

Distress and Patient-Centered Communication among Veterans with Incidental (Not Screen-Detected) Pulmonary Nodules

A Cohort Study

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Abstract

Rationale: Incidental pulmonary nodule detection is postulated to cause distress, but the frequency and magnitude of that distress have not been reported. The quality of patient–clinician communication and the perceived risk of lung cancer may influence distress

Objectives: To evaluate the association of communication processes with distress and the perceived risk of lung cancer using validated instruments.

Methods: We conducted a prospective cohort study of patients with incidentally detected nodules who received care at one Department of Veterans Affairs Medical Center. We measured distress with the Impact of Event Scale and patient-centered communication with the Consultation Care Measure, both validated instruments. Risk of lung cancer was self-reported by participants. We used multivariable adjusted logistic regression to measure the association of communication quality with distress.

Measurements and Main Results: Among 122 Veterans with incidental nodules, 23%, 12%, and 4% reported experiencing mild, moderate, and severe distress, respectively, at the time they were

informed of the pulmonary nodule. Participant-reported risk of lung cancer was not associated with distress. In the adjusted model, high-quality communication was associated with decreased distress (odds ratio [OR] = 0.28, 95% confidence interval [CI] = 0.08–1.00, $P = 0.05$). Among participants who reported a risk of malignancy of 30% or less, high-quality communication was associated with decreased distress (OR = 0.15, 95% CI = 0.02–0.92, $P = 0.04$), but was not associated with distress for those who reported a risk greater than 30% (OR = 0.12 (95% CI = 0.00–3.97, $P = 0.24$), although the P value for interaction was not significant.

Conclusions: Veterans with incidental pulmonary nodules frequently reported inadequate information exchange regarding their nodule. Many patients experience distress after they are informed that they have a pulmonary nodule, and high-quality patient–clinician communication is associated with decreased distress. Communication strategies that only target improved knowledge of the risk of malignancy may not be sufficient to reduce the distress associated with nodule detection.

Keywords: pulmonary nodule; patient-clinician communication; patient-centered outcomes

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Every year, hundreds of thousands of patients are diagnosed with incidental pulmonary nodules (1, 2), fueled by the large and growing number of patients who undergo radiologic imaging studies (3–6). The number of patients with pulmonary nodules is likely to substantially increase, as multiple organizations, including the U.S. Preventive Services Task Force, now recommend annual low-dose computed tomography (CT) screening for adults at high risk of developing lung cancer (7–12). These recommendations are mainly based on the National Lung Screening Trial, which showed that low-dose CT screening resulted in substantial mortality benefits, but at the cost of very many false positives, usually due to detection of a pulmonary nodule (13).

Harris and colleagues (14) recently developed a taxonomy of harms from screening that are also applicable to the detection of pulmonary nodules. One of the harms is the resultant psychosocial consequences. Limited evidence from screening trials suggests that distress increases in the short term, and qualitative studies from patients in routine care settings indicate that nodule detection is associated with distress as well (15–19). The screening trials have not evaluated methods to mitigate these harms, but the qualitative work has identified communication processes as a potentially modifiable factor that might be associated with distress.

Based on this work, and guided by a theoretical model of patient-centered communication processes (20), we evaluated the occurrence and magnitude of distress among a cohort of Veterans with incidental pulmonary nodules. We hypothesized that distress would be common, and higher general communication quality and lower perceived risk of lung cancer would be associated with decreased levels of distress.

Some of the results from this article were presented at the May 2014 International Conference of the American Thoracic Society as an abstract.

Methods

Overview and Setting

We conducted a prospective study at the Portland Veterans Affairs Medical Center (PVAMC), an academic-affiliated hospital with outlying primary care clinics, among patients with an incidentally detected (not

from screening) nodule. At the PVAMC, thoracic radiology images with nodules are electronically flagged (2). In general, primary care providers are responsible for notifying the patient and determining the evaluation, usually without guidance from pulmonologists. Study participants were recruited between February 2012 and December 2013.

