



Patient-clinician communication among patients with stage I lung cancer

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Abstract

Purpose Limited data exist about patient-centered communication (PCC) and patient-centered outcomes among patients who undergo surgery or stereotactic body radiation therapy (SBRT) for stage I non-small cell lung cancer (NSCLC). We aimed to examine the relationship between PCC and decision-making processes among NSCLC patients, using baseline data from a prospective, multicenter study.

Methods Patients with stage I NSCLC completed a survey prior to treatment initiation. The survey assessed sociodemographic characteristics, treatment decision variables, and patient psychosocial outcomes: health-related quality of life (HRQOL), treatment self-efficacy, decisional conflict, and PCC.

Results Fifty-two percent ($n = 85$) of 165 individuals planned to receive SBRT. There were no baseline differences detected on patient psychosocial outcomes between those who planned to receive SBRT or surgery. All participants reported high HRQOL ($M = 72.5$, $SD = 21.3$) out of 100, where higher scores indicate better functioning; high self-efficacy ($M = 1.5$, $SD = 0.5$) out of 6, where lower numbers indicate higher self-efficacy; minimal decisional conflict ($M = 15.2$, $SD = 12.7$) out of 100, where higher scores indicate higher decisional conflict; and high levels of patient-centered communication ($M = 2.4$, $SD = 0.8$) out of 7 where higher scores indicate worse communication. Linear regression analyses adjusting for sociodemographic and clinical variables showed that higher quality PCC was associated with higher self-efficacy ($\beta = 0.17$, $p = 0.03$) and lower decisional conflict ($\beta = 0.42$, $p < 0.001$).

Conclusions Higher quality PCC was associated with higher self-efficacy and lower decisional conflict. Self-efficacy and decisional conflict may influence subsequent health outcomes. Therefore, our findings may inform future research and clinical programs that focus on communication strategies to improve these outcomes.

Keywords Patient-clinician communication · Lung cancer · Stereotactic radiation therapy · Psychosocial outcomes

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Introduction

Lung cancer is the second most common cancer among men and women, as well as the leading cause of cancer-related mortality in the USA [1]. In 2013, lung cancer screening was recommended for adults from 55 to 80 years old with a 30 pack year history and active smoking within the last 15 years [2, 3]. This recommendation may lead to an increase in the number of patients who are diagnosed with early stage NSCLC. Presently, the recommended therapy for stage I NSCLC is surgical resection [4]. However, many patients decline or cannot tolerate surgery due to poor lung function, or a high risk for complications, and therefore are offered definitive radiation therapy [5]. Stereotactic body therapy (SBRT) is emerging as a safe, efficacious, and feasible therapy for early stage NSCLC [6–10]. Thus, SBRT utilization will likely increase [11–13], but there are limited comparative data describing patient experiences between SBRT and other NSCLC treatments [14]. One small ($n = 58$) recent trial comparing surgery to SBRT found that those who underwent SBRT had higher overall survival, higher global quality of life, and lower indirect costs after approximately 3 years [15, 16].

There are several psychosocial characteristics that may have a substantial impact on treatment satisfaction, treatment adherence, mood, and overall treatment outcomes, including self-efficacy, treatment related decisional conflict, and quality of patient-clinician communication. These outcomes have yet to be examined among patients diagnosed with stage I NSCLC who are planning to undergo SBRT or surgical resection. Self-efficacy, the belief in one's ability to achieve or accomplish a goal or task, has been positively associated with patients' mood and quality of life [17] and to the maintenance of a healthier lifestyle among cancer survivors [18]. Moreover, self-efficacy is inversely associated with patients' ability to communicate with their clinicians about health care decisions [19]. Decisional conflict, the extent to which an individual feels uncertainty about a decision, is another important facet of a patient's experience when choosing a treatment. For example, higher decisional conflict is associated with higher uncertainty and decreased knowledge about treatment among newly diagnosed prostate cancer patients [20].

