Supportive Care in Lung Cancer: Improving Value in the Era of Modern Therapies

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OVERVIEW

Driven by a discipline-wide imperative to maximize patient centeredness and value, supportive care services have experienced remarkable growth and acceptance in oncology care. Two such services with a growing evidence base and examples of routine integration into usual oncology care are palliative care and integrative medicine. Both focus on the patient experience with cancer during and after cancer-directed treatments occur, from diagnosis through survivorship or end-of-life care. With a frame of increasing value for all in the oncology care ecosystem, we highlight the evidence for how these two disciplines can improve the experience of patients with cancer and their loved ones. We further highlight how additional focus in palliative care and integrative medicine can continue to build toward a shared vision of high-value, high-quality cancer care.

Dedicated attention to the palliative and supportive care needs of patients with lung cancer is now the standard of care as reflected in national and international guidelines, including those of ASCO, the European Society for Medical Oncology, and the National Comprehensive Cancer Network. Palliative and supportive care is defined as patient- and family-centered care that optimizes quality of life (QOL) by anticipating, preventing, and treating suffering. Palliative care throughout the continuum of illness involves addressing physical, intellectual, emotional, social, and spiritual needs and facilitates patient autonomy, access to information, and choice. Resultant to proliferation of guidelines, palliative care specialty services are now increasingly available and have become more routinely integrated into multidisciplinary cancer care teams, tumor board discussions, and as part of evaluations for clinical trials.

As thoracic oncology experiences a rapid growth of its disease treatment armamentarium, the regular use of palliative, supportive, and complementary therapies has become more vital. The shifting survival curve for thoracic malignancies has rendered engagement with patients to address physical, social, emotional, and spiritual issues only more pressing, including optimizing symptom control, emotional coping, and uncertainty management. Hence, together with forging novel treatments like immunotherapeutics, there should be a paralleled emphasis on patient-centered care, particularly around aligning care with patient goals, such as through advance care planning and goal setting, and improving patient QOL and satisfaction with care through the standard integration of palliative and supportive care services. Herein we review the evolving role of palliative and supportive care in an era of new therapies, the role of complementary therapies, and the value proposition for palliative and supportive care in the management of thoracic malignancies.

EVOLVING ROLE OF SUPPORTIVE CARE IN THE ERA OF NOVEL THERAPIES AND PROLONGED LIFE SPAN

A growing body of evidence has emerged demonstrating improved patient-centered outcomes with the integration of palliative and supportive care into oncologic care. In light of this evidence, in 2012 ASCO prepared a provisional clinical opinion supporting the integration of palliative and supportive care into standard oncologic care. Given the growing strength and consistency of the evidence, ASCO more recently convened an expert panel in palliative care in oncology to perform a systematic review of this evidence and update of the 2012 provisional clinical opinion. This work resulted in the ASCO clinical practice guideline update published in 2017. The recommendations resulting from this practice guideline are summarized in Table 1.

This evidence is of particular importance to thoracic malignancies because the patient populations studied had...
TABLE 1. Summary of the 2017 ASCO Clinical Practice Guideline for Integration of Palliative Care Into Standard Oncology Care

<table>
<thead>
<tr>
<th>Specific Recommendation</th>
<th>Evidence Quality</th>
<th>Strength of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Patients with advanced cancer should receive dedicated palliative care services, early in the disease course concurrent with active treatment</td>
<td>Evidence based: interme-diate</td>
<td>Strong</td>
</tr>
<tr>
<td>(2) Palliative care services should be provided by interdisciplinary teams with consulta-tion available in both the inpatient and outpatient settings</td>
<td>Evidence based: interme-diate</td>
<td>Moderate</td>
</tr>
<tr>
<td>(3) For newly diagnosed patients with an advanced cancer, early referrals to palliative care should occur, with the suggested timeframe being within 8 weeks of diagnosis</td>
<td>Evidence based: interme-diate</td>
<td>Moderate</td>
</tr>
<tr>
<td>(4) Among patients with cancer with high symptom burden and/or unmet physical or psychosocial needs, outpatient cancer care programs should provide and use pallia-tive care services as a complement to their care</td>
<td>Evidence based: interme-diate</td>
<td>Moderate</td>
</tr>
<tr>
<td>(5) For caregivers of patients with cancer, caregiver-tailored palliative care support should be considered, such as education or support offered remotely or in person</td>
<td>Evidence based: low</td>
<td>Weak</td>
</tr>
</tbody>
</table>

notable proportions of patients with lung cancer. A comprehensive overview of the research is provided in the ASCO clinical practice guideline; herein we will address two questions: (1) What is the evolving evidence informing expected outcomes when palliative care is concurrently provided to patient populations with lung cancer? (2) How can palliative and supportive care be integrated into the care of thoracic oncology patient populations?

