Cancer Anorexia and Cachexia
Screening in an ambulatory infusion service and nutrition consultation

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BACKGROUND: Cancer anorexia-cachexia syndrome compromises physical function and nutritional and emotional well-being. Systematic screening followed by nutrition referral for appropriate interventions is rare.

OBJECTIVES: The purpose of this study was to pilot a screening process followed by nutritional assessment and intervention when warranted for patients with lung malignancies.

METHODS: Adult patients with lung malignancies were invited to complete the 12-item Anorexia/Cachexia Scale (A/CS-12) on the day of chemotherapy initiation in ambulatory infusion. Those who scored at a preset threshold were referred to nutrition services for a comprehensive assessment and intervention plan. Those who scored better than the threshold completed the A/CS-12 at each infusion visit for as many as 16 weeks.

FINDINGS: 90 participants enrolled, and 46 scored in a moderate-to-severe-risk category; of those, 42 were referred to nutrition services.

KEYWORDS
anorexia; cachexia; malnutrition; nursing; screening; lung cancer

DIGITAL OBJECT IDENTIFIER
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CANCER ANOREXIA-CACHEXIA SYNDROME (CACS) has signs and symptoms—appetite and weight loss plus muscle wasting—that comprise a common clinical scenario that should be assessed to implement appropriate support sooner rather than later within a course of cancer treatment (Bozzetti et al., 2012). Anorexia and cachexia have been described as emotionally disturbing symptoms (Del Rio et al., 2012), and they compromise physical function and nutritional well-being (LeBlanc, Nipp, et al., 2015). As reviewed by Lis, Gupta, Lammersfeld, Markman, and Vashi (2012), malnutrition in patients with cancer has been strongly associated with poorer quality of life. Weight loss has been associated with worse outcomes in patients with cancer than in those without weight loss (Moumtzi et al., 2016). In 2011, an international consensus panel defined cancer cachexia as “a multifactorial syndrome characterized by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment” (Fearon et al., 2011, p. 490).

Objective measures, such as weight loss and biochemical serum markers, have been combined with patient-reported measures to predict malnutrition and nutritional risk (Gioulbasanis et al., 2011). Bruggeman et al. (2016) recommended that oncology services implement strategies to screen for cachexia, adding systematic collection of patient-reported symptoms to objective criteria (e.g., weight changes, C-reactive protein). However, such practice is infrequent, even in cancer specialty clinics (Andrew, Waterfield, Hildreth, Kirkpatrick, & Hawkins, 2009). Patients often are not referred for nutrition consultations at a time when support may prevent cachexia, but later in treatment when less can be done to address the issue (Santarpia, Contaldo, & Pasanisi, 2011). Nutritional screening can be used to determine the need for additional information, a more comprehensive assessment, and subsequent intervention (Bozzetti et al., 2012; Mueller, Compfr, & Ellen, 2011). A nutrition assessment provides more comprehensive information for registered dietitians to plan an intervention. Consequently, a need exists for further investigation of the feasibility of screening by oncology nurses followed by nutrition consultation and education (Adams et al., 2009; Hopkinson, 2015).
Once individuals with cancer are identified as being at risk for CACS, several treatment interventions show promise as a way to prevent the severity of subsequent compromise. During this early period, termed pre-cachexia (Bruggeman et al., 2016), investigators have studied selective androgen receptor modulators, finding significantly increased lean muscle mass with oral agents compared to placebo in a randomized phase 2 trial (Dobs et al., 2013). As reviewed by Bruggeman et al. (2016), the use of progestins, dronabinol, and corticosteroids in patients with established cachexia has had mixed results with prevalent side effects. Ghrelin receptor agonists have been studied in cachexic patients with cancer, revealing findings of increased lean body mass (Garcia et al., 2015). However, to date, nutritional supplementation to a balanced diet, directed and monitored by professional registered dietitians, remains the standard approach to ensuring adequate protein and caloric intake (Lee, Leong, & Lim, 2016; Thompson et al., 2017).