Patient-centered communication plays a large role in the discussion of treatment options and the development of a follow-up care plan. High quality communication has been associated with decreased distress among patients diagnosed with incidental pulmonary nodules [21], as well as higher satisfaction with treatment and improved treatment outcomes among oncology patients [22]. Patient-centered

communication is a modifiable clinician behavior that may improve patient and caregiver engagement in treatment decision-making [23].

The purpose of this manuscript is to examine the associations of patient-centered communication with decisional conflict and self-efficacy. We hypothesized that higher quality patient-centered communication would be associated with higher self-efficacy and lower decisional conflict, when controlling for important sociodemographic and clinical characteristics. We also hypothesized that baseline HRQOL would be lower in the group of patients who planned to receive SBRT compared to the group that planned to receive surgery.

Material and methods

Setting

This analysis focuses on baseline data from a prospective, multicenter, longitudinal study of patients with confirmed or suspected stage I NSCLC. We included patients treated at seven health care centers in the Pacific Northwest of the USA: the VA Portland Health Care System (VAPORHCS), an employee-based academically affiliated hospital with outlying clinics; Oregon Health & Science University (OHSU), an employee-based academic, quaternary health center; Legacy Health, a private nonprofit, tertiary health organization incorporating both private-practice and employed physicians; Providence Health & Services, a majority employee-based not-for-profit organization; PeaceHealth, a not-for-profit health care system with private-practice and employed physicians; Tuality Healthcare, a not-for-profit community-based health care system with both employed and community physicians; and Kaiser Permanente, a nonprofit employee-based health plan organization. All settings provide comprehensive multidisciplinary cancer treatment including surgical resection and SBRT.

Participants

Participants were eligible if they were (1) adults considered for curative treatment of clinical stage I NSCLC and (2) scored greater than 17/30 on the St. Louis University Mental State Examination (SLUMS) [24] in order to exclude individuals with dementia or severe cognitive impairment. We excluded patients who were non-English speaking, had a history of lung cancer within the past 5 years, had a diagnosis of schizophrenia or a cognitive disorder (e.g., dementia), or had a severe hearing impairment. Pathologic confirmation of lung cancer was not a criterion for eligibility. Figure 1 provides an overview of the sample selection.