At the PVAMC, all patients found to have a nodule are entered into a clinical registry regardless of nodule number and characteristics. Medical records from patients enrolled in this registry were reviewed, and those with newly reported, incidental nodules less than 3 cm were potentially eligible for this study. Patients with a plan for, but who had not yet obtained, nonurgent imaging follow up were potentially eligible. After approval from the treating clinician and mental health clinician (if relevant), we contacted the patient by mail to participate. The Institutional Review Board of the PVAMC approved this study, and all patients provided written informed consent.

We excluded patients who scored less than 17/30 on the St. Louis University Mental Status Examination (21), who resided in skilled nursing care facilities, had previously been diagnosed with lung cancer, were diagnosed with psychotic or cognitive disorders, or had a terminal illness (including a current diagnosis of cancer). Participants completed surveys in person with trained research coordinators.

Primary Outcome Measure

We used the Impact of Event Scale (IES) to measure symptoms of emotional distress as a result of nodule detection experienced in the 7 days before the survey. Several studies have reported that the IES has high internal consistency among patients with cancer (22). For the primary analyses, we used a score of 8 or more to indicate at least mild distress (23).

Secondary Outcome Measure

The patient-centered communication model includes the exchange of information as a key component of high-quality communication. We assessed appropriate information exchange by measuring participants' perceptions of lung cancer malignancy risk. A similar scale was used in a previous trial of lung cancer screening (24). We used an 11-point Likert scale (with 10-point incremental percentage

increases from 0 to 100%) to measure the participants' estimates that the nodule was caused by lung cancer (25). We used an identical scale to determine the participants' perceptions of the clinicians' estimate of risk. To analyze self-reported lung cancer malignancy risk, we dichotomized the responses to 30% or less chance or greater than 30% chance. We also calculated the objective risk of lung cancer based on the Mayo model (26).

Primary Exposure Measure

The primary exposure variable was the overall quality of self-reported communication regarding the nodule. Participants were asked to answer the communication questions regarding the clinician who would be responsible for coordinating nodule care (usually the primary care provider) or the clinician who first notified them if they had not communicated with the responsible clinician about the nodule. The primary measure of the perception of communication was the statement "The overall quality of communication with your provider is excellent," which was rated on a seven-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 (27). For the primary analysis, we dichotomized this variable as "high quality" if participants indicated they agreed, strongly agreed, or very strongly agreed, and "low quality" if the response was neutral to very strongly disagreed. Missing responses were coded as missing and not included in the primary statistical analyses, but were included in sensitivity analyses. We also used this variable measured continuously in sensitivity analyses.

Covariates

We used self-report to measure sex, education level, marital status, income, smoking status, and self-report of mental health conditions. We abstracted information from the electronic medical record regarding: age at entry to the study; nodule details, including size, location (upper versus non-upper lobe), characteristics (spiculated versus nonspiculated); indication for the imaging study that best characterized the nodule and was to be used as the baseline (symptomatic

versus asymptomatic [e.g., a chest X-ray for cough noted a small nodule, and subsequent CT was performed for nodule visualization, not the cough, was categorized as “asymptomatic”]); and time from the imaging study to the date of survey administration. We did not independently review the radiologic images. We reviewed the electronic medical record to identify how the participant was informed about the study results (letter, phone, in person) and who informed her/him, but used self-report as our measure. We collected information on reasons why participants did not seek more information about nodules from their clinicians and suggestions for improving communication processes.

We used a Likert scale (0–10 from “very worst” to “very best”) to measure how informed the participant was about the nodule and how satisfied she/he was with the clinician’s explanation. We categorized responses as “not at all,” “somewhat,” and “very” for scores of 0, 1–7, and 8–10, respectively. Participants were permitted to report “I don’t know” as well.