What Is the Evolving Evidence Informing Expected Outcomes of Palliative Care in Patients With Lung Cancer?

In 2009, Bakitas et al7 reported the findings of the ENABLE II (Educate, Nurture, Advise, Before Life Ends) randomized controlled trial (RCT) involving 312 patients with advanced cancer (35% had lung cancer) recruited from National Cancer Institute–designated rural cancer centers and Veterans Affairs–affiliated outreach clinics. A psychoeducational intervention was conducted by advanced practice nurses and consisted of four weekly educational sessions and monthly follow-up sessions. The primary outcomes were measures of QOL, including Functional Assessment of Cancer Therapy (FACT)–Palliative Care scale scores, symptom intensity, and resource use. The study showed that patients had improved QOL (p = .02), reduction in depressed mood (p = .02), and a trend toward lower symptom intensity (p = .06).

In 2010, Temel et al8 reported findings of a single-institution RCT of early referrals to palliative care with standard oncology care versus standard oncology care alone among 151 patients with newly diagnosed metastatic non–small cell lung cancer (NSCLC). The primary endpoint was change in the score on the Trial Outcome Index from baseline to 12 weeks, which was composed of a sum of physical, functional well-being, and lung cancer subscales of the FACT-Lung scale. Patients in the early palliative care group were to receive a palliative care visit within 3 weeks of random assignment and at least once per month after the initial visit. Patients in the early palliative care group had better Trial Outcome Index scores (59 vs. 53; p = .009) and better FACT-Lung scores (98 vs. 91.5; p = .03) than the standard oncology care group at 12 weeks. Furthermore, there were also fewer depressive symptoms in the palliative care group versus the standard care group (6% vs. 38%, respectively; p = .01). Notably, despite fewer patients in the early palliative care group receiving aggressive end-of-life care (defined as chemotherapy within 14 days before death, no hospice care, or admission to hospice within 3 days of death) compared with the standard care group (33% vs. 54%, respectively; p = .05), median survival was longer among patients receiving palliative care (11.6 vs. 8.9 months; p = .02).

In 2014, Zimmermann et al9 reported on a cluster RCT in which they compared early palliative care versus standard care among 461 patients with stage III or IV solid tumors with a poor prognosis (22% had lung cancer). Twenty-four medical oncology clinics were randomly assigned as to whether they would provide the palliative care intervention, which included palliative care consultation and monthly follow-up in the oncology palliative care clinic by a palliative care clinician and nurse. Telephone contacts were also provided, both at 1 week after the consultation and with a 24-hour call-in service for management of urgent issues. The primary outcome was change in QOL at 3 months as measured by the Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being. There was only a trend in improvement in the assessment score (p = .07), although there

PRACTICAL APPLICATIONS

- There is a compelling and growing body of evidence for routine integration of palliative care into lung cancer care with outcomes related to quality of life, depression, anxiety, health care utilization, and potentially survival.
- Palliative care integration into lung cancer care includes both foundational delivery of services from oncology teams and more specialized services from palliative care teams when needs dictate.
- There is a guiding framework from the American College of Chest Physicians for integration of complementary therapies into the care of patients with lung cancer.
- Palliative brings patient-centered and financial value to patients and oncology practices alike through six main, evidence-based drivers.
- Regular provision of palliative care services is a common theme found among high value oncology practices.
was significant improvement in secondary outcomes including the Quality of Life at the End of Life scale (p = .05) and in the measure of patient satisfaction with care (p = .003).