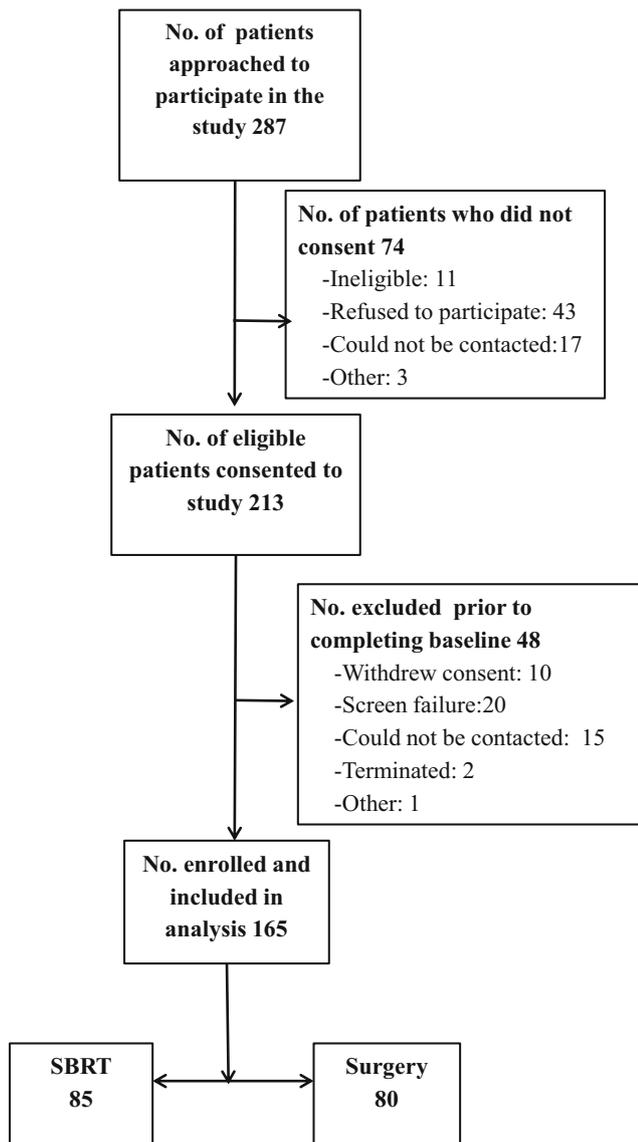


Fig. 1 Overview of the sample selection

Study procedures

This study was approved by the OHSU/VA joint Institutional Review Board (no. 10340) as well as the Providence (no. 15-031A) and Legacy Institutional Review Boards. Eligible participants were recruited in three modalities: (1) in-person by a research coordinator after a treating clinician introduced the study to the patient, (2) via the use of a flyer detailing the study given to potential participants by their clinician if the study coordinator was unavailable, or (3) clinicians provided contact information for potential participants after introducing the study. All participants completed informed consent before participation.

Once enrolled, participants were contacted in-person or by telephone prior to the initiation of curative treatment to complete their baseline survey. Baseline surveys were conducted

prior to initiation of treatment. We used a standardized report form to obtain diagnosis and treatment information from the electronic medical record.

Measures

Primary outcome measures

Decisional conflict was measured using the Decisional Conflict Scale (DCS), a multidimensional tool of 16 items divided into five subscales: personal uncertainty, deficits of feeling uninformed, unclear values, inadequate support, and perception that an ineffective choice has been made. Items are scored using a 5-point Likert scale (1 = strongly agree to 5 = strongly disagree) [25]. Scores < 25 indicate no decision-making difficulty and scores > 37.5 suggest delayed decision-making or uncertainty about making the decision.

The Communication and Attitudinal Self-Efficacy (CASE-CANCER) instrument measured each participant's perception of his or her ability to fulfill three treatment related roles: understanding and participating in care, maintaining a positive attitude, and seeking and obtaining information [26]. Scores range from 0 to 6, where lower scores indicate higher self-efficacy.

Secondary patient-centered outcome measures

Health-related quality of life (HRQOL) was assessed using two validated measures (European Organization for Research and Treatment of Cancer QLQ-C30 and QLQ-LC13). The QLQ-C30 contains 30 items covering health issues relevant for cancer patients, 24 of which are aggregated into scales measuring functioning, symptoms and global health, and quality of life. The remaining six items evaluate cancer symptoms and the perceived economic impact of the treatment [27]. A higher score indicates a better level of functioning or global QOL [28, 29]. The QLQ-LC13 is a supplementary, lung cancer-specific questionnaire with 13 items addressing symptoms associated with lung cancer and its standard treatment [30]. A higher score indicates higher symptomatic functional impairment. This information was included as a covariate in the analysis.

The Control Preferences Scale (CPS) uses a 5-point scale to measure the degree of control that the participant prefers when making lung cancer treatment decisions. Participants were also asked about their perception of their actual level of control in how the treatment decision was ultimately made [31]. For both actual and preferred roles, we categorized the responses into "patient-controlled" (responses 1 and 2), "shared" (response 3), and "clinician-controlled" (responses 4 and 5). We also assessed concordance between the preferred and actual role. Participants whose preferred and actual roles were

the same based on the three categories above were classified as concordant; all other combinations were discordant. This information was included descriptively and not in the analysis.

The State Trait Anxiety Inventory (STAI) was used to measure anxiety symptoms. We utilized the six-item short-form, which offers a briefer scale while maintaining results that are comparable to those obtained using the full STAI. The anxiety inventory has scores ranging from 20 to 80, where higher scores indicate a higher level of anxiety [32]. This information was included descriptively and not in the analysis.

