guiding the development of lung cancer survivorship programs and resources. The factors associated with higher unmet needs as described in the present study could be used to identify and direct high-needs groups of patients to appropriate survivorship resources. Further studies are needed to explore the ability of supportive care interventions to mitigate unmet needs in lung cancer patients.

## CONCLUSIONS

Unmet supportive care needs are common in lung cancer patients, with some patients experiencing a very high number of unmet needs. Unmet needs are more common in younger patients and in patients with more advanced disease and worse quality of life. Further work is needed to develop resources to address those needs.

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## CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

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