Participants reported if they were satisfied with care regarding the pulmonary nodule and if that care could be better. These items used a five-point Likert scale (strongly disagree to strongly agree). For the satisfaction variable, we dichotomized responses as either satisfied (agree or strongly agree) versus not satisfied (neutral, disagree, or strongly disagree). For perceived quality of care, we dichotomized responses as either “care could not be better” (disagree or strongly disagree) or “care could be better” (neutral, agree, or strongly agree).

Participants reported if their clinician was skilled and knowledgeable about caring for patients with nodules using a five-point Likert scale (not at all knowledgeable to extremely knowledgeable) (28). Responses were dichotomized as “skilled/knowledgeable” if the participant reported “very” or “extremely knowledgeable (an expert),” or “not skilled/knowledgeable” otherwise. If participants could not estimate the clinicians’ skill and knowledge, their response was recorded as missing, and was included as “not skilled/knowledgeable” in the univariate analyses.

Analysis

We used logistic regression to report odds ratios (ORs) as measures of the association of patient, nodule, and communication

characteristics with distress and self-reported risk of lung cancer. Because there are limited data about potential confounders of the associations with distress, models were constructed parsimoniously, excluding variables that were not confounders if they did not change the threshold level of significance and/or point estimates by more than 10%. *A priori*, we adjusted for age, smoking status, and self-reported depression. Education, marital status, self-reported post-traumatic stress disorder (PTSD), nodule characteristics, time from nodule identification to survey administration, and who informed the participant, and the method used to inform the participant did not confound the relation between general communication and the distress, so were not included in the final model. Income and indication for the imaging study did confound the association, so the final model included these variables plus age, smoking status,

and self-reported depression. We did not include possible intermediate outcomes between communication and distress, such as information obtained, satisfaction with the explanation, and nodule care/clinician variables, in the adjusted model.

We performed multiple sensitivity analyses. First, we used linear regression to measure univariate associations by using continuous outcome measures of risk and distress. Second, we performed an analysis with communication measured continuously for the association with distress. Third, because our outcome of distress was common, we used generalized linear model regression to estimate the univariate relative risks. Because of our relatively small sample size, we could not measure the multivariable-adjusted relative risk of communication with distress.

The patient-centered communication theoretic model emphasizes adequate information exchange as a core domain, and

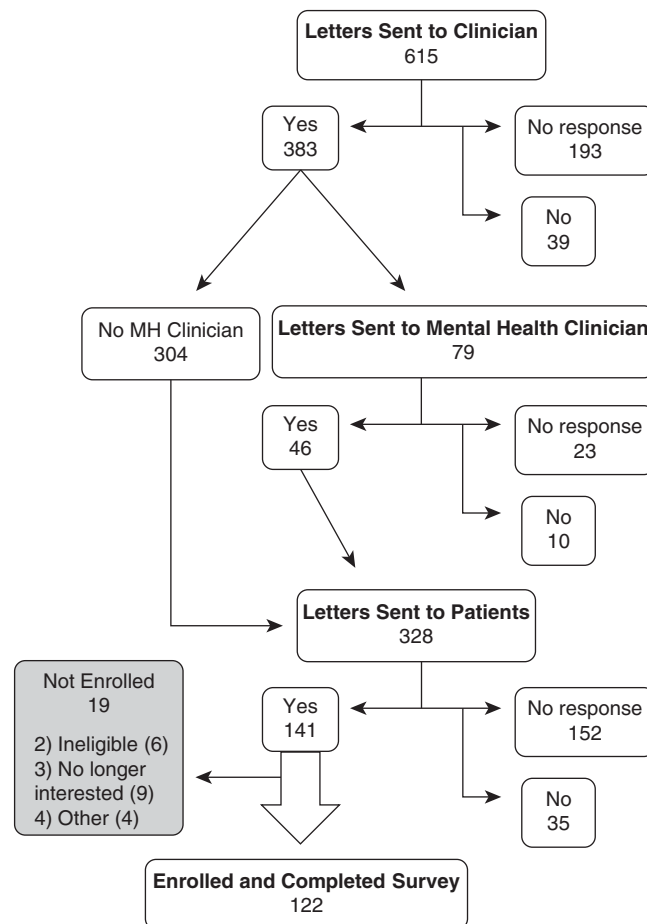


Figure 1. Flow chart of patient enrollment. MH = mental health.