Primary exposure measure

The primary exposure variable was the overall quality of self-reported communication about the treatment options. Overall quality was measured using participants' response to the statement "The overall quality of communication with your clinician is excellent" (question 6A) on the patient-centered communication (PCC) tool. Responses are rated on a 7-point Likert scale from "very strongly agree" to "very strongly disagree." This question is from the Consultation Care Measure, which is based on the patient-centered communication model and was recommended in an analysis of multiple communication instruments [33]. Scores range from 0 to 7 where lower scores indicate a higher degree of patient centeredness [34]. For descriptive purposes, we dichotomized responses using a score of 1–3 (agreed, strongly agreed, or very strongly agreed) to characterize communication as "high quality" and a score of 4–7 (neutral, disagreed, strongly disagreed, or very strongly disagreed) to characterize "low quality" communication. When completing this measure, participants were directed to think of their initial treatment decision appointment experience and the clinician who was involved in the treatment decision appointment. For the primary analyses, we used the single-item response measured continuously and for the sensitivity analysis we used the entire scale measured continuously.

Covariates

The survey included questions about sociodemographic characteristics, self-reported comorbid illnesses, smoking status and tobacco use, institution at which the medical service was provided, and previous and family history of cancer. We used a Likert scale (0–10 from "very worst" to "very best") to measure participants' perception of how informed they were about treatment options and their satisfaction with their clinician's explanation of the treatment options. Trained abstractors extracted information from each participant's electronic medical record about treatments offered and treatment selected (Surgery vs. SBRT) using standardized case report forms. A copy of the baseline questionnaire used can be found in Supplement A.

Data analysis

Prior to conducting analyses, data were checked for completeness and accuracy (SPSS version 22). We summarized the descriptive data for demographic variables and the scores on self-report measures for all participants. Bivariate analyses were conducted using *t* tests on the continuous variables when the data were normally distributed. Two separate linear multiple regression analyses, both adjusting for age, race, sex, smoking status, education, income, institution at which the medical service was provided, satisfaction with clinician's explanation of treatment options, HRQOL, and treatment type, were utilized to assess the association between (1) patient-centered communication and communication/attitudinal self-efficacy and (2) patient-centered communication and decisional conflict. Categorical covariates were all dichotomized as follows: race (White/non-White), gender (male/female), smoking status (never smoker/current or past smoker), education (less than college/completion of college or beyond), income ($\leq \$29,999$ or $\geq \$30,000$), and institution at which the medical service was provided (VA/non-VA). A priori, we adjusted for the covariates listed above. Global HRQOL score was entered into the models as a continuous covariate. The final adjusted models did not control for the HRQOL subscales that were different between treatment groups, or the institution at which the patient received care, because the inclusion of these subscales did not change the threshold level of significance or the point estimates by more than 10%. Response to the single item in the PCC (mentioned above) was included as a continuous variable for the primary regression analyses and the full-scale PCC score was used as a continuous variable for the sensitivity analyses.

Results

The baseline demographic characteristics are presented in Table 1. The average age of the overall sample was 70.7 (SD = 8.1). The majority were male (66%) and White (92.7%). Among the 165 participants, 52% ($n = 85$) planned to receive SBRT. Of those, 83 ultimately received SBRT, one individual passed away prior to treatment, and one individual had a subsequent biopsy that was negative for cancer and did not receive any treatment. Among the 80 participants who were scheduled to have surgery, 76 ultimately underwent surgery, one individual was on surveillance, and three were considering or receiving alternative treatment.

Most participants (72.7%) were former smokers, and 21.8% were current smokers. Participants were diagnosed with one or more of the following comorbidities chronic obstructive pulmonary disease (43.6%), post-traumatic stress disorder (17.0%), and depression (23.0%).