As reviewed by Skipper, Ferguson, Thompson, Castellanos, and Porcari (2012), assessment of malnutrition risk has been targeted for older adults who are hospitalized and receiving long-term care, as well as for patients with cancer. Most questionnaires require professional administration for a combination of objective and subjective responses. Methods to assess the patient report of symptoms and experiences that indicate risk level for CACS have been tested and developed for brevity. The 12-item Anorexia/Cachexia Scale (A/C-12) was tested as a subscale of the Functional Assessment of Anorexia–Cachexia Therapy (FAACT) (LeBlanc, Samsa, et al., 2015) in 79 patients with lung cancer. The questionnaire performed well regarding internal consistency (Cronbach alpha = 0.79) and aspects of convergent validity.

**FIGURE 1. FUNCTIONAL ASSESSMENT OF ANOREXIA–CACHEXIA THERAPY, 12-ITEM ANOREXIA/CACHEXIA SCALE**

Please mark 1 number per line to indicate your response as it applies to the past 7 days.

<table>
<thead>
<tr>
<th>DURING THE PAST 7 DAYS</th>
<th>0 (NOT AT ALL)</th>
<th>1 (A LITTLE)</th>
<th>2 (SOMEWHAH)</th>
<th>3 (QUIET A BIT)</th>
<th>4 (VERY MUCH)</th>
</tr>
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<tbody>
<tr>
<td>I have a good appetite.</td>
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<tr>
<td>The amount I eat is sufficient to meet my needs.</td>
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<tr>
<td>I am worried about my weight.</td>
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<td>Most food tastes unpleasant to me.</td>
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<tr>
<td>I am concerned about how thin I look.</td>
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<tr>
<td>My interest in food drops as soon as I try to eat.</td>
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<tr>
<td>I have difficulty eating rich or heavy foods.</td>
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<tr>
<td>My family or friends are pressuring me to eat.</td>
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<tr>
<td>I have been vomiting.</td>
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<td>When I eat, I seem to get full quickly.</td>
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<tr>
<td>I have pain in my stomach area.</td>
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<tr>
<td>My general health is improving.</td>
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</table>

IMPLICATIONS FOR PRACTICE

- Implement a feasible practice change for screening of cancer anorexia-cachexia syndrome (CACS).
- Use the 12-item Anorexia/Cachexia Scale, a validated patient-report survey, in the infusion setting.
- Increase detection of early symptoms for CACS in patients treated with chemotherapy for lung cancer to refer at-risk patients to nutrition services.

Methods

Design, Setting, and Sample

A longitudinal, single-arm study was implemented in the thoracic infusion services of the Dana-Farber Cancer Institute. Chemotherapy-naïve, English-speaking adult patients diagnosed with a lung malignancy and with no major physical or psychological limitations were offered participation. The study was approved by the Dana-Farber/Harvard Cancer Center Institutional Review Board as minimal risk.

Procedures

A nurse scientist or research staff member scanned appointments for new chemotherapy “starts.” Infusion nurses approached patients to ascertain their interest in hearing more about the study. Eligible and consenting patients were asked to complete a one-page self-report survey, the A/CS-12 (LeBlanc, Samsa, et al., 2015) (see Figure 1). Participants reported, and the investigator or infusion nurse monitored, the time to complete the survey. Scoring was conducted immediately after survey completion. An institution-specific teaching sheet with recommendations for a healthy diet was provided to all participants on completion of the survey. A written referral to nutrition services was made for participants whose scores indicated moderate or severe anorexia and risk for CACS. For those scoring no or low risk, administration of the A/CS-12 continued at each infusion visit for as many as 16 weeks. Research team members or infusion nurses administered the survey, depending on who was most available. Comprehensive nutrition assessment by dietitians included analysis of subjective and objective information: food, fluid, and nutrient intake and output; anthropometric and biochemical data; and physical activity expenditure (Thompson et al., 2017). Quality of life and symptoms and side effects associated with disease burden or treatment also were evaluated and addressed.