we hypothesized that the association of communication quality with distress may be modified by the assessment of adequate information, that is, perceived risk of lung cancer. We assessed the association between general communication quality and distress for effect modification by this variable. Likelihood ratio tests were conducted to assess the interaction between communication and distress and the risk perception subgroup. *P* values for interaction were obtained to compare the fit of the models with and without the interaction terms.

All tests were two tailed using robust standard errors to minimize assumptions about equal variance, and a *P* value of less than 0.05 was considered statistically significant. Analyses were conducted using Stata/IC 11.0 (StataCorp, College Station, TX).

Results

We collected data from 122 participants out of 328 contacted Veterans (response rate = 37%; 20% of total potentially eligible; Figure 1). Few clinicians or patients actively declined to participate, and the most common reason for nonparticipation was inability to contact the clinician or patient (classified as “no response” in Figure 1). Participants were mostly older men who often had concomitant self-reported depression and PTSD diagnoses (Table 1). The average nodule size was 6 mm (SD = 3 mm; range = 2–18 mm). Distribution of the nodule size was: 50 nodules of 4 mm or less, 42 nodules of greater than 4–6 mm, 19 nodules greater than 6–8 mm, and 11 nodules greater than 8 mm.

Information Obtained

Veterans participated only if their clinician gave assent and indicated that the patient was informed about the nodule. Over one-third (36%) of participants could not recall receiving this information before our contact, and classified as receiving notification from the research staff (Table 1). These participants were still surveyed about their reactions and communication about the nodule after our initial contact.

Participants often reported being ill informed about their nodule, and only 12% felt very informed. They were more often satisfied with their clinicians’ explanation of the nodule, although 32% could not answer

Table 1. Cohort characteristics

Characteristic	<i>n</i> (%) or Mean ± SD (<i>n</i> = 122)
Age, yr	64.1 ± 8.7
Sex (% male)	114 (93)
Socioeconomic status	
Education (≥college)	77 (63)
Currently married	64 (53)
Income (≥\$30k/yr)	70 (61)
Smoking status	
Never	27 (22)
Past	58 (48)
Current	37 (30)
Mental health	
Depression (self-reported)	60 (49)
PTSD (self-reported)	39 (32)
Nodule/imaging characteristics	
Nodule size, mm	5.8 ± 2.7
Location in upper lobe	46 (41)
Spiculated nodule	2 (2)
Symptomatic indication*	99 (82)
Detection to study visit, d	122 ± 76
Nodule information processes/satisfaction	
How the participant was informed	
Letter	62 (52)
Visit	32 (27)
Phone	26 (22)
Who informed the participant	
Primary care provider	41 (34) [†]
Research	44 (36)
Other	37 (30)
How informed about what a nodule is	
Not at all informed	39 (32)
Somewhat informed	65 (54)
Very informed	14 (12)
Unknown	3 (2)
How satisfied with clinician’s explanation	
Not at all satisfied	7 (6)
Somewhat satisfied	23 (19)
Very satisfied	32 (26)
Unknown	21 (17)
Missing	39 (32)
Nodule care	
Satisfied with care	78 (69)
Care could not be better	24 (21)
Clinician is very skilled/knowledgeable	21 (17)
Participant-reported risk of lung cancer	
≤30%	50 (41)
>30%	56 (46)
Missing	16 (13)
Average self-reported risk of lung cancer	39% ± 26%
Participant’s assessment of the clinician-estimated risk of lung cancer	
≤30%	36 (30)
>30%	45 (37)
Missing	41 (34)
Average calculated risk of lung cancer (Mayo model)	10% ± 12%
Communication processes	
Low-quality communication	28 (23)
High-quality communication	68 (56)
Missing quality communication	26 (21)
Average communication quality score (lower scores better; max score = 7)	3.0 ± 1.9