Table 1 Demographic characteristics based on treatment group

Characteristic	Surgery (<i>n</i> = 80) <i>N</i> (%) or mean ± SD	Radiation (SBRT) (<i>n</i> = 85) <i>N</i> (%) or mean ± SD
Sites		
VA Portland Health Care System	36 (45.0%)	46 (54.1%)
Oregon Health & Science University	32 (40.0%)	10 (11.8%)
Other site	12 (15.0%)	29 (34.1%)
Demographic		
Age (years)	68.2 ± 8.1	73.2 ± 8.1
Male	49 (61.3%)	60 (70.6%)
White	73 (91.3%)	80 (94.1%)
Education (≥college)	62 (77.5%)	52 (61.2%)
Currently married	46 (57.5%)	29 (34.1%)
Income (≥ \$30 k/year)	47 (58.8%)	42 (49.4%)
Retired	48 (60.0%)	71 (83.5%)
Smoking status		
Never	6 (7.5%)	3 (3.5%)
Former	59 (73.8%)	61 (71.8%)
Current	15 (18.8%)	21 (24.7%)
Pack-years ^a	56.5 ± 40.2	58.7 ± 33.0
Comorbidities		
COPD	28 (35.0%)	44 (51.8%)
Depression	25 (31.3%)	13 (15.3%)
PTSD	15 (18.8%)	13 (15.3%)
Communication		
How the participant was informed about potential cancer diagnosis		
Letter	3 (3.8%)	4 (3.5%)
Visit	62 (77.5%)	59 (69.4%)
Phone	12 (15.0%)	18 (21.2%)
Cannot recall or other	3 (3.8%)	4 (3.5%)
Who first discussed treatment options		
Pulmonologist	29 (36.3%)	36 (42.4%)
Surgeon	35 (43.6%)	11 (12.9%)
Oncologist	4 (5.0%)	15 (17.6%)
Primary care clinician	7 (8.8%)	7 (8.3%)
Other	4 (5.0%)	8 (9.4%)
Unknown	1 (1.3%)	8 (9.4%)
How informed about treatment options		
Not at all informed	0 (0.0%)	0 (0.0%)
Somewhat informed	10 (12.5%)	7 (8.2%)
Very informed	65 (81.3%)	77 (90.6%)
Unknown	4 (5.0%)	1 (1.2%)
How satisfied with clinician's explanation		
Not at all satisfied	0 (0.0%)	0 (0.0%)
Somewhat satisfied	4 (5.0%)	4 (4.7%)
Very satisfied	72 (90.0%)	80 (94.1%)
Unknown	4 (5.0%)	1 (1.2%)

COPD chronic obstructive pulmonary disease, PTSD post-traumatic stress disorder

^a Pack-years only calculated for those who previously or currently smoked

Most participants (73.3%) were initially informed of a potential cancer diagnosis during an in-person clinic appointment. Initial treatment discussions most often took place with a pulmonologist (39.4%), followed by a thoracic surgeon (27.8%), radiation or medical oncologist (11.5%), a primary care provider (8.5%), or other/unknown (12.7%; Table 1). Regarding treatment decisions, 86% (*n* = 142) felt “very well informed” about treatment options (Table 1) and 95.1% (*n* = 156) felt that the communication with their clinician was “high quality” (Table 2).

Participants' scores on the patient-centered outcomes are presented in Table 2. Overall, participants reported high global HRQOL (*M* = 73.2 SD = 21.0). Those who planned to receive surgery had higher HRQOL in the Role domain (Surgery: *M* = 89.0 SD = 20.4 vs. SBRT: *M* = 76.5 SD = 31.0, *p* = 0.002) and the Physical domain (Surgery: *M* = 86.8, SD = 18.6 vs. SBRT: *M* = 71.9, SD = 23.1, *p* < 0.001), yet they had more emotional HRQOL impairment (Surgery: *M* = 73.9, SD = 23.6 vs. SBRT: *M* = 82.5, SD = 17.6, *p* = 0.01). All participants reported moderate levels of lung cancer symptom-specific impairment (coughing: *M* = 39.6, SD = 27.7; dyspnea: *M* = 27.6, SD = 27.7). Those who planned to receive SBRT had significantly more functional impairment related to dyspnea (Surgery: *M* = 18.5, SD = 21.5 vs. SBRT: *M* = 36.2, SD = 30.1, *p* < 0.001) and no group differences were detected on coughing (Table 2). Participants reported high self-efficacy (*M* = 1.5, SD = 0.5), no decisional conflict (*M* = 15.6, SD = 13.0), high levels of patient-centered communication (*M* = 2.4, SD = 0.9), and high overall quality of patient-physician communication (*M* = 9.3, SD = 1.0). No other treatment group differences were detected.

