

# Clinic-based depression screening in lung cancer patients using the PHQ-2 and PHQ-9 depression questionnaires: a pilot study

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## Abstract

**Objectives** This study aims to validate the ability to perform depression screening with the patient health questionnaire (PHQ)-2 and PHQ-9 depression modules in a busy, outpatient practice, and to evaluate the prevalence of depression among lung cancer outpatients at our institution.

**Methods** In 2010, 64 patients in a thoracic malignancy clinic completed the Patient Health Questionnaire-2. Patients endorsing either one or both items were then given the Patient Health Questionnaire-9, a nine-item depression assessment tool. Patients with mild or worse depression were offered a referral to a mental health care provider.

**Results** Eighteen of 64 patients (28 %) endorsed one or both items on the PHQ-2. Thirteen of 18 patients with a positive PHQ-2 screen completed the PHQ-9, with mean score of 10.2 (SD 3.91), suggesting moderate depression. PHQ-9 item 4, evaluating fatigue, was positive in 12 patients, and PHQ-9 item 9, evaluating suicidal ideation, was never reported. Only 1 of 18 patients with a positive PHQ-2 screen

was being followed by a psychiatrist, and no patient accepted a new referral to a mental health provider.

**Conclusions** The PHQ-2 and PHQ-9 modules are an effective means of depression screening in a busy, outpatient clinic. A high prevalence of depression was reported; yet, suicidal ideation was not reported. Depression severity ranged from mild to severe. The most endorsed PHQ-9 item was fatigue, although it is uncertain if this reflects a symptom of depression, a sequela of lung cancer itself, or both. The lung cancer patients in this sample who reported depression were unlikely to receive mental health services.

**Keywords** Lung cancer · Oncology · Depression · Screening · Patient health questionnaire · PHQ

## Introduction

Depression adversely affects the quality of life of many cancer patients, and numerous studies have sought to estimate the prevalence of depression in this vulnerable population. Published prevalence rates of depression in cancer patients vary widely, due to differences between study populations, variable criteria for defining depression, and the utility of different depression screening tools [1]. A recently published meta-analysis describes a 24.6 % prevalence of all types of depression among cancer patients and a 16.3 % prevalence of Diagnostic and Statistical Manual of Mental Disorders (DSM)-defined major depression [2]. Among individuals with cancer, lung cancer patients are at particularly great risk of developing depression [1], and depression may negatively affect treatment outcomes [3, 4]. In a population of nearly 1,000 lung cancer patients, 33 % reported depression [5]. In contrast to this unique group, depression is seen less often in the general population, with 1-year

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prevalence of major depression estimated at 6.6 % [6]. Accordingly, the National Comprehensive Cancer Network recommends routine screening for forms of distress, including depression, in cancer patients [7]. The American Psychosocial Oncology Society has also developed guidelines for screening and treatment of emotional well-being that have been incorporated into the ASCO Quality Oncology Practice Initiative [8]. Oncologists often underestimate depressive symptoms in their patients [9]. Accordingly, there is great need for an effective, time-efficient depression screening method for lung cancer patients.

### Patient health questionnaire

The patient health questionnaire (PHQ) originated as the depression screening module within the Primary Care Evaluation of Mental Disorders (PRIME-MD) instrument [10]. The nine-item version of the PHQ, the PHQ-9, was validated as a reliable depression screening tool as well as a measure of depression severity and is based upon the DSM-IV criteria for major depression [11]. The utility of the PHQ-9 has been demonstrated in large studies of the primary care population [11, 12] and the elderly [13] and has been shown to perform as well as other depression screening methods [14]. The initial two PHQ items, assessing depressed mood and anhedonia, comprise the PHQ-2 screen. The PHQ-2 has also been validated as a highly sensitive (89 to 96 %) brief screening tool in the primary care population [15, 16]. Recent studies have also validated the use of the PHQ-9 among oncology outpatients [17–19].

Our study sought to demonstrate the feasibility of using the PHQ-2 and PHQ-9 screening modules in the lung cancer population in a busy, outpatient setting. Although the patient sample is small, we were also interested in estimating the prevalence of depression in a population of ambulatory, lung cancer patients at our comprehensive cancer center.

### Patients and methods

Between November 2009 and May 2010, the PHQ-2 was administered 143 times to consecutive patients in a thoracic malignancy clinic at the University of California, San Diego, Moores Cancer Center. The PHQ-2 involves answering “yes” or “no” to the following two questions: “During the past month, have you often been bothered by feeling down, depressed, or blue?” and “During the past month, have you often been bothered by little interest or pleasure in doing things?” [15]. Due to the recurrent nature of oncology visits for patients undergoing chemotherapy, some patients completed the PHQ-2 screen more than once. Ten patients with malignancies other than non-small cell lung cancer or small cell lung cancer were excluded from analysis, as were two patients with incomplete

registration, resulting in 64, unique, lung cancer patients completing the PHQ-2 screen. Screened patients were predominantly female (69 %) and had stage IV disease (66 %) (Table 1).

