

Psychosocial challenges for patients with advanced lung cancer: interventions to improve well-being

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Abstract: As compared to other cancers, lung malignancies are associated with high symptom burden, poorer prognosis, and stigmatization. Such factors increase psychological distress and negatively impact quality of life. Research has documented the efficacy of psychosocial interventions to alleviate psychological distress and promote well-being among patients with cancer. This article summarizes the current literature on psychosocial interventions in lung cancer. Major types of psychosocial interventions in lung cancer include cognitive-behavioral therapies, psycho-education, mind-body, exercise, and supportive or palliative care strategies. Discussion relative to the purpose, sample, research design, outcomes, and quality of the studies is presented. Findings may be useful in clinical environments as a resource to help health providers better understand mental health treatment options and care for patients facing lung cancer. The need to direct future research toward the advancement of science and improve well-being and quality of life outcomes for patients with advanced lung cancer and their family members is discussed.

Keywords: lung cancer, psychosocial interventions, psychological distress, quality of life, advanced lung cancer

Introduction

A diagnosis of lung cancer, the second leading cancer in incidence among men and women and leading cause of cancer death,¹ is associated with high symptom burden, poorer prognosis, and stigma associated with links to smoking behaviors.²⁻⁵ Such factors increase psychological distress and negative social impacts of the disease on patients and their families.² Thus, improving psychosocial well-being to enhance the quality of life (QOL) is a primary goal at all stages of lung cancer during treatment and survivorship.⁵ Research has shown that psychological distress, such as that occurs during depressive episodes, can be a prognostic indicator of poorer clinical outcomes and survival for patients with cancer.^{2,6} Despite this observation, lung cancer remains understudied in the area of psychosocial care as compared to other cancers,² even with the recognition of unmet supportive needs.⁷ Therefore, the purpose of this article is to provide a current overview about research-based psychosocial interventions to support wellness for patients with advanced lung cancer across the survivorship spectrum with a discussion of findings in the context of trends in the field and updated evidence.

A growing literature documents psychosocial-oriented interventions to support mental health for patients with cancer.^{6,8,9} Such interventions include a wide-ranging host of options such as cognitive-behavioral therapies (CBTs), problem-solving approaches, mind-body and alternative therapies, supportive group-based treatments, and education

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focused modalities.^{9–11} While research demonstrates that many of the approaches are efficacious in managing psychological symptoms and in promoting facets of well-being, studies persist with methodological problems such as samples that did not have distress prior to intervention induction, lack of randomization and blinding, variability in identified interventions and outcomes, and other potential bias.^{8,10,12} In general, barriers associated with the inclusion of patients with lung cancer in the intervention studies include the presence of high symptom burden and the challenges associated with access to study sites that require physical presence at the designated times. Patients with lung cancer are recognized to have higher needs for comprehensive supportive care, and given both poor physical function and psychological distress, may need interventions that are multimodal in nature.^{7,13,14}

Methods

A data base search was conducted using the terms lung cancer and psychosocial interventions with CINAHL, Medline, psychINFO, Scopus, Cochrane, and PubMed search engines. To maintain up-to-date findings, only articles published in

the past 10 years (2007–2017) were included in the review. Inclusion criteria comprised articles that targeted 1) testing of psychosocial research interventions in lung cancer; 2) a lung cancer sample; 3) English language in full-text articles (no conference abstracts); and 4) outcomes focused on improving wellness and positive psychological indices. Exclusion criteria included 1) articles that focused on psychosocial interventions for mixed cancer groups; 2) articles that focused on smoking cessation interventions; and 3) articles that described proposed protocols (no data). Initially, 4701 citations were recovered. After a reiterative and systematic evaluation with removal of duplicate articles, 20 articles were incorporated in the final review. This article includes a review of psychosocial interventions for patients with lung cancer with appraisal of 1) type of intervention; 2) sample characteristics; 3) research design and methods; 4) instruments used; and 5) outcomes. Table 1 provides a summary of major findings of the 20 articles in the above mentioned areas. Major psychosocial intervention categories incorporated in the review include CBTs, psycho-education, mind–body, exercise, and supportive or palliative care typologies.