A linear multiple regression analysis found that higher quality patient-centered communication was associated with higher self-efficacy ($\beta = 0.17$, *p* = 0.03) (Table 3). The overall model also explained a significant proportion of the variance (12%) in self-efficacy scores (adjusted $R^2 = 0.12$, $F(10, 146) = 3.19$, *p* = 0.001). Individual predictors that were significant in the model included Global HRQOL ($\beta = -0.30$, *p* < 0.001) and satisfaction with clinician's explanation of treatment ($\beta = -0.03$, *p* = 0.001). A second linear multiple regression, controlling for the same variables, revealed that higher quality patient-centered communication was associated with less decisional conflict ($\beta = 0.43$, *p* < 0.001). The overall model also explained a statistically significant proportion of the variance (21%) in decisional conflict scores (adjusted $R^2 = 0.21$, $F(10, 140) = 4.95$, *p* < 0.001).

Sensitivity analyses

Two additional linear regression models with the same two dependent outcome variables (self-efficacy and decisional conflict) were conducted using the PCC total scale as a continuous variable for the sensitivity analyses. These models

Table 2 Bivariate comparison of patient baseline psychosocial characteristic based on treatment type

Patient psychosocial experience	Surgery (<i>n</i> = 80) <i>N</i> (%) or mean ± SD	Radiation (SBRT) (<i>n</i> = 85) <i>N</i> (%) or mean ± SD
Primary outcomes		
Self-Efficacy (CASE)	1.5 ± 0.5	1.4 ± 0.5
Decision-conflict (DCS)	16.11 ± 13.89	16.4 ± 12.4
Other patient-centered outcomes		
QLQ-C30 Global	76.0 ± 18.8	70.6 ± 22.6
QLQ-C30 Social	89.8 ± 22.4	85.7 ± 25.2
QLQ-C30 Role	89.0 ± 20.4*	76.5 ± 31.0*
QLQ-C30 Physical	86.8 ± 18.6*	71.9 ± 23.1*
QLQ-C30 Emotional	73.9 ± 23.6*	82.5 ± 17.6*
QLQ-C30 Cognitive	84.4 ± 20.4	83.3 ± 22.0
QLQ-LC13 Dyspnea	18.5 ± 21.5*	36.2 ± 30.1*
QLQ-LC13 Coughing	36.7 ± 27.4	42.4 ± 27.9
Anxiety Symptoms (STAI)	46.5 ± 7.5	48.2 ± 7.0
Quality of Communication (QOC)	9.2 ± 1.0	9.4 ± 0.9
Control Preferences Scale (CPS)		
Preferred decision making		
Patient-controlled	18 (22.5%)	28 (32.9%)
Shared	47 (58.9%)	33 (38.8%)
Clinician-controlled	15 (18.8%)	23 (27.1%)
Actual decision making ^a		
Patient-controlled	4 (40%)	5 (17.9%)
Shared	4 (40%)	15 (53.6%)
Clinician-controlled	2 (20%)	8 (28.6%)
Concordant decision making	9 (90.0%)	26 (92.9%)
Primary exposure		
Patient-centered communication (PCC total)	2.5 ± 0.8	2.3 ± 0.9
Quality of communication (PCC 6A—single item)	2.1 ± 0.9	2.1 ± 1.1
Low quality	4	4
High quality	76	80

