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Original article

Scan-associated distress in lung cancer: Quantifying the impact of "scanxiety"

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ABSTRACT

Objectives: Diagnostic imaging may be a major source of cancer-related distress, a condition known as "scanxiety". Scant scholarly work has been performed to evaluate scan-associated distress in cancer. We sought to characterize risk factors for scan-associated distress among patients with Non-Small Cell Lung Cancer (NSCLC), and to evaluate the impact of scan-associated distress on quality of life.
Materials and methods: We conducted a cross-sectional survey study of patients with recurrent/metastatic NSCLC treated at an academic medical center. Clinical and demographic variables were obtained through chart abstraction and patient self-report. We used a modified version of the Impact of Event Scale 6 (IES-6) to specifically assess distress associated with scans, and quality of life was measured using the Functional Assessment of Cancer Therapy – Lung (FACT-L).
Results: Among 103 participants (survey response rate 76.3%), median age was 67, 61.2% were women, and 82.5% were white. At the study visit, 72.8% of subjects discussed a recent scan, and 83% reported some scan-associated distress. Scan-associated distress was not associated with whether the patient had a recent scan, progressive disease or time from diagnosis. Scan-associated distress was associated with impaired quality of life ($p = 0.004$); each unit increase in IES-6 corresponded to an approximately one-unit decrease in FACT-L score.
Conclusion: Scan-associated distress is a common problem among patients with NSCLC, and is associated with impaired quality of life. Scan-associated distress severity was not associated with time since diagnosis or whether a recent scan was discussed at the study visit, which implies scan-associated distress may be a persistent problem.

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1. Introduction

Screening for cancer-related distress, termed the "6th vital sign," has been recommended by multiple certifying agencies [1–3]. Cancer-related distress is associated with impaired quality of life, reduced satisfaction with care, and worse overall survival [4]. In addition to symptomatic distress from therapeutic toxicity, cancer progression and co-morbid illness, patients may also experience distress as a result of the diagnostic scans they undergo.

In a piece for *Time* magazine in 2011, Bruce Feiler coined the term "scanxiety" to describe this scan-associated distress [5]. "Scanxiety" refers to the often-debilitating anxiety patients with cancer experience in the period surrounding imaging studies for their cancer. While no study to date has formally evaluated the association of scan-associated distress with quality of life among patients with cancer, multiple studies have shown that imaging can

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cause significant distress when healthy patients undergo cancer-screening scans [6–9].

The primary objective of this study was to characterize the nature of scan-associated distress among a group of patients with recurrent or metastatic non-small cell lung cancer (NSCLC). Patients with NSCLC were selected because scans are frequently ordered in this disease [10]. We first aimed to identify demographic and clinical risk factors associated with scan-associated distress severity, and then evaluated the association of scan-associated distress severity with quality of life. Scans are ubiquitous in modern oncology; as such, having a deeper understanding of how these scans affect quality of life could have a significant impact upon clinical practice.

2. Materials and methods

2.1. Study design and patients

We conducted a cross-sectional survey in a consecutive convenience sample of patients seen in the outpatient thoracic medical oncology clinics at the Abramson Cancer Center at the University of Pennsylvania from May to August 2015. Eligible participants were at least 18 years of age with a primary diagnosis of recurrent or metastatic non-small cell lung cancer. Additional inclusion criteria were approval of the patient's oncologist to approach the patient and ability to understand enough English to complete the survey. Trained research assistants approached potential subjects in the waiting room. After completing an electronic informed consent process, patients completed all surveys on a web-enabled tablet. The survey took approximately 10 minutes to complete. Each patient was eligible to complete the survey once. The Institutional Review Board of the University of Pennsylvania approved the study protocol.

2.2. Study variables

To measure scan-associated distress we used the Impact of Event Scale 6 (IES-6) instrument, an abbreviated form of the Impact of Event Scale-Revised (IES-R). The IES-R is one of the most widely used instruments to measure the psychological impact of a specific event. This 22-item scale has been validated in the setting of a wide variety of stressors, ranging from cancer diagnosis to sexual assault. It has a 3-factor structure, mirroring the diagnostic criteria for post-traumatic stress disorder (PTSD): intrusion, avoidance and hyperarousal [11–14]. The IES-6 is an abbreviated 6-item survey that was designed to maintain the same factor structure. The IES-6 has very good internal consistency (Cronbach's Alpha = 0.8) and correlates strongly with IES-R across a wide variety of traumatic events. The heading for the survey stated, "Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each one has been for you during the past 7 days with respect to your most recent scan (i.e. CT, PET, MRI).". This heading was used to focus questions on scan-associated distress, rather than generalized distress. Scores ranged from 0–24, with higher scores indicating more severe scan-associated distress [15].