Table 1 Review of studies

Author, year	Purpose	Demographics: sample size, sex (n, %), age (mean SD), race/ethnicity	Design/ methodology	Instruments	Major findings
Adamsen et al, 2012 ³⁹	Evaluate feasibility and preliminary efficacy of an exercise and relaxation intervention for sedentary patients with advanced-stage lung cancer.	Fifteen participants; advanced stage (III–IV) non-small-cell lung cancer (NSCLC) n=13 and small-cell lung cancer (SCLC) n=12 receiving chemotherapy and/or radiation therapy. Mean age 66 years (range 45–80 years); seven men (47%), eight women (53%); Danish.	Six-week supervised hospital-based group exercise and relaxation program including resistance, cardiovascular and relaxation training 4 hours weekly, and a concurrent unsupervised home-based exercise program; qualitative data collection.	Individualized semi-structured interviews (n=15) and one focus group interview (n=8 participants).	Adherence rate of 76% to hospital-based component, but not the home-based exercise. Participants reported increased muscle strength, improvements in well-being, energy, and symptoms of breathlessness.
Badr et al, 2015 ²¹	To evaluate the feasibility and early efficacy of a dyadic telephone-based six-session psychosocial intervention (psychological functioning is the primary outcome).	Thirty-nine patients with advanced stage III NSCLC, n=10 (26%); stage IV, n=33 (84%); SCLC, n=6 (16%) and caregivers. Ten males (26%); 29 females (74%); age 68.17±10.3 years; range 38–87 years; n=33 Caucasians (85%); 34 (86%) had some college education or degree.	Randomized control trial (RCT); participants randomized to psychosocial intervention or to usual care; six weekly 1-hour telephone sessions with mental health trained intervener, tailored content and homework.	Six-Item Patient Reported Outcomes Measurement Information System (PROMIS) short forms for depression and anxiety; 38-item Lorig competence scale; 4-item relatedness scale.	Feasibility and preliminary efficacy demonstrated; patients in psychosocial intervention arm had significant improvements in depression and anxiety symptoms; large effect sizes for relatedness and competence, low attrition rates (88% of sample completed the study).

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Table 1 (Continued)