In 2015, Ferrell et al. published findings of their quasi-experimental study of 491 patients with all stages of NSCLC, in which they compared usual care versus an interdisciplinary palliative care intervention. The usual care group was recruited first, followed by the intervention group. Patients in the intervention group received an initial nurse-completed comprehensive baseline assessment, including QOL, symptoms, and psychological distress, with presentation at an interdisciplinary meeting for creation of a personalized palliative care plan and recommendations for supportive care referrals. Patients in the intervention group also received four educational sessions organized around the physical, psychological, social, and spiritual domains of QOL. QOL endpoints were assessed at 12 weeks and included QOL and symptom burden (assessed by the FACT-Lung scale), spiritual well-being (assessed by the Functional Assessment of Chronic Illness Therapy–Spiritual Well-Being scale), and psychological distress (as measured by the distress thermometer). Patients in the intervention group had better QOL (p < .001), improved symptoms (p < .001), greater spiritual well-being (p = .001), and lower psychological distress (p < .001) at 12 weeks, after controlling for baseline scores. Patients in the intervention group also had significantly higher numbers of completed advance care directives (44% vs. 9%; p < .001) and overall supportive care referrals (61% vs. 28%; p < .001). Notably, QOL benefits were seen largely in the patients with early-stage disease versus those with stage IV disease.

Finally, in 2017, Temel et al. published results of their RCT of early palliative care among 350 patients with lung (55%) and gastrointestinal (45%) malignancies. The palliative care intervention was composed of visits with a palliative care clinician once a month until death, and those in the usual care group would receive palliative care upon request or referral. The primary study endpoint was change in QOL (FACT-General scale), and secondary endpoints included change in QOL from baseline to week 24, change in depression, and differences in end-of-life communication. This study found improvement in QOL at week 24 (p = .01) but not at week 12 (p = .39). Patients receiving the intervention had less depression at week 24 (p = .048) and also were more likely to discuss their care wishes with their oncologist if they were dying (30.2% vs. 13.5%; p = .004). Interestingly, the intervention effects varied by cancer type, with patients with lung cancer having improvements in measures of QOL and depression at weeks 12 and 24 (all p < .05).

These studies, as part of a larger body of evidence, point to the value of supportive care in lung cancer populations in improving patient outcomes. The bulk of these data are composed of patients with advanced lung cancers, although it is notable that the study by Ferrell et al. included patients with all stages of lung cancer and the greatest benefits in outcomes were among those with earlier-stage disease. In summary, as reflected in the 2017 ASCO clinical guidelines, integration of palliative care into standard oncology care is supported by a body of evidence pointing to its beneficial impacts on QOL, symptom control, and psychosocial-spiritual well-being, together with improved end-of-life planning outcomes, for patients with lung cancer.

How Can Palliative and Supportive Care Be Integrated Into the Care of Patients With Lung Cancer?

Based on the aforementioned research findings and guidelines, palliative care should be standardly integrated into the care of patients with advanced lung cancers at the time of initial diagnosis and approximately monthly thereafter. This presents a question regarding palliative care capacity, both because of the fact that outpatient palliative care resources are frequently limited and because patients with advanced lung cancer are living longer, yielding a greater population requiring care in palliative care clinics. Furthermore, although there is some evidence to support concurrent palliative care among patients with earlier-stage lung cancer, expanding to this population poses further need for palliative care resources to accommodate these patients.

In light of these practical challenges, three potential models for integrating palliative care into standard oncology care can be considered. All three models are based on an overarching generalist/specialist approach to palliative care delivery, as described by Quill and Abernathy and supported within the 2017 ASCO guidelines. In this model, basic management of symptoms, depression/anxiety, and patient/family communication regarding prognosis, goals of care, and advance care planning are expected roles and competencies on the part of the oncology clinical care team. In addition, all models assume inclusion of regular assessments of patient-reported outcomes metrics to ensure regular review of patient symptoms and other issues, with prompt interventions where needed. The use of patient-reported outcomes metric–based interventions in oncology is supported by a recent RCT by Basch et al., which demonstrated a survival benefit with their implementation.

Undergirded by generalist/specialist palliative care model and standard assessment of symptoms and other concerns via patient-reported outcomes metrics, potential models of integrated care delivery are as follows.

Concurrent care model. This model is most consistent with the evidence and is characterized by concurrent care—an initial consultation within 8 weeks of diagnosis followed by monthly patient visits—by an interdisciplinary palliative care team for all patients with advanced lung cancer and for patients with other disease stages who are identified through screening as having specialty palliative care needs. Although further research of appropriate triggers for specialty palliative care is required, the 2017 ASCO guidelines propose potential triggers based on extant evidence.