To measure quality of life, we used the Functional Assessment of Cancer Therapy – Lung (FACT-L) instrument. The FACT-L is an extensively validated 36-item instrument to measure quality of life using a 4-factor structure (Physical, Social, Emotional, and Functional Well-being). Scores range from 0–136, with higher scores indicating improved quality of life [16].

Demographic variables including age, sex, race, educational level, marital status and household income were obtained through patient self-report. We determined clinical factors, such as original tumor stage, time since diagnosis and molecular profile through chart abstraction. We also utilized chart abstraction to determine if each patient was receiving information about a new scan at the study visit, and if they were experiencing progressive disease leading to a change in treatment.

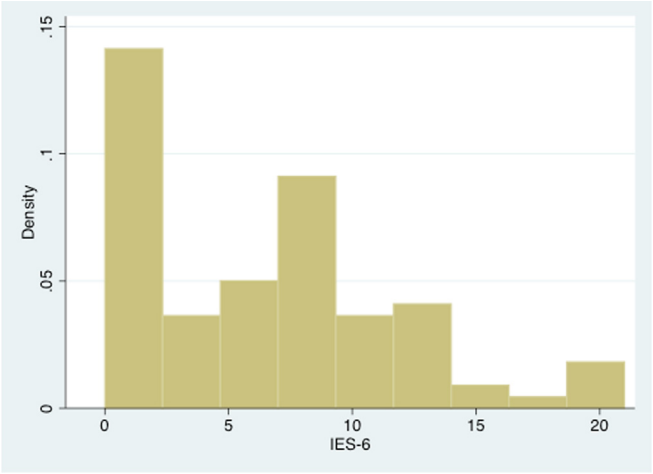

Fig. 1. Distribution of scores on Impact of Event Scale 6 (IES-6). Mean (Standard Deviation) Score 6.39 (5.29). Range 0–21.

2.3. Statistical analyses

The sample size was based on an expected effect size of 0.3 in the IES-6 (IES-6 score equivalent, 1.59). With 103 patients, we would have 82% power to detect such a difference, assuming a 2-sided Type I error rate of 0.05 [17]. Descriptive statistics were utilized to characterize our sample. To compare risk factors for scan-associated distress severity between groups we used Student *t*-tests and analysis of variance tests (ANOVA) as appropriate. To evaluate the association of scan-associated distress with quality of life, we fit a linear regression model using IES-6 as the independent variable and FACT-L as the dependent variable. All tests were 2-sided, and a p value of less than 0.05 was considered significant.

3. Results

We screened 144 patients to identify 135 eligible subjects, of whom 106 consented to participate in the study. Each subject completed the survey once. Three patients were subsequently dropped from analysis due to not meeting eligibility requirements. This yielded a 76.3% rate of study participation. The median age of survey participants was 67, with a range of 35–84 and standard deviation (SD) of 10.4. In this cohort, 61.2% of patients were women, 82.5% were white, 72.8% were currently married, and 53.4% had completed at least a college degree. Former and current smokers made up 67.8% of the sample. At the study visit, 72.8% of subjects discussed a recent scan and 27.2% experienced progressive disease leading to a change in treatment (See Table 1).

The distribution of IES-6 scores is presented in Fig. 1. The mean score (SD) was 6.39 (5.29), with a range of 0–21. Among patients surveyed, 83% experienced some degree of scan-associated distress. None of the assessed demographic or clinical variables was significantly associated with scan-associated distress severity. There was some indication that women, never smokers, and those with high household income had more severe scan-associated distress, but those differences were not statistically significant. Scan-associated distress severity was not associated with whether a patient was attending the visit to discuss a recent scan, time from diagnosis, or if there was progressive disease. (See Table 1)