(Continued)

Table 1. (Continued)

Characteristic	n (%) or Mean ± SD (n = 122)
Distress [‡]	
No distress	59 (48)
At least mild distress	48 (39)
Missing distress	15 (12)
Average distress score	12.8 ± 15.1

Definition of abbreviation: PTSD = post-traumatic stress disorder.

Percentages may not add to 100% secondary to rounding; percentages are of nonmissing data unless there were more than 10% missing data, in which case this category is included.

*For example, nodules found on a computed tomography (CT) performed for cough or hemoptysis, for example, were categorized as “symptomatic.” If a chest X-ray for cough noted a small nodule and subsequent CT was performed for nodule visualization, not the cough, this was categorized as “asymptomatic.”

[†]A total of 28 unique primary care providers.

[‡]Distress measured on Impact of Event Scale with scores ≥ 8 classified as mild or greater distress.

this question, as they felt they had not received any explanation, and 17% reported this as unknown, as they felt they had no basis for comparison to report satisfaction.

Although 13% of participants could not estimate a risk that the nodule was lung cancer, on average, they reported a 39% risk of malignancy (SD = 26%), and 46% of the participants reported a risk greater than 30%. Average calculated risk using the Mayo model was 10% (SD = 12%).

Distress

As a result of the nodule diagnosis, 23%, 12%, and 4% of participants reported mild, moderate, and severe distress, respectively. Fifteen participants (12%) felt unable to report on their level of distress, most often because they could not recall previously being informed about the nodule. Of the participants who reported, the average score on the IES was 13 (SD = 15; Table 1).

Table 2 shows the univariate associations of each characteristic with at least mild distress. Table E1 reports the cohort characteristics stratified by distress. Notably, neither a self-perceived risk of lung cancer over 30% (OR = 1.73, 95% CI = 0.74–4.03, $P = 0.21$) nor inability to estimate that risk (OR = 2.31, 95% CI = 0.71–7.51, $P = 0.16$) were associated with distress. Characteristics associated with known risk for malignancy, such as increased age, current or past history of smoking, and nodule size, were either not associated with increased distress or inversely associated. Mental health comorbidities of self-reported depression and PTSD were strongly associated with increased distress (OR = 8.31, 95% CI = 3.44–20.07, $P < 0.001$ and

OR = 3.26, 95% CI = 1.40–7.54, $P = 0.006$, respectively). The mode of communication and the role of the clinician who notified the participant were not associated with distress. Higher satisfaction with the clinician’s explanation and reporting that care could not be better were associated with decreased distress.

Patient-Centered Communication and Distress

Quality of communication was not associated with distress (OR = 0.45, 95% CI = 0.18–1.15, $P = 0.10$) on univariate analysis, but, in multivariable-adjusted analysis, high-quality communication was associated with decreased distress (OR = 0.28, 95% CI = 0.08–1.00, $P = 0.05$). Among participants who reported a risk of lung cancer to 30% or less, high-quality communication was associated with decreased distress (OR = 0.15 (95% CI = 0.02–0.92 $P = 0.04$), but was not associated with distress for those who reported a risk of greater than 30% (OR = 0.12, 95% CI = 0.00–3.97, $P = 0.24$). The P value for interaction was 0.14.