Triggered integration model. This model is implemented when there are insufficient resources to meet outpatient palliative care needs required in the concurrent care model. In the triggered integration model, the oncology care team...
establishes dedicated resources within the oncology staff (e.g., an advance practice nurse) backed by interdisciplinary resources to provide concurrent palliative care within the oncology clinic. Key components of palliative care provided within the randomized trials have been summarized by the acronym TEAM. TEAM is characterized as follows. T represents time with the patient of at least 1 extra hour per month at regular intervals dedicated to palliative care issues. E denotes education and includes ongoing, structured discussions about managing symptoms, goals, preferences for care, prognostic understanding, advanced care planning, and communication of these discussions with the health care team. A represents assessments that systematically (e.g., electronically available patient-reported outcomes metrics) query patients about symptoms (e.g., Edmonton Symptom Assessment System), psychosocial well-being (e.g., Patient Health Questionnaire-2), spirituality (e.g., the FICA Spiritual Assessment Tool, which assesses faith and belief, importance, community, and areas to address in care\textsuperscript{14}), distress (e.g., distress thermometer), and caregiver issues. Finally, M refers to management and includes referrals to interdisciplinary services that are triggered when assessments identify specific palliative care needs. Established protocols should provide clear pathways for when to involve interdisciplinary services (e.g., psychosocial needs resulting in a mental health provider referral).

Concurrent and triggered integration model. A third potential model is a hybrid of the aforementioned models, in which palliative care services are concurrently provided to all patients with advanced cancer but in addition, there is a dedicated generalist palliative care provider integrated into the oncology clinic. This provider regularly assesses patients receiving palliative care services who, as high-risk patients, may have issues arise between their palliative care visits and provides ongoing assessments of all patients with lung cancer who may not be receiving palliative care services. This service can expeditiously identify palliative care issues for immediate intervention and/or for specialty referrals. This third model may also function well where outpatient palliative care services are present but may be insufficient in capacity to provide all ongoing palliative care follow-up.

In summary, there is strong evidence to support concurrent palliative care services in the care of patients with advanced lung cancer. This added layer of support should also be considered for patients of earlier-stage lung cancers, particularly where assessments indicate palliative care needs. Models of palliative care delivery should be established in oncology clinics, with the concurrent care model being most consistent with the evidence. In light of insufficient palliative care resources to meet the needs of a growing population of patients living with advanced lung cancers, adaptations such as the triggered integration model and the hybrid concurrent/triggered model can also be considered.

VALUE AND COST OF PALLIATIVE AND SUPPORTIVE CARE

Over the last decade, the evidence base supporting improvement in patient and caregiver outcomes through routine integration of palliative care into oncology care has transitioned from nascent to robust. In response, palliative care consultation teams across the United States have grown by leaps and bounds, with a more than threefold increase in availability in less than 2 decades. Paralleling the growth of palliative care, oncologists have experienced wholesale changes in how cancer care is delivered, including an imperative to demonstrate robust links between services rendered and value. This shift toward pay-for-value has led to thoughtful searches across the field to maximize the delivery of high-value services while rooting out and reducing those services that do not improve outcomes of importance.

The Value Imperative for Palliative Care

A consistent characteristic of high-value oncology care is regular and normalized delivery of palliative care. This has been observed in both qualitative reviews of high-value practices alongside large prospective studies. For example, Blayney et al\textsuperscript{18} studied seven high-value practices, finding a common theme among them related to early and routine palliative care integrated into usual oncology care. Furthermore, they found regular deployment of care practices that focus on goal setting and supporting the patient journey through cancer,\textsuperscript{18} indicating a culture that embraces the delivery of palliative care philosophies both by the oncology team and palliative care specialists. In fact, the expert oncologist panel judged routine integration of palliative care as one of the top three attributes to carry the highest immediate potential for lowering spending without compromising the quality of care. Additionally, we performed our own analyses of preferred care practices that meet quality measures in reimbursement arrangements that stress high value, such as the oncology care model. To no surprise, there can be clear relationships drawn between most quality measures in the oncology care model and proven ways palliative care can improve those measures.\textsuperscript{19}