Author, year	Purpose	Demographics: sample size, sex (n, %), age (mean SD), race/ethnicity	Design/ methodology	Instruments	Major findings
Chambers et al, 2015 ³	To evaluate acceptability of an acceptance-focused cognitive-behavioral intervention.	Twenty-five patients, 65.12 (SD =9.59) years; 22 females (88%); three males (12%). Fifteen (60%) of this Australian sample had high school or below education. Stage and type not reported. Participants recruited from local support network.	Pre-post design. Six weekly telephone-delivered 1.5 hour sessions; 3-month qualitative interview.	Fourteen-Item Hospital Anxiety and Depression Scale (HADS); Impact of Events Scale (IES); The Center for Epidemiological Studies Depression Scale (CESD); The Cataldo Lung Cancer Stigma Scale (CLCSS); The Functional Assessment of Cancer Therapy-Lung (FACT-L).	Improvements in psychological distress, depression, stigma with declines in quality of life (QOL). Patients reported that intervention was beneficial.
Chan et al, 2011 ¹⁹	To evaluate the effectiveness of a psycho-educational intervention on the symptoms (anxiety, breathlessness, fatigue).	One hundred forty-one adults with advanced (stage III–IV) lung cancer who were receiving palliative radiation. Asian sample was from Hong Kong; mostly male (83%). Age and educational background not stated.	Two-group RCT; usual care control group. Intervention included symptom management education and coaching in progressive muscle relaxation provided 1 week prior to radiotherapy and 3 weeks later. Symptom data recorded at baseline, 3, 6, and 12 weeks post-intervention. Health diary.	The Chinese version of the A-state scale of the State-Trait Anxiety Inventory (STAI); breathlessness measured with a 100 mm visual analog scale (VAS); Piper Fatigue Scale; Medical Outcomes Study, RAND Short Form-36 (SF-36).	Twenty-seven percent attrition rate at week 12. Intervention group had significant changes on symptom cluster compared to control group over time with small effect sizes.
Chen et al, 2015 ⁴⁰	To evaluate the effectiveness of a home-based walking exercise on anxiety, depression, and cancer-related symptoms.	One hundred sixteen patients; 54 men, 62 women; age 64.16±10.89 years, range 37–88 years; 10.66 ± 4.73 years of education; 75 (65%) had stage I disease with all stages included; most post-surgery; Taiwanese sample.	RCT; participants randomized to 12-week walking sessions or usual care.	HADS; Taiwanese version of the MD Anderson Symptom Inventory (MDASI).	The exercise group demonstrated significant improvements in their anxiety and depressive symptoms over time (3 and 6 months); 45% completed; 62% at least half of the program.
Fouladbakhsh et al, 2014 ²⁹	To evaluate feasibility and preliminary efficacy of 14 week yoga intervention.	Nine NSCLC survivors who received post-surgical treatment; age 67±6.5 years, range 52–78 years; six females; eight Caucasians; one African American.	One group, repeated measures design. Three weeks pre-intervention, 8 weeks of yoga, and 3-week post-intervention phase, 3- and 6-month follow-up.	Pittsburgh Sleep Quality Index (PSQI); Profile of Mood States-Brief (POMS); SF-36; cortisol measures.	Ninety-five percent completed intervention; significant improvements reported for mood, QOL, and sleep indices.
Geerse et al, 2017 ⁴⁵	To determine the effects of a supportive care intervention.	Two hundred twenty-three patients newly diagnosed or recurrent lung cancer. NSCLC (n=181, 81%); SCLC (n=34, 15%); other (n=8, 4%); females (42%, n=94); the Netherlands.	Patients randomized to supportive care intervention (1:1 psychosocial nurse, referrals) or to usual care. Patients were tested at 1, 7, 13, and 25 weeks for quality of life, mood, satisfaction, end-of-life care, survival.	The European Organization of Research and Treatment of Cancer Quality of Life (EORTC-QLQ-C30), the European Quality of Life-5D, HADS, Patient Satisfaction Questionnaire-III; The Distress Thermometer (DT) and Problem List (DT/PL).	One hundred eleven (50%) completed study (44% usual care, 55% in the experimental group). No differences in patient-reported outcomes. Lower numbers of patients in supportive care group had chemotherapy before death, survival rates were similar. There were 33 deaths.*