Scale interpretation: CASE = range from 1 to 6; higher scores indicate lower self-efficacy. DCS = range from 0 to 100; higher scores indicate more decisional conflict. QLQ-C30 = range from 0 to 100; higher scores indicate higher (“better”) functioning. QLQ-C13 scores range 0–100; higher score represents higher (“worse”) symptom impairment. STAI = range from 20 to 80; higher scores indicate more anxiety. QOC = range from 1 to 10. Higher scores indicate higher quality communication. PCC = range from 1 to 7; higher scores indicate worse communication. *QLQ-C30* Quality of Life-Cancer, *QLQ-13* Quality of Life-Lung Cancer, *CASE* Communication and Attitudinal Self-Efficacy, *DCS* Decisional Conflict Scale, *STAI* State Trait Anxiety Index, *QOC* Quality of Communication, *CPS* Control Preference Scale, *PCC* Patient-Centered Communication

**p* < 0.05

^a Actual role in decision-making was only calculated among patients who had elected a treatment and perceived that they had a role in the treatment decision that had been made (*n* = 38)

controlled for the same sociodemographic and clinical covariates as the primary analyses. The direction and significance of the associations were not appreciably different in these analyses.

Discussion

Overall, participants were very satisfied with the communication with their clinician and felt well informed about their treatment decisions. Prior to treatment, patients in our sample reported minimal decisional conflict related to treatment choice, high treatment related self-efficacy, and high global HRQOL. There were no significant baseline group differences on global patient psychosocial experiences between those who planned to receive surgery and those who planned to receive SBRT. However, those who planned to receive SBRT reported higher levels of dyspnea-related impairment and higher levels of emotional functioning. The finding related to emotional functioning is consistent with other literature, demonstrating that older patients may experience less distress after receiving a cancer diagnosis and undergoing treatment [35]. This age-dependent relationship may partially explain the baseline differences in emotional functioning between the two treatment groups. Conversely, those in the surgery treatment group presented with higher baseline levels of role and physical related functioning. These differences in physical function are likely related to prior evidence suggesting that patients who elect SBRT are typically more physically impaired and thus cannot tolerate surgery [7]. The longitudinal assessment of these patient psychosocial experiences will be helpful to elucidate whether more group differences emerge over time between the two treatment groups. The longitudinal assessment will also elucidate how baseline differences influence subsequent HRQOL and medical outcomes following treatment.

As hypothesized a priori, higher quality patient-clinician communication was associated with higher treatment related self-efficacy when controlling for relevant sociodemographic and clinical variables. Prior research suggests that self-efficacy, in the context of cancer treatment, influences subsequent clinical outcomes including mood, cognitive problems, and quality of life [17]. Furthermore, self-efficacy has been linked to increased adherence to treatment [18, 36], which for SBRT consists of five curative treatment sessions, as well as follow-up surveillance recommendations. Finally, our finding is consistent with other research that linked higher self-efficacy to increased communication about treatment options between patients and their clinician [19].

As we predicted, higher patient-clinician communication was associated with lower decisional conflict. This finding indicates that patients may feel more certain about

Table 3 Regression analyses examining variables associated with self-efficacy and decisional conflict