Yet the value proposition for palliative care integration into oncology care also requires quantitative, prospectively collected data with real-world implementation. The “value proposition,” a term often used in the business world to denote the differentiating value brought on by a new product or service, of palliative care integration centers around two key arguments. First, palliative care increases indirect sources of revenue for health care organizations. Second, palliative care maximizes cost savings related to decreased provisions of low-value care. The former can include bonuses and payments related to improvements in patient satisfaction and hospital readmission scores, whereas the latter is achieved through lesser delivery of unreimbursed care (e.g., that exceeds the allotted Disease-Related Group code), and low-value care near the end of life (e.g., chemotherapy in the last days, transfers to intensive care units with no goals). Importantly, the value proposition is not rooted in the increasingly outdated fee-for-service model; specialty palliative care services are generally cost centers, not contribution margin drivers.
Moving along the accounting ledger, in addition to building assets associated with cost savings to patients, clinical organizations, and payers, palliative care naturally has costs of its own. Because of their multidisciplinary nature, services can be associated with high fixed costs related to clinician salaries. Furthermore, with the bimodal age and experience distribution in the specialty palliative care workforce and with many clinicians entering the field as a second career, clinician salaries can be high. Additionally, because many programs are starting from scratch, recruitment, onboarding, and administrative costs related to necessary startup activities are often substantial. Thus, the value proposition is truly a balance between the direct costs related to starting and running a team, the indirect costs (e.g., opportunity costs when resources are taken away from other areas to support palliative care), and the potential value realized by patients, caregivers, health systems, and payers.

A Building and Compelling Evidence Base for Palliative Care Maximizing Value

To address all components of the value proposition argument for greater palliative care integration, outcomes important to patients, health systems, and payers have been seamlessly weaved into study designs from even the earliest of studies. For example, one of the earliest home-based palliative care trials 15 years ago by Brumley et al demonstrated among 500 patients in an integrated health system profound benefits from the “extra layer of support” that palliative care adds. These benefits included increased satisfaction with services at 60 days after enrollment and significantly fewer emergency department visits, hospital days, skilled nursing facility days, and physician visits than those in the comparison group. Those enrolled in palliative care averaged a 45% decrease in costs compared with patients that received usual care. In 2011, Morrison et al first demonstrated sizable fixed and variable costs savings for hospitalized patients evaluated by palliative care. They showed that there was an adjusted net savings of $1,696 in direct costs per admission and $279 in direct costs per day for palliative care patients who were discharged alive compared with controls. Greater costs savings were seen among those patients who died during the inpatient admission; there was an adjusted net savings of $4,908 in direct costs per admission and $374 in direct costs per day for palliative care patients who were discharged alive compared with palliative care patients who died compared with controls. Similar analyses demonstrated cost savings up to $6,900 for Medicaid patients, including reductions of $4,098 in hospital costs per admission for patients discharged alive and $7,563 for patients who died in the hospital. Demonstrating dramatic cost reductions when considering palliative care as a population health strategy, the authors estimated that the reductions in Medicaid hospital spending in New York State alone could be as high as $252 million annually.

As patient and caregiver outcomes from prospective trials started to emerge, outcomes related to value and health care utilization were reported. For example, the aforementioned RCT by Temel et al, demonstrating a potential survival benefit with palliative care compared with usual care, also reported no cost increases with the addition of palliative and hospice services while also demonstrating lower chemotherapy-related costs. This is remarkable, considering that patients did not overall receive less chemotherapy in the palliative care intervention arm, just less near the end of life. Further reviews of studies have continued to confirm the concept of predictable cost savings associated with palliative care integration, across both outpatient and inpatient delivery.

Table 2 summarizes key studies that demonstrate outcomes related to health care value improved by palliative care integration into oncology.

The Road Ahead: Value and Palliative Care Hand in Hand

Oncology will always remain one of the most resource-intensive medical disciplines. Caring for those with substantial morbidity, using methods that are often costly because of their cutting-edge characteristics, while using a multidisciplinary team to address needs from all angles comes at a cost. Yet we are learning that routine integration of palliative care into oncology can curtail costs that are unnecessary and can prevent health care utilization that is not wanted, while supporting patient preferences and values. This counters any myth that cost savings as a result of palliative care involvement originate from anything other than supporting patient wishes. It turns out that doing the right thing, as defined by patients and their caregivers, leads to appropriate resource utilization when warranted and savings for all when not.

INTEGRATIVE HEALTH APPROACHES IN THE CARE OF PATIENTS WITH LUNG CANCER

Having explored evidence undergirding the integration of palliative care services into the care of patients with lung cancer, including its evidence-based role in care and resultant value associated with integration, we now turn to examining the role of integrative oncology in the care of patients with lung cancer. Integrative oncology is now recognized as a supportive and adjunctive model of care for patients with lung cancer; in 2013, the American College of Chest Physicians published evidence-based practice guidelines to facilitate implementation of integrative health approaches in lung cancer care.