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Author, year	Purpose	Demographics: sample size, sex (n, %), age (mean SD), race/ethnicity	Design/ methodology	Instruments	Major findings
Greenberg et al, 2015 ³³	To determine feasibility and efficacy of biofeedback-assisted stress management (BFSM) among patients with NSCLC.	Attempted to enroll 16 patients newly diagnosed with NSCLC; study terminated after eight patients enrolled due to attrition. Of the seven who began study, there were four females, six Caucasians, median age 68 years, range 46–71 years. Stage not reported.	Pre-post design; scheduled for six BFSM training sessions, each lasting 30–45 minutes. Sessions occurred during chemotherapy due to scheduling issues.	HADS; Patient Health Questionnaire-8 (PHQ-8); FACT-L; DT/PL.	One participant completed all sessions. Feasibility impacted negatively by patient condition, scheduling issues, and intervention interruptions. Data showed positive trends, with patients learning to decrease stress, improve respiration, and heart rate variability.
Greer et al, 2015 ¹⁸	To evaluate the feasibility and preliminary efficacy of a brief behavioral intervention for dyspnea management.	Thirty-two symptomatic patients (at least moderate breathlessness) with advanced lung cancer (stage III or IV NSCLC; extensive-stage SCLC) receiving treatment; 56.3% female; mean age 63.34±7.96 years.	Single-group pre-post design; measures obtained at baseline and 6 weeks; intervention consisted of two CBT sessions for teaching dyspnea management strategies. Sessions occurred within 4 weeks of each other; participants received recordings.	Modified Medical Research Council Dyspnea Scale, FACT-L, HADS.	Eighty four percent (n=27) completed the study. Improvements in dyspnea, QOL, and mood.
Lehto et al, 2015 ²⁶	To evaluate feasibility and preliminary efficacy of a mindfulness-based meditation protocol.	Forty patients with advanced NSCLC; stage III, n=13; stage IV, n=27; age 66.2±9.5 years, range 44–87 years; 27 females, 13 males. Thirty four Caucasians; two Asians, one African American, one Native American, two unknown.	Longitudinal RCT design (baseline, 8 and 12 weeks). Participants randomized to 6-week intervention, involved home-based didactic and formal training in meditative practices or usual care.	SF-36; MDASI.	Twenty percent attrition; improved health-related quality of life (HRQOL) parameters including psychological wellness indices (vitality, perceived social functioning).
Milbury et al, 2015 ³¹	To evaluate feasibility and preliminary efficacy of a couple-based Vivekananda Yoga (VKC) intervention.	Fifteen patients (mean age =73 years, 63% female, stage III) with partners. Of patients who completed, eight were Caucasian, one was Latino/Hispanic.	Single-arm pre-post design. 15-session VKC program that focused on dyad interconnectedness.	Brief Symptom Inventory-18 (BFI-18); PSQI; SF-36; Functional Assessment of Cancer Therapy Spiritual Well-Being Scale (FACT-SWB); Benefit Finding in Cancer Scale; perceived closeness and responsiveness measure.	Nine (60%) completed the intervention. Decrease in anxiety ($t=2.41$; $p=0.04$; $d=0.81$). Improved mental health QOL ($t=2.51$; $p=0.04$; $d=0.84$). Effect sizes for benefit finding ($d=0.65$; distress ($d=0.37$) were nonsignificant.
Milbury et al, 2015 ³¹	To evaluate feasibility and preliminary efficacy of a couple-based Tibetan yoga intervention.	Fourteen consented, 10 patients completed; mean age 71.22±6.16 years, range 61–82 years; Five females; eight Caucasians; one Latino/Hispanic; one other. Stage IA–IIIB; 50% at least had some college education.	Single-arm pre-post design. Two to three weekly sessions (45–60 minutes) over 5–6 weeks (15 total).	Centers for Epidemiological Studies-Depression (CES-D); Anxiety symptom of BFI-18. PSQI; Brief Fatigue Inventory (BFI); SF-36; FACT-SWB; Finding Meaning in Cancer Scale (FMCS).	For patients, there was a significant increase in spiritual well-being and benefit finding. Medium effect sizes for depressive symptoms and small effect sizes for anxiety.

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Table I (Continued)