Risk of Lung Cancer

Table 2 shows the univariate associations of the patient, nodule, and communication characteristics with a greater than 30% self-reported risk that the pulmonary nodule was lung cancer. Table E1 reports the cohort characteristics stratified by perceived risk. Known predictors of malignancy, such as current smoking status and nodule size, were associated with increased perceived risk (OR = 4.79, 95% CI = 1.50–15.27, $P = 0.008$ and OR = 1.31, 95% CI = 1.08–1.59, $P = 0.007$, respectively). PTSD was

associated with a decreased self-reported risk (OR = 0.42, 95% CI = 0.18–0.97, $P = 0.04$), and reporting that the clinician was very skilled/knowledgeable at caring for patients with pulmonary nodules was associated with increased risk perception (OR = 4.21, 95% CI = 1.28–13.78, $P = 0.02$).

Sensitivity Analyses

The direction and significance of the univariate associations reported in Table 2 were not appreciably different when we analyzed distress and perceived risk of lung cancer measured continuously. Similarly, the analysis of the association of communication measured continuously with distress did not appreciably alter the direction or significance of the association. Finally, the direction and significance of the univariate associations between distress and participant-perceived risk of lung cancer were similar when measured as relative risks, although, as expected, the magnitude of those associations decreased.

Seeking Information

Table 3 lists reasons why participants did not seek more information and suggestions for improving communication processes. Among the participants who did not seek more information, the most common reason was satisfaction with the information already received. Other commonly reported reasons included that they had more important problems to worry about, the clinician had not informed them about the nodule, and the clinician was not worried, so they were not worried. In terms of potential changes to communication processes, one participant (1%) felt nothing could be improved. A majority of participants wanted more information about the frequency of nodule detection, more information about the causes of nodules, more discussion with the clinician about the patients’ worries and fears, more information about the risk of lung cancer, and to always be informed in person.

Discussion

We found that Veterans with incidental pulmonary nodules frequently reported inadequate information exchange regarding their nodules. Almost half experienced at least mild distress. Many

Table 2. Univariate associations with at least mild distress and a participant-reported risk of lung cancer greater than 30%

Characteristic	Distress ≥Mild*	Participant-Reported Risk of Lung Cancer >30%
	OR (95% CI)	OR (95% CI)
Age (per year)	0.93 (0.87–1.00) [†]	0.99 (0.94–1.03)
Sex (male)	1.39 (0.31–6.18)	0.83 (0.18–3.93)
Socioeconomic status		
Education (≥college)	1.37 (0.62–3.04)	0.52 (0.23–1.17)
Currently married	1.01 (0.47–2.18)	0.81 (0.38–1.76)
Income (≥\$30k/yr)	0.72 (0.31–1.63)	0.81 (0.36–1.85)
Smoking status		
Never	Ref	Ref
Past	0.46 (0.17–1.23)	1.80 (0.65–5.02)
Current	0.43 (0.15–1.26)	4.79 (1.50–15.27) [†]
Mental health		
Depression (self-reported)	8.31 (3.44–20.07) [†]	1.00 (0.46–2.15)
PTSD (self-reported)	3.26 (1.40–7.54) [†]	0.42 (0.18–0.97) [†]
Nodule/imaging characteristics		
Nodule size (in mm)	1.02 (0.89–1.18)	1.31 (1.08–1.59) [†]
Location in upper lobe	1.14 (0.51–2.55)	1.41 (0.62–3.20)
Symptomatic indication [‡]	3.00 (1.00–9.03) [†]	0.80 (0.29–2.19)
Detection to visit (per days)	1.00 (0.99–1.00)	1.00 (1.00–1.00)
Nodule information processes/satisfaction		
How the participant was informed		
Letter	Ref	Ref
Visit	0.41 (0.14–1.23)	1.57 (0.62–4.00)
Phone	0.76 (0.30–1.95)	0.96 (0.36–2.55)
Who informed the participant		
Primary care provider	Ref	Ref
Research	1.09 (0.42–2.78)	0.48 (0.19–1.23)
Other	0.77 (0.31–1.93)	0.63 (0.23–1.69)
How informed about what a nodule is		
Not at all informed	Ref	Ref
Somewhat informed	1.38 (0.57–3.33)	1.42 (0.59–3.37)
Very informed	0.77 (0.21–2.86)	0.66 (0.18–2.48)
How satisfied with clinician’s explanation		
Not at all satisfied	Ref	Ref
Somewhat satisfied	0.22 (0.02–2.13)	1.33 (0.11–16.78)
Very satisfied	0.10 (0.01–0.95) [†]	0.31 (0.03–3.42)
Unknown	0.06 (0.01–0.68) [†]	0.24 (0.02–2.83)
Nodule care		
Satisfied w/ care	0.40 (0.17–0.98) [†]	0.91 (0.38–2.20)
Care could not be better	0.26 (0.09–0.78) [†]	0.85 (0.33–2.22)
Clinician is very skilled/knowledgeable	1.15 (0.44–3.00)	4.21 (1.28–13.78) [†]
Participant-reported risk of lung cancer		
≤30%	Ref	NA
>30%	1.73 (0.74–4.03)	NA
Missing	2.31 (0.71–7.51)	NA
Communication processes		
High-quality communication	0.45 (0.18–1.15)	0.97 (0.37–2.51)
Communication quality (for every 1 point improvement)	0.82 (0.65–1.04)	0.83 (0.67–1.05)