Recently, a consensus group defined integrative oncology as “a patient-centered, evidence-informed field of cancer care that utilizes mind and body practices, natural products, and/or lifestyle modifications from different traditions alongside conventional cancer treatments. Integrative oncology aims to optimize health, quality of life, and clinical outcomes across the cancer care continuum and to empower people to prevent cancer and become active participants before, during, and beyond cancer treatment.”

The core purpose of integrative oncology converges with a holistic, biosocial, personalized approach to the patient and moves away from the reductionist model of disease.
described by Greene and Loscalzo. Integrative oncology serves to “put the patient back together” by introducing evidence-based complementary therapies to address the physical, emotional, and spiritual impact from cancer and its sequelae.

Complementary therapies are increasingly supported by the literature to address many of the unique problems faced by the patient with lung cancer. With lung cancer as the leading cause of cancer death, it is not surprising that patients often experience a high burden of symptoms, poorer prognoses, and social stigmatization related to their smoking history. Taken together, these factors, in addition to the complexities related to treatment, all lead to increased psychosocial and physical distress.

In Table 3, we have summarized the 2013 American College of Chest Physicians evidence-based practice guidelines for complementary therapies in integrative medicine and lung cancer. In this section, we have also included some updated evidence since its publication.

In these guidelines, the authors note that the commonly used term CAM (complementary and alternative medicine) is often used to describe adjunctive therapies and includes both complementary strategies, which are evidence based, and alternative therapies, which are largely unproven methods. The guidelines review only complementary modalities and are based on a large systematic literature review of meta-analyses, systematic reviews, RCTs, and prospective cohort studies in accordance with the American College of Chest Physicians evidence-based clinical practice guidelines development methodology. Because patients with lung cancer experience symptoms such as anxiety, nausea, vomiting, and pain, which are associated with treatment of all patients with cancer, another guideline ("2017 Clinical Practice Guidelines on the Evidence-Based Use of Integrative Therapies During and After Breast Cancer Treatment") may provide additional guidance in the use of complementary therapies for patients with lung cancer.

Some of the common modalities used in lung cancer treatment with reasonable evidence include mind-body modalities, massage, exercise, acupuncture, and nutrition. In China, Chinese herbal medicines are used extensively in the different stages of the patient’s cancer journey. However, in the West, Chinese herbal medicine is rarely studied adequately to provide sufficient evidence to guide its use for patients with cancer. Practice guidelines have been developed by Chinese oncology experts to enhance the efficacy of targeted treatments, prolong survival, decrease treatment side effects, and improve QOL. These guidelines are based on several decades of research ranging from case series to RCTs and are of varying quality.

For example, Chinese herbal medicines demonstrated beneficial effects when used concomitantly with icotinib by patients with advanced NSCLC in a recent study.

### Mind-Body Modalities

Mind-body modalities refer to healing techniques administered by professionals that enhance health by focusing on brain, mind, body, and behavioral interactions, as well as the impact of emotional, mental, social, spiritual, experiential, and behavioral factors on overall well-being. Deng et al specifically addressed the modalities of yoga, tai chi/qigong, hypnosis, music therapy, psychosocial/relaxation techniques, as well as mediation and mindfulness-based stress reduction. The first three modalities (tai chi, qigong, and yoga) all involve integration of breathing, meditation, and aerobic movements. In traditional Chinese medicine, tai chi and qigong are used to balance the vital life energy (qi), resulting in improved immune and cardiovascular function and stress reduction. A small study of 32 patients with NSCLC who had undergone a thoracotomy showed no increase in cortisol level in the tai chi group compared with patients who received a standard lung resection.
Another meta-analysis of 13 trials and 592 subjects found that qigong/tai chi positively affected QOL, fatigue, immune function, and cortisol levels of patients with cancer. The authors noted that there was a high risk of bias included in the trials and that further, more rigorous studies are needed. Well-controlled trials have confirmed that yoga may improve mood, stress, QOL, and sleep, as well as chemotherapy-induced nausea/anticipatory nausea, pain, fatigue, and appetite.

**Psychosocial Interventions**

Deng et al evaluated six systematic reviews and one meta-analysis involving 178 studies and more than 20,000 patients with lung cancer. The authors were not able to demonstrate a survival benefit for psychosocial interventions, but they determined that (1) cognitive-behavioral therapy was beneficial in improving QOL, depression, anxiety, pain, fatigue, and distress; (2) behavioral methods reduced nausea, vomiting, anticipatory nausea and vomiting, anxiety, and depression; and (3) relaxation training ameliorated tension, anxiety, mood and hostility, while reducing blood pressure/heart rate, nausea, sleep disturbance, and pain. A more recent review by Lehto et al looked at psychosocial interventions in lung cancer therapies, including cognitive-behavioral therapies, psychoeducation, mind-body exercise, and supportive/palliative care strategies. Further well-designed studies are needed to provide additional guidance in using these therapies.