Author, year	Purpose	Demographics: sample size, sex (n, %), age (mean SD), race/ethnicity	Design/ methodology	Instruments	Major findings
Mosher et al, 2016 ¹⁷	To determine preliminary efficacy of a telephone-based symptom management to address patient and caregiver anxiety and depressive symptoms and patient symptoms of pain, fatigue, and breathlessness.	One hundred and six dyads consisting of patients who were symptomatic and caregivers; patients aged 63.47±7.68 years, range 42–85 years; most were in treatment for stage I–IV NSCLC; 13 patients with SCLC. 53% (n=56) female; primarily Caucasian with 13 years of education.	Random assignment to four sessions of a brief (45 minutes) telephone-delivered symptom management (cognitive-behavioral, emotion-focused therapy or education/support condition).	The Patient Health Questionnaire-8 (PHQ-8); Generalized Anxiety Disorder 7-item scale (GAD-7); Brief Pain Inventory Short Form (BPI-SF); Fatigue Symptom Inventory; 4 items from Memorial Symptom Assessment Scale (breathlessness); 16-item standard self-efficacy scale.	Study hypothesis not supported. No significant findings for patient outcomes symptom management 2 and 6 weeks post-intervention in either group. There was no control group for comparison. Attrition rate was 40% at 6 weeks post-intervention.
Porter et al, 2011 ¹⁶	To evaluate efficacy of a caregiver-assisted coping skills protocol for patients with lung cancer.	Two hundred thirty-three patients; 222 with NSCLC stage I–III; 10 limited-stage SCLC; age 65.3±9.5 years; 84.5% Caucasian; 11.6% African American; 4% unknown; 31% of samples were high school graduates and 54% had some college education or were college graduates.	Participants were randomized to receive either a caregiver-assisted coping skills training or education/support for both caregiver and patient. Both interventions were delivered via 14 telephone sessions. Testing occurred at baseline, after intervention, and 4-month follow-up.	Beck Depression Inventory (BDI); Trait Scale of STAI; FACT-L.	Patients in both interventions demonstrated some improvement in depressive symptoms, QOL, and self-efficacy from baseline to 4-month condition. Coping intervention is more beneficial for patients with state II–III cancer. Education/support intervention is more positive for stage I disease. There was no control group for comparison. Attrition rates were 27% posttesting and 40% at 4-month follow-up.
Quist et al, 2015 ¹⁴	To determine the potential benefits of a 6-week supervised group exercise intervention.	One hundred fourteen patients undergoing chemotherapy for NSCLC IIIb–IV; 57 females, 57 males; median age 66 years. Education years not reported. Danish sample.	Pre-post design. The 6-week hospital-based supervised, structured, and group-based exercise program with progressive muscle relaxation training.	FACT-L; HADS.	Analysis based on 71 patients. Exercise adherence was 68%. Physical and functional capacity, anxiety level, and emotional well-being were improved. No effects on HRQOL.
Raz et al, 2016 ⁴⁴	To evaluate long-term effects of an interdisciplinary supportive care intervention aimed at improving psychological distress, symptoms, and HRQOL in post-surgical patients.	Seventy-one pre-surgery patients with early stage (stage I–IIIb) who completed 1-year follow-up. Intervention, n=38; control, n=33; part of larger cohort study (n=239). Age range 34–91 years; 43 females (61%); 28 males (39%); stage I (n=37, 52%); stage II (n=19, 27%); stage III (n=15, 21%). Sixty-two (87%) Caucasians; six (8%) African Americans; three (4%) Asians; 39 (55%) college educated.	Quasi-experimental, sequential enrollment design. Intervention included comprehensive assessment of QOL before surgery, interdisciplinary care planning, and patient education. Care was individualized and tailored to particular patients (symptom management, psychosocial support, care referrals). Outcomes assessed at baseline and 6, 12, 24, 36, and 52 weeks.	DT; FACT-L.	HRQOL and distress were significantly improved 12 months after surgery in the supportive intervention group.

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Author, year	Purpose	Demographics: sample size, sex (n, %), age (mean SD), race/ethnicity	Design/ methodology	Instruments	Major findings
Schofield et al, 2013 ²⁰	To evaluate effectiveness of a multifaceted supportive care intervention to address targeted unmet needs of patients.	Hundred and eight patients with advanced lung cancer eligible for palliative radiation and/or chemotherapy. Participants randomized to intervention or to standard care control. Mean age was 62.3–65.6±9.2–11.4 years (range 36–84). Education years not reported.	RCT; intervention incorporated two sessions – one at start of medical treatment and one posttreatment. Content was based on individual needs assessment.	38-item Needs Assessment for Advanced Lung Cancer Patients; DT; 14-item HADS; EORTC QLQ-C30.	Effect sizes suggested benefit for symptom scores but not significant. Intervention was not effective in improving psychological parameters, HRQOL, or supporting resolution of unmet needs.
Temel et al, 2010 ⁴³	To determine effects of early palliative care on patient outcomes following diagnosis of advanced lung cancer.	Hundred and fifty-one patients with newly diagnosed metastatic NSCLC. Participants were not previously receiving palliative care.	Patients were randomized to either a palliative care group (n=77) or to standard care (n=74) following diagnosis. Assessments occurred at baseline and 12 weeks.	HADS; PHQ-9; FACT-L.	Participants who received palliative care were significantly less likely to be depressed at 12-week data point. Median survival was longer for early palliative care group despite less aggressive medical interventions.
Tian et al, 2015 ²²	To evaluate effects of patient education during chemotherapy on treatment side effects, psychological status, nutritional intake, and performance status.	Intervention (n=62); control group (n=110). Chinese sample; 85 participants over 50 years (49%); 87 less than 50 years (51%); 121 men (70%); 93 (54%) with 7–12 years of education with 32% (n=55) with 6 years or less. 23% (n=40) stage I–II; 77% (n=132) had stage III–IV disease.	Post-group only comparison study. Trained medical student provided information on nutrition, management of chemotherapy side effects, exercise, and relaxation methods, and answered questions during first chemotherapy cycle.	HADS; Food Frequency Survey; Treatment-induced side effects questionnaire; Eastern Cooperative Oncology Group performance Status measure.	Intervention reported higher protein intake, less depressive symptoms, lower levels of severe treatment side effects; and better performance status. Patient education appeared to lead to better outcomes. Allocation to study groups was not randomized; based on admission time to hospital. Reliance on self-report.
van den Hurk et al, 2015 ²⁵	To determine if Mindfulness Based Stress Reduction (MBSR) is feasible and effective in decreasing psychological distress in patients and their partners.	Nineteen patients with NSCLC (n=15) or SCLC (n=4); completed or in treatment; 11 (58%) stage IV disease; variation in treatment and time since diagnosis. Education unknown; the Netherlands sample.	Pre-post design. Intervention was Kabat-Zinn 8-week MBSR program.	HADS; EORTC QLQ for Lung Cancer; IES; Penn State Worry Questionnaire (PSWQ).	No significant change in depressive and anxiety symptoms pre-post assessment.