Definition of abbreviations: CI = confidence interval; NA = not applicable; OR = odds ratio; PTSD = post-traumatic stress disorder.

*Distress measured on Impact of Event Scale with scores ≥8 classified as mild or greater distress.

[†]P < 0.05.

[‡]Nodules found on a computed tomography (CT) performed for cough or hemoptysis, for example, were categorized as “symptomatic.” If a chest X-ray for cough noted a small nodule and subsequent CT was performed for nodule visualization, not the cough, this was categorized as “asymptomatic.”

Veterans substantially overestimated their risk of lung cancer. Interestingly, current smoking status and nodule size were associated with increased perceived risk, but these characteristics and self-perceived risk itself were not associated with increased distress. High-quality communication was associated with

decreased distress that was not modified by self-perceived risk.

Similar to our previous qualitative findings among Veterans and non-Veterans with incidental pulmonary nodules (17–19), we found that information exchange was often inadequate and patients frequently experienced distress. That work suggested

that self-perceived risk of lung cancer influenced distress, but that finding was not substantiated in this study. Communication quality was associated with distress only among participants with a lower self-perceived risk of lung cancer, but the P value for interaction was nonsignificant. Thus, more study is necessary to determine

Table 3. Information seeking and communication recommendations

	Times Reported n (%)
Reasons for not seeking more information from the clinician (n = 85)	
Satisfaction with the information previously provided	24 (28)
There were other/more important problems to worry about	13 (15)
My clinician did not inform me about my nodule diagnosis	12 (14)
My clinician didn't seem worried about it so I wasn't	11 (13)
I had a visit scheduled with my clinician already	10 (12)
I didn't think about seeking more information	7 (8)
I wasn't worried or concerned about the diagnosis	6 (7)
I thought my clinician would call	5 (6)
I assumed my clinician was too busy to answer my questions	4 (5)
I don't know how to contact my clinician	3 (4)
I have had previous experience with my clinician not calling me back	3 (4)
I was scared of the possible answer	1 (1)
Other responses	15 (18)
Recommendations for improving communication processes (n = 121)	
More information about how common nodules are	112 (93)
More information about what a nodule is	108 (89)
More discussion regarding patients' worries and fears	90 (74)
More information about the risk of lung cancer	85 (70)
Tell the patient in person about their nodule diagnosis	85 (70)
Decrease the time interval from imaging study to information about results	78 (66)
More patient involvement in determining the follow-up interval	72 (60)
More information about the risks of radiation from planned computed tomography scans	67 (55)
More information about <i>everything</i> , in letter or phone call (including: how to contact clinician, explanation of follow-up plan, other resources, etc.)	17 (14)
Ensure clinician is being honest and giving facts	11 (9)
More interaction with the clinician regarding nodule	11 (9)
Show pictures of scan and explain image	6 (5)
Other responses	17 (14)

if self-perceived risk, a surrogate of adequate information exchange, actually acts as an effect modifier of this association.