Dependent variable	Unadjusted <i>B</i> (SE)	Adjusted β^a	R^2	95% CI	<i>p</i> value
Model 1: self-efficacy ^a			0.12		
Patient-clinician communication	0.09 (0.04)	0.18		0.01 to 0.17	0.024
Age	-0.003 (0.01)	-0.05		-0.01 to 0.01	0.591
Education	-0.09 (0.10)	-0.07		-0.28 to 0.10	0.366
Race	0.08 (0.16)	0.04		-0.23 to 0.39	0.603
Income	-0.02 (0.08)	-0.02		-0.18 to 0.13	0.776
Smoking status	-0.19 (0.18)	-0.08		-0.55 to 0.16	0.286
Gender	-0.17 (0.9)	-0.16		-0.338 to 0.002	0.048
Treatment type	-0.13 (0.08)	-0.13		-0.29 to 0.03	0.32
Global HRQOL	-0.01 (0.002)	-0.29		-0.011 to -0.003	<0.001
Satisfaction with clinician's explanation	-0.002 (0.004)	-0.03		-0.011 to 0.007	0.683
Model 2: decisional conflict ^a			0.21		
Patient-clinician communication	5.50 (0.96)	0.43		3.60 to 7.39	<0.001
Age	0.10 (0.14)	0.06		-0.16 to 0.37	0.449
Education	-4.67 (2.38)	-0.15		-9.37 to 0.04	0.052
Race	-0.86 (3.78)	-0.02		-8.33 to 6.62	0.822
Income	-2.30 (1.91)	-0.09		-6.09 to 1.48	0.231
Smoking status	0.41 (4.56)	0.01		-8.60 to 9.43	0.928
Gender	-2.32 (2.11)	-0.09		-6.49 to 1.85	0.274
Treatment type	-2.32 (2.02)	-0.09		-6.31 to 1.67	0.252
Global HRQOL	-0.03 (0.05)	-0.06		-0.12 to 0.06	0.472
Satisfaction with clinician's explanation	-0.16 (0.11)	-0.11		-0.37 to 0.05	0.143

^a Models adjusted for age, race, gender, smoking status, education, income, treatment type, satisfaction with clinician's explanation, and global HRQOL

a treatment decision when they perceive high quality communication between themselves and their clinician and demonstrates that patient-clinician communication is an important part of the treatment planning process. Improved decisional certainty may lead to enhanced treatment knowledge and adherence [20]. In addition, higher quality communication is related to lower levels of distress [21] as well as higher patient perception of trust and satisfaction with their provider [22]. Moreover, the process of the patient-clinician communication could be a target for enhanced communication strategy interventions. There is also evidence of improved clinician communication and patient engagement in treatment related discussions following a randomized controlled patient-centered communication intervention, though the longer term impact of patient-centered communication interventions on long-term outcomes (i.e., QOL) is less clear [23]. Finally, a recent review suggests that the measurement of patient-centered outcomes alone may improve patient-clinician communication through mechanisms such as increasing symptom awareness, prompting discussion, and streamlining consultations [37].

Limitations

There are a few limitations which should be taken into consideration when interpreting the results of this study. First, the cross-sectional nature of the design impedes the ability to draw causal conclusions about the relationships tested; therefore, longitudinal research is needed to determine the directionality of the relationships assessed. Second, our sample was comprised of primarily White men, from the Pacific Northwest, so this may pose threats to the generalizability of these findings to other patient samples. However, this limitation is attenuated by the fact that participants were recruited from multiple institutions and sites and did not appear to be a confounder in the analyses. Third, while participants often identified one care provider to base their responses related to the patient-clinician communication measure, responses may have been based off multiple appointments and interactions with various members of the care team. We tried to mitigate this limitation, however, by asking participants to think of their treatment decision-making visit and capture participants' responses soon after that visit.

Conclusion

Patients with stage I NSCLC generally have a high level of satisfaction with their oncology care and feel well informed about their treatment options prior to treatment initiation. High quality patient-clinician communication was associated with higher self-efficacy and lower decisional conflict among patients. Self-efficacy, decisional conflict, and satisfaction with care likely influence subsequent health outcomes. Patient-clinician communication may be a process that could be improved using communication strategy interventions. Prospective, longitudinal research is needed to understand how these patient-centered psychosocial experiences influence long-term patient-centered outcomes and treatment outcomes between those who receive SBRT and those who receive surgery for early stage lung cancer. No baseline group differences existed on psychosocial outcomes among our sample, which will provide a valid sample from which to study longitudinal changes.

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Compliance with ethical standards

Conflict of interest Authors have disclosed that they do not have any conflicts of interest.

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