Results CBTs

CBTs are grounded in approaches that help patients change distorted fears and cognitions, and modify nonadaptive coping behaviors.¹⁵ CBT participants learn how to monitor and reframe nonrational thoughts and beliefs that contribute to depressive and/or anxious affect.³ Further, patients learn alternatives to avoid anxiety provoking situations

via analysis of triggers and incremental exposures.¹⁵ In the studies primarily incorporating CBT interventions, other treatment modalities were also included. Porter et al evaluated the efficacy of a caregiver-assisted coping skills training intervention grounded in cognitive-behavioral principles for 233 patients with lung cancer (limited to stage I–III non-small-cell lung cancer [NSCLC] or limited-stage small-cell lung cancer [SCLC]) who were undergoing medical

treatment.¹⁶ The intervention included fourteen 45-minute telephone-delivered sessions and involved cognitive restructuring, problem solving, communication, relaxation, and activity-rest cycle training. Participants were randomized to the intervention group or to an education/support comparison group.¹⁶ Participants in both the groups appeared to derive some benefit in modifying depressive symptoms and improving QOL from the respective interventions.¹⁶ Similarly, Mosher et al evaluated a briefer telephone-delivered symptom management CBT (six 45-minute sessions) for symptomatic patients (included stage I–IV NSCLC and SCLC in treatment) and their caregivers.¹⁷ Also using random assignment, the experimental group was compared to an education/support group. The symptom management intervention included cognitive restructuring, problem solving, emotion-focused self-soothing, pleasant activities, and relaxation training.¹⁷ Neither of these two randomized pilot studies identified outcome differences from the tested experimental interventions,^{16,17} and the Mosher et al's study did not improve symptom outcomes.¹⁷ Further, both of the studies had problematic attrition rates, 27% posttesting and 40% at the 4-month follow-up for the first¹⁶ and 40% at 6 weeks for the second study.¹⁷

A study that utilized a pre-post design combined 6 weeks of telephone-delivered manualized CBT with acceptance-based content in a sample of 25 patients with lung cancer, stage not determined.³ The rationale for strengthening CBT with acceptance-based treatment is to help the patient change their relationship to and increase tolerance to distressing thoughts and symptoms.³ The study outcomes targeted psychological distress and lung cancer stigma perceptions. Improvement was detected in psychological and cancer-related distress and stigma, although QOL perceptions declined.³