A core component of patient-centered communication processes is accurate information exchange about the diagnosis and risks and benefits of treatment options (29) that includes plain language, describes absolute instead of relative risks, and uses tables and graphs (30, 31). In this study and our previous work, almost all patients reported not receiving adequate information about the risk of lung cancer, and most substantially overestimated this risk (17–19). With regard to pulmonary nodules, accurate understanding of the risk of lung cancer guides subsequent decisions (32), and may impact patients' understanding and willingness to pursue active surveillance approaches, as widely recommended for small nodules (33, 34). Adherence to recommended follow up, and thus differences in resource utilization, may be influenced by appropriate information exchange.

In addition to information exchange, high-quality patient-centered communication includes other core processes, such as discussion of individual values and preferences, engaging in shared decision making, and ensuring a therapeutic alliance (20). Given the inadequacy of information exchange, it was surprising that many participants still reported overall high-quality communication. This discrepancy may indicate that clinicians in general had demonstrated high quality in the noninformational aspects of communication processes and/or possible ceiling effects of our communication measures.

Adequate understanding may not, by itself, influence other patient-centered outcomes without attention to these other core communication processes. For example, a report from the Nederlands-Leuven Longkanker Screenings Onderzoek (NELSON) trial that found that participants' knowledge about screening, which was in general higher than nonparticipants (35), was not associated with patient-centered

outcomes (36). Our results also suggest that risk perception may not directly influence distress. The U.S. Preventive Services Task Force and others recommend using formal tools to inform patients considering screening about the potential risks and benefits (12, 37). Utilization of such tools may be helpful, but attention to shared decision making and consideration of patients' values and preferences may be equally, if not more, important.

Patient-centered outcomes have been evaluated among lung cancer screening trial participants, but not for patients in routine care settings (15–19). Although participants in screening trials experience increased distress as a result of nodule detection, they are unlikely representative of patients in routine care, particularly in terms of sociodemographic and psychosocial characteristics (38, 39). In addition, communication processes in trials are different than in routine care. Communication strategies are widely recognized and recommended as important mechanisms that influence patient-centered outcomes (40–42), and it will be important to continue to evaluate these strategies as screening is widely implemented. Given the strong associations between mental health conditions and increased distress that we observed, targeted communication strategies should be considered for these patients. Similarly, patients found to have larger (>8 mm) nodules may need different communication strategies, as these patients were not well represented in our cohort.

Our results have several potential limitations. First, previous qualitative results from this cohort were similar to a non-Veteran cohort from the northeastern United States, but it is not clear if our findings are generalizable to other care settings, such as for patients with nodules larger than 8 mm or those undergoing lung cancer screening. Second, this analysis is cross-sectional, so additional research is required to determine the direction of the association between communication and distress. Third, many participants were unable to report on risk of lung cancer and other variables, often as a result of inadequate communication with their clinicians. In addition, only 62% of clinicians gave us permission to discuss the study with their patients. Finally, ORs may not accurately reflect the magnitude of relative risk when an outcome is common, as in this case. Thus, changes in communication scores may not be

associated with as large a change in distress as might otherwise be expected.

Conclusions

Many patients experience distress from incidental pulmonary nodule detection and seldom report receiving adequate information. With inadequate information on the risk of lung cancer, many

overestimate this risk. Neither the perceived risk of lung cancer nor factors associated with increased risk were associated with increased distress, which suggests that communication strategies that target improved knowledge may not be sufficient to reduce the distress of nodule detection. Communication strategies may also need to include consideration of patients' values and

preferences, and attention to shared decision-making processes. Clinicians and healthcare systems should consider implementing processes that include all the domains of high-quality, patient-centered communication. ■

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