Patients answering yes to either or both questions on the PHQ-2 were then given the PHQ-9, in which patients rated nine problems on a “0 to 3” scale. Depression severity was calculated by using the total PHQ-9 score: mild depression (5–9), moderate depression (10–14), moderately severe depression (15–19), and severe depression (20–27) [11]. PHQ modules were scored by a registered nurse, who notified the physician of the results. Patients that completed both the PHQ-2 and PHQ-9, and whose PHQ-9 score indicated mild or worse depression, were offered referral to a mental health care provider.

The study was conducted in accordance with the ethical standards of our institution, approved by our institutional review board, and in compliance with the Declaration of Helsinki. All participating patients gave written consent prior to their inclusion in the study.

### Results

Overall, of the 143 episodes the PHQ-2 was given, it was completed 131 times. Eighteen of the 64 unique patients (28 %) who completed the PHQ-2 screen answered yes to

**Table 1** Study patient characteristics

Study patient characteristics	(n=64)
Age (years) <sup>a</sup>	
Mean (SD)	66.7 (11.54)
Range	38–95
Gender (%)	
Female	44 (69)
Male	20 (31)
Histology (%)	
Small cell lung cancer	4 (6)
Non-small cell lung cancer	60 (94)
Stage (%) <sup>b</sup>	
I	8 (13)
II	3 (5)
III	11 (17)
IV	42 (66)
Depression history (%)	
Depression documented in medical record <sup>c</sup>	6 (9)
Taking antidepressant medication <sup>d</sup>	17 (27)

<sup>a</sup> Patient age on January 1, 2010

<sup>b</sup> AJCC seventh edition, at time of screen

<sup>c</sup> Depression listed in past medical history or problem list in the electronic medical record at the time of screen

<sup>d</sup> Aripiprazole, bupropion, desvenlafaxine, duloxetine, escitalopram, fluoxetine, mirtazapine, nortriptyline, paroxetine, sertraline

one or both items. Fourteen patients reported feeling “down, depressed, or hopeless,” and 14 patients reported “little interest or pleasure in doing things.” Ten of 64 patients (16 %) endorsed both PHQ-2 items.

Thirteen of 18 patients with a positive PHQ-2 completed the PHQ-9, with mean score 10.2 (SD 3.91), suggesting moderate depression. Mean PHQ-9 scores did not differ significantly between those who endorsed one (9.50, SD 2.81) or both (10.86, SD 4.81) PHQ-2 items ( $p=0.56$ ). Distribution of the PHQ-9 scores and number of patients reporting each PHQ-9 item can be found in Table 2. Most patients screened were found to have mild depression, and PHQ-9 item 4, “Feeling tired or having little energy” was most frequently endorsed and received the highest scores with a mean value of 2.23 on a 0–3 scale. No patient endorsed PHQ-9 item 9, evaluating suicidal ideation. Only 1 of 18 patients with a positive PHQ-2 screen was followed actively by a psychiatrist, and no patient in the study accepted a new referral to a mental health provider. While some patients completed the PHQ-2 more than once, patients with negative PHQ-2 screens continued to have negative screening results during the study period, as patients with positive PHQ-2 screen were consistently positive. Only two patients in the study population had positive and negative PHQ-2 results at different time points.

## Discussion

The majority of depression prevalence studies in lung cancer patients have used the Hospital Anxiety and Depression Scale (HADS) as a screening tool [20], and to our knowledge, only two recent studies have used the PHQ-9 [20]. In a seminal paper describing the benefits of early palliative care in metastatic non-small cell lung cancer patients, 12 of 72 patients (17 %) receiving standard care had major

depression, as determined by the PHQ-9, in comparison to 9 of 76 (12 %) patients receiving early palliative care [21]. Whitney et al. report a 43 % prevalence of depression in a series of 14 lung cancer patients using the PHQ-9 and also address whether the PHQ-9 is better used as a categorical or dimensional assessment of depression. When used as a categorical measure of depression, five of nine PHQ-9 symptoms must be present “more than half the days” for 2 weeks to diagnose major depression (this must include one of the first two items: depressed mood and anhedonia). If two to four of the nine PHQ-9 items are present more than half the days, then “other depression” is diagnosed. In contrast, they evaluated the total PHQ-9 score as a dimensional, or continuous, means of assessment and conclude that patients may often be subthreshold when screened categorically but have mild or worse depression on the dimensional PHQ-9 scale and thus benefit from treatment [20]. Thekkumpurath et al. recently demonstrated that a PHQ-9 score of 8 or greater is sensitive and specific for diagnosing major depression in cancer patients [19]. Among the 13 patients in our study with a positive PHQ-2 screen and completed the PHQ-9, three patients met criteria for major depression, and three patients demonstrated other depression when the PHQ-9 was used as a categorical assessment. In contrast, 11 of these 13 patients meet criteria for major depression when the PHQ-9 is used as a dimensional assessment with a cut off score of  $\geq 8$ .