Instrument

The A/CS-12 first was validated in a study with participants diagnosed with cancer or HIV (Ribaudo et al., 2000) then validated in a trial specifically for patients with lung cancer (LeBlanc, Samsa, et al., 2015). Total scores can range from −36 to 12. Higher scores indicate lower risk of CACS and have been associated with better outcomes. Davis et al. (2009) used the A/CS-12 to categorize appetite as good (−3 to 12), moderate (−19 to −4), or poor (−36 to −20). The authors followed this approach to scoring in the current study.

Specific objectives for this pilot study were as follows:

- Determine the percentage of nutrition referrals made for patients scoring −4 or less on the A/CS-12 (moderate to severe anorexia).
- Calculate the time to complete the A/CS-12.
- Determine the percentage of participants who scored and had a classification of malnutrition.

The previous referral rate to nutrition services for at-risk patients actively treated for lung cancer was estimated to be 50%. The authors considered the use of A/CS-12 to be successful if an 80% referral rate was achieved.

Analysis

Descriptive statistics were used to summarize demographic and survey data. The observed rate of moderate to severe anorexia risk based on the A/CS-12 and referral rate were reported with exact 95% confidence intervals. Categorical and continuous variables were compared by group with the Fisher’s exact test and the Wilcoxon rank sum test, respectively.

Results

During a 19-month period, 157 potentially eligible patients were identified, among whom 123 (78%) were contacted for recruitment. The authors missed the opportunity to recruit 21 (13%) potentially eligible patients because of competing demands in the clinic. Others were not recruited because of rescheduled and late infusion appointments.

Twenty-three (19%) contacted patients declined participation, 10 (8%) were deemed ineligible after contact because they did not speak English, were anxious, were depressed, or had prior chemotherapy. Ninety (73%) participants provided written consent and underwent screening for anorexia and cachexia risk using the A/CS-12. Most participants were diagnosed with non-small cell lung cancer, and 44 had stage IV disease (see Table 1). Of the 90 patients screened, at one point during treatment, 46 indicated a moderate to severe risk for anorexia and cachexia with a median A/CS-12 score of −7.5 (range = −18 to −4). Moderate to severe risk for anorexia and cachexia was marginally associated with female gender (correlation with the longer FAACT = 0.96), and it was able to discriminate between known groups of patients with CACS and those without the diagnosis.

Clinical nurses at the Dana-Farber Cancer Institute in Boston, Massachusetts, identified anorexia as an important issue to address in all patients with cancer (Underhill, Boucher, Roper, & Berry, 2012) and worked with nurse scientists, research staff, and dietitians to evaluate a new practice process and outcome, improving on the about 50% referral rate to nutrition services. The goal of the current study is to pilot the use of a patient-reported measure to assess the risk of anorexia and cachexia in patients with lung malignancies to initiate nutritional evaluation and intervention prior to the development of malnutrition.
gender \((p = 0.09)\), diagnosis \((p = 0.07)\), and higher stage of disease \((p = 0.09)\). Twenty-nine enrolled women indicated anorexia and cachexia risk, compared to 17 men. Most participants with non-small cell \((n = 37)\) and small cell lung cancer \((n = 6)\) indicated anorexia and cachexia risk.

Of 46 patients indicating anorexia and cachexia risk, 31 received a team nurse referral solely as a result of the A/CS-12 score. An additional five participants were doctor-referred, and one of those did ultimately score at risk. Ten participants self-referred to nutrition services, five of whom ultimately scored at risk on the A/CS-12. In total, 42 participants indicating anorexia and cachexia risk on the A/CS-12 received a referral for a nutrition consultation. Six referred participants did not receive the consultation; three missed the appointment with the dietitians and did not reschedule prior to the end of chemotherapy, one did not schedule an appointment, and two entered supportive services elsewhere. Thirty-six participants with a referral received a nutrition consultation, of which 17 were classified with malnutrition. Nineteen did not classify as malnourished but were counseled on general nutrition for weight management. Ten of these participants received specific counseling to increase fluids or protein intake, and two were deemed at risk for malnutrition based on diagnosis and side effects.