**Acupuncture**

Acupuncture has been used clinically in traditional Chinese medicine for more than 2,500 years. A recent article from the National Cancer Institute conference on acupuncture for symptom management in oncology reviewed the state of the science, evidence, and research gaps. Some mechanistic studies show that acupuncture point stimulation has modulatory effects on the central and peripheral nervous systems, including the autonomic nervous system. Deep tissue sensory afferent nerves are stimulated and activate central nervous system pathways that control sensory modulation and autonomic regulation. Prolonged stimulation

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**TABLE 3. Complementary Therapies in Lung Cancer as Part of a Suggested Multidisciplinary Approach**

<table>
<thead>
<tr>
<th>Approach</th>
<th>Grade</th>
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<tbody>
<tr>
<td><strong>Initiation of complementary therapies</strong></td>
<td></td>
</tr>
<tr>
<td>Ask all patients with lung cancer about their interest in using complementary therapies, and counsel on risks and benefits</td>
<td>2C</td>
</tr>
<tr>
<td><strong>Mind-body modalities interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Use mind-body modalities to reduce anxiety, mood disturbance, and sleep disturbance in symptomatic patients and to improve QOL</td>
<td>2B</td>
</tr>
<tr>
<td>Use mind-body modalities to reduce acute or chronic pain in symptomatic patients</td>
<td>2B</td>
</tr>
<tr>
<td>Use mind-body modalities to reduce anticipatory chemotherapy-induced nausea and vomiting</td>
<td>2B</td>
</tr>
<tr>
<td>Use yoga (a movement-based mind-body modality) to reduce fatigue and sleep disturbance and improve mood and QOL in symptomatic patients</td>
<td>2B</td>
</tr>
<tr>
<td><strong>Massage</strong></td>
<td></td>
</tr>
<tr>
<td>Add massage therapy by trained professionals for anxiety and pain, not adequately controlled by usual care</td>
<td>2B</td>
</tr>
<tr>
<td><strong>Exercise-based pulmonary rehabilitation interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Provide supervised exercise-based pulmonary rehabilitation to improve cardiorespiratory fitness and functional capacity in patients with compromised lung function awaiting pulmonary resection for suspected lung cancer</td>
<td>2C</td>
</tr>
<tr>
<td>Provide supervised exercise-based pulmonary rehabilitation to improve postsurgical cardiorespiratory fitness and functional capacity in patients with lung cancer</td>
<td>2C</td>
</tr>
<tr>
<td>Provide supervised exercise-based pulmonary rehabilitation to improve cardiorespiratory fitness and functional capacity in patients with lung cancer with compromised lung function receiving palliative anticancer therapy</td>
<td>2C</td>
</tr>
<tr>
<td><strong>Acupuncture</strong></td>
<td></td>
</tr>
<tr>
<td>Use acupuncture for patients with chemotherapy or radiation-associated nausea or vomiting</td>
<td>2B</td>
</tr>
<tr>
<td>Use acupuncture for patients with inadequately controlled cancer-related pain and peripheral neuropathy</td>
<td>2C</td>
</tr>
<tr>
<td><strong>Diet interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Recommend a diet rich in nonstarchy vegetables and fruits to reduce the risk of cancer in patients who may develop lung cancer</td>
<td>2C</td>
</tr>
<tr>
<td>Limit consumption of a large amount of red meat and processed meat in patients who may develop lung cancer, because lower red meat intake may reduce the risk of lung cancer</td>
<td>2C</td>
</tr>
<tr>
<td>Add high-calorie and high-protein supplements (1.5 kcal/mL) to the diets of patients with weight loss undergoing treatment of lung cancer to achieve weight stabilization</td>
<td>2C</td>
</tr>
<tr>
<td>Use oral supplementation with n-3 fatty acids to improve nutritional status in patients with sarcopenia</td>
<td>2C</td>
</tr>
</tbody>
</table>