All but one patient who completed the PHQ-9 screen (92 %) reported trouble with fatigue, as measured by PHQ-9 item 4. Additionally, PHQ-9 item 4 received the highest mean score, reflecting the severe burden of fatigue in these patients. Fatigue is highly prevalent among cancer patients, to the extent that the National Comprehensive Cancer Network began to issue guidelines for the management of cancer-related fatigue in 2000 [22]. Accordingly, we recommend routinely screening cancer patients for fatigue,

**Table 2** PHQ-9 results ( $n=13$ )

PHQ-9 item	No. of patients reporting each item (%)	Mean score (SD)
(1) Little interest or pleasure in doing things	10 (77)	1.31 (1.03)
(2) Feeling down, depressed, or hopeless	9 (69)	1.00 (1.00)
(3) Trouble falling or staying asleep, or sleeping too much	11 (85)	1.69 (1.03)
(4) Feeling tired or having little energy	12 (92)	2.23 (1.01)
(5) Poor appetite or overeating	11 (85)	1.92 (1.12)
(6) Feeling bad about yourself or that you are a failure or have let yourself or your family down	3 (23)	0.46 (0.97)
(7) Trouble concentrating on things, such as reading the newspaper or watching television	10 (77)	1.31 (1.03)
(8) Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	2 (15)	0.31 (0.73)
(9) Thoughts that you would be better off dead or of hurting yourself in some way	0 (0)	0 (0)

Distribution of total PHQ-9 scores (%) is as follows: mild Depression, score 5–9=8 (61); moderate depression, score 10–14=3 (23); moderately severe depression, score 15–19=1 (8); and severe depression, score 20–27=1 (8)

in addition to depression. Furthermore, fatigue is a somatic aspect of depression incorporated in the DSM-IV diagnostic criteria and consequently included in the PHQ-9. Therefore, it is uncertain if the study's measure of fatigue reflects true symptoms of depression, disease burden from lung cancer itself [23], effects of chemotherapy, or (most likely) some combination of the three.

In contrast to the fatigue item, no patient in our study gave a positive response to PHQ-9 item 9, suicidal ideation. This is somewhat surprising but may be a consequence of the small number of patients who completed the PHQ-9. In a study of nearly 3,000 ambulatory patients at a tertiary cancer center in the UK, PHQ-9 item 9, "Thoughts that you would be better off dead or of hurting yourself in some way," was used as a screening tool to assess suicidal ideation, with a positive response reported by 7.8 % of study participants [24].

Unfortunately, all 13 patients in the study that were offered a referral to a mental health provider declined the referral. One patient indicated that she would see a psychiatrist who had treated her in the past. The majority of the remaining patients declined a referral to mental health because they did not feel that it was warranted. Additionally, patients may have declined the referral due to fatigue and/or feeling burdened by their already frequent visits to oncology clinic and the infusion center. Also, only one patient with a positive PHQ-2 screening result was being followed by a psychiatrist, although other patients had documentation of depression in the electronic medical record and were receiving antidepressant medications. Accordingly, more effort must be made to help cancer patients identified with depression accept treatment for their condition.

While PHQ-2 screening was completed 131 of 143 times, the lower number of unique patients (64) is a limitation of the study, and due to this small sample size, the results should be interpreted with caution. Some patients completed the screening two or three times during the study period, which reflects the frequency in which lung cancer patients are seen in the ambulatory setting. This is often due to the need for chemotherapy administration at regular intervals, symptom management, and/or planned monitoring during clinical trials. Eight patients account for the 12 instances in which the PHQ-2 was refused. In contrast to those who completed the PHQ-2, this small group was mostly male (5 of 8), and only one individual was taking antidepressant medication.

Only 13 of 18 patients (72 %) with positive PHQ-2 screens completed the PHQ-9. Two PHQ positive patients declined to complete the PHQ-9, and in the other three cases, the patients had left clinic before the PHQ-2 forms were reviewed by the nurse. This reflects reluctance of some patients to complete multiple depression screening measures in one clinical encounter, as well as logistical challenges in administering two evaluations during the same visit. The study yield may be improved upon by incorporating the PHQ-2 into an electronic

format, recorded by the medical assistant along with vital signs, and generating an electronic alert to the nurse if positive. Additionally, since this pilot study was completed, a program has been started at our institution, training more nurses to screen for forms of cancer-related distress.

This screening exercise did not include the use of a structured diagnostic interview to confirm depression diagnoses, which is also a limitation of the study. Diagnostic interviews were used to validate the PHQ-2 and PHQ-9 in primary care and oncology populations [11, 12, 15, 16, 19, 22]; thus, future studies investigating this sequential use of both patient health questionnaires in lung cancer patients should also incorporate a diagnostic interview. Additionally, while the study population is in many ways typical of lung cancer patients, the high female to male ratio, greater than 2 to 1, may have impacted the study results, given the greater prevalence of reported mood disorder among women [6].

In conclusion, this pilot study demonstrated that the PHQ-2, with subsequent administration of the PHQ-9 to positive responders, is an effective means of depression screening in lung cancer patients, combining the sensitivity and brevity of the PHQ-2 with the greater specificity and severity measurement of the PHQ-9. We believe that this screening method may be administered in a busy, outpatient oncology clinic, with minimal inconvenience to the patients or clinical staff.

**Conflict of interest** All authors have no financial or other conflict of interest to report. The authors have full control of the primary data and agree for journal review of the data if requested.

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