### Discussion

In the current study, screening for CACS in patients treated with chemotherapy for a lung malignancy resulted in a high percentage of at-risk patients being referred to nutrition services. The self-report screening tool, the A/CS-12, was administered successfully in the infusion service with minimal time required for completion. Most participants with at least moderate risk for CACS and who were referred to nutrition services were not assessed as malnourished and were provided interventions by professional dietitians to prevent further nutritional decline.

The infusion and research team members missed recruitment of some potentially eligible participants because of demands of a busy infusion service. Participants were required to give written documentation of consent, and conducting the informed consent process adds a task to what is normally not a component of a direct care infusion nurse’s time. However, the ability to conduct subsequent screening was not affected in the same manner. The delivery and review of a one-page survey was a feasible task.

The findings of patient-reported screening feasibility and referral success have not been reported outside of a clinical trial (Bruggeman et al., 2016; Del Fabbro et al., 2015). Oncology nurses have been encouraged to assess patients for CACS risk (Del Ferraro, Grant, Koczywas, & Dorr-Uyemura, 2012; Walz, 2010), but no empirical data have supported the practice. Van der Meij et al. (2013) did report the results of screening with objective measures only in patients with stage III non-small cell lung carcinoma, finding similar results that cachexia was already present in 18% of the Dutch sample and that 23% were at risk. The current findings provide a foundation for the role and interdisciplinary collaboration between nursing and nutrition services. In addition, screening using a systematic method followed by referral and nutrition consultation for patients at higher risk may be more

### TABLE 1. SAMPLE CHARACTERISTICS BY RISK GROUP

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>LOW RISK(^a) ((N = 44))</th>
<th>MODERATE TO SEVERE RISK(^b) ((N = 46))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>Body mass index ((\text{kg/m}^2))</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Time (minutes) to complete the first survey(^c)</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Average time (minutes) to complete all surveys(^d)</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Gender**
- Female: 19
- Male: 25

**Diagnosis**
- Mesothelioma: 7
- Non-small cell lung cancer: 36
- Small cell lung cancer: 1

**Stage**
- I: 7
- II: 3
- III: 14
- IV: 20

**Body mass index category**
- Underweight: –
- Normal: 14
- Overweight: 20
- Obese: 10

\(^a\) Scored greater than –4
\(^b\) Scored –4 or less
\(^c\) Data were missing for 1 participant in the low-risk category and for 2 participants in the moderate-to-severe-risk category.
\(^d\) Data were missing for 2 participants in the moderate-to-severe-risk category.
cost effective than ad hoc or blanket referrals (Kruizenga et al., 2005).

The successful screening practice change described in this article will be vetted by the authors’ institutional nursing council and administration and considered for wider implementation. An in-depth evaluation of longer-term patient outcomes could be launched to further establish the efficacy of screening plus referral. Preventing patients with lung cancer from spiraling into malnourishment would be a worthwhile goal.

Limitations
The current pilot study was limited by the exclusion of non-English speakers and data collection at a single site and only in patients with lung malignancies. The findings cannot be generalized to community settings without in-house nutrition services.

Implications for Nurses
Screening for CACS in patients treated with chemotherapy for lung cancer can result in a high percentage of at-risk patients being identified and referred to nutrition services. Nurses may want to consider a brief patient-reported survey that has established thresholds for when to refer. Screening and referral identify patients who are most likely to benefit before becoming malnourished and who require prophylactic nutrition intervention.

Conclusion
Screening patients with lung malignancies in the ambulatory infusion unit for CACS risk was feasible using a short patient-report survey and increased the number of at-risk patients being referred to nutrition services. Oncology nurses and dietitians may be able to identify at-risk patients and provide support before cachexia is irreversible.

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REFERENCES