Abbreviation: QOL, quality of life.
activates brainstem descending diffuse noxious inhibitory pathways to produce analgesia. Furthermore, functional MRI studies demonstrate that acupuncture influences the activity of the insula and limbic system related to affective responses and pain modulation, as well as the activity of somatosensory areas S1 and S2. There is also evidence of peripheral nerve sensory modulation mediated by adenosine. Finally, some of the long-term effects of acupuncture may be explained by cortical plasticity and effects on opioid binding. Given the substantial unmet symptom management needs and accumulating research evidence, use of acupuncture is recommended for pain, cancer-related fatigue, chemotherapy-related nausea and vomiting, likely xerostomia, as well as palliative care and cancer survivorship.47

Massage Therapy
Massage therapy uses the hands or mechanical devices to manipulate the muscles and reduce muscle tension and pain. In a small meta-analysis, Lee et al48 found that massage therapy compared with no massage or conventional care significantly reduced short-term cancer pain. However, the study was limited by inclusion of RCTs and case-controlled trials with possible selection bias.49 Deng et al34 concluded that there is moderate-strength evidence from RCTs that supports the use of massage to decrease anxiety and pain for patients with cancer.

Nutrition
Nutritional care appears to be beneficial in all phases of lung cancer from prevention to treatment to survivorship. Evidence suggests a decreased risk of lung cancer with increased intake of fruits and nonstarchy vegetables, cruciferous vegetables, and carotenoid intake from foods (not supplements). Notably, some data show an inverse correlation between vegetable consumption and lung cancer incidence in smokers. During lung cancer treatment, calorie- and protein-dense supplementation is suggested based on studies of other patients with cancer with weight loss, anorexia, and cachexia. Finally, patients with cancer and sarcopenia have depleted omega-3 fatty acids, and preliminary results from RCTs of patients with NSCLC with sarcopenia demonstrate that the benefits of omega-3 fatty acid supplementation (known for its anticathetic effects), both during and after treatment, outweigh the risks.34

Exercise
Finally, supervised exercise-based pulmonary rehabilitation was suggested in the 2013 American College of Chest Physicians guidelines,36 not only for patients with suspected lung cancer awaiting pulmonary resection but also for patients with postoperative and inoperable lung cancer. The recommendations are based on a few studies that demonstrate notable improvement in cardiovascular fitness and functional capacity before surgery and modest improvement in exercise capacity and QOL after surgery. For patients with inoperable disease, there are preliminary data showing modest improvements in exercise tolerance and functional capacity among patients able to follow the regimen. RCTs are needed to increase the strength of this recommendation.

Clinical Considerations
By establishing the evidence-based guidelines that we have reviewed, the American College of Chest Physicians has provided a framework for clinicians and health systems to disseminate and implement complementary methods (mind-body modalities, massage, exercise, acupuncture, and nutrition) in the care of the patient with lung cancer. Based on our center’s experience at the University of California, Los Angeles, for close to 25 years, we have developed a person-centered, healing-oriented model to help patients with serious refractory problems, including those at various stages of their cancer journey. Using an integrative oncological approach, we help patients manage their stress at the time of their diagnosis, support them through the rigor of treatment to minimize both short- and long-term side effects, and work with them to maintain remission or to slow the progression of disease. This model emphasizes palliation at all stages of the disease process, focusing on enhancing QOL. Additional clinical considerations include the following: (1) the patient and his or her family’s right to select a treatment plan based on individual values, beliefs, and available evidence; (2) access to resources, including accessibility to and availability of competent providers; and (3) insurance coverage. The hope is that integrative health/palliative care, appropriate for people at any age and any stage of a serious illness, would become more available to address the clinical, emotional, psychosocial, and spiritual concerns of the patient and family—a biopsychosocial-ecological-spiritual model of care.49-51

CONCLUSION
Supportive care has experienced remarkable growth and acceptance in oncology care, particularly as the evidence base has grown, demonstrating improvements in notable patient outcomes associated with these services. In light of that body of evidence, the standard integration of palliative and supportive care services is now recommended for all patients with advanced cancer. This body of evidence has particular relevance to lung cancer, as many of the populations studied included, or solely represented, patients with lung cancer. The value of the standard integration of supportive care services has also been well demonstrated, further underscoring the rationale for integration. Finally, the evidence base supporting the inclusion of an integrative health care approach within supportive care services is also growing, and guidelines highlight how integrative modalities serve as part of a holistic approach to the care of patients with lung cancer. The modern era of lung cancer therapies includes an integrated emphasis on patient-centered care through the standard integration of supportive care services to improve value and patient well-being throughout the cancer care continuum, from diagnosis to survivorship or end-of-life care.
References