Utilizing an evidenced-based CBT for anxiety, a small (n=32) pre-post pilot study was conducted to manage dyspnea among symptomatic patients with advanced lung cancer.¹⁸ Perceived breathlessness is anxiety provoking for patients and contributes to psychological distress and even panic disorder.¹⁸ The intervention also incorporated training in relaxation strategies and breath meditation.¹⁸ The study had low attrition rates and the findings suggested improvements in QOL, dyspnea, and depressive symptoms.¹⁸

Psycho-educational interventions

Psycho-educational interventions provide targeted information to help patients manage unmet needs.^{7,19} Schofield et al conducted a randomized control trial (RCT) to determine the effectiveness of a multifaceted supportive intervention

that was tailored to meet the unmet needs of patients with advanced lung cancer who were preparing for palliative radiation and/or chemotherapy.²⁰ Multidisciplinary in nature, the intervention consisted of six manualized educational modules and self-care pamphlets that addressed unmet needs that patients identified during initial consultation. The provided information included diverse topics such as communicating with others, managing emotional distress, and sleep problems. The study did not find significant differences between participants who received the experimental intervention and the standard care (control group) on management of unmet needs, psychological distress, health-related quality of life (HRQOL), and anxiety/depression symptoms.²⁰

A psychosocial intervention grounded in self-determination theory evaluated the effectiveness of a dyadic approach to reduce psychological distress and improve self-efficacy among patients with advanced lung cancer and their caregivers.²¹ The aim of the pilot RCT was to build self-competence, autonomy, connectedness, and belonging, factors that are associated with enhanced psychological well-being. The intervention was delivered via telephone in six weekly sessions tailored in accordance with the dyadic personalized needs.²¹ Findings were promising with improved psychological indices for the intervention group and strong effect sizes for patient competence and relatedness.²¹

Chan et al conducted an RCT that compared a psycho-education intervention targeting a problematic symptom cluster (shortness of breath, anxiety, fatigue) during palliative radiation therapy to a usual care condition.¹⁹ The intervention consisted of education on symptom management and self-care strategies, and coaching on progressive muscle relaxation. After participant training, a relaxation audiotope and written materials were provided.¹⁹ The intervention was identified as well received (94% completed) with a significant pattern of change in the symptom cluster over time compared to the control condition.¹⁹ In a study that incorporated a posttest design, a multifaceted education intervention that aimed at providing nutritional information, exercise, and relaxation techniques to patients newly diagnosed with lung cancer and eligible to receive chemotherapy was compared to a standard care condition.²² Despite the study limitations, results suggested comparative benefits relative to managing treatment side effects, lowered depressive symptoms, and better perceived performance status in the intervention group.²²

Mind–body interventions

Mind–body interventions such as mindfulness-based programs, yoga, and tai-chi integrate a holistic approach that

emphasizes the connectedness between mental states and physiological balance.²³ Mindfulness-based programs incorporate training in meditation and mindfulness practices to improve stress management and reduce depressive and anxious symptoms for patients with cancer.¹¹ Kabat-Zinn developed the original mindfulness-based stress reduction (MBSR) training program which has subsequently been implemented in both healthy and clinical populations.²⁴ In general, mindfulness programs aim to help participants cultivate heightened awareness of the current mental and bodily experience with a nonjudgmental, accepting, and open attitude.¹¹ While testing of MBSR and other mindfulness-based interventions in cancer has been increasing, their application to patients with lung cancer remains limited.²⁵ Two pilot studies were identified which tested a mindfulness intervention to improve psychological indices and HRQOL parameters for patients with lung cancer.^{25,26} Both studies included small sample sizes of patients with advanced disease with one using a pre-post²⁵ and the other an RCT design.²⁶ Both studies included patients with advanced disease who were in treatment with no significant benefits noted for reductions in anxiety and depressive symptoms in one.²⁵ In the pilot RCT, findings demonstrated clinically significant effect sizes suggesting promise and need for further research with larger sample sizes.²⁶ A larger scale MBSR RCT to manage psychological distress in lung cancer patients is in progress.²⁷

Yoga involves many schools and traditions that share a common thread of coordinating the mind and body via use of breathing, postures, movement, and meditative practices.^{28,29} Yoga programs have been piloted for patients with lung cancer,²⁹ including two studies that incorporated caregivers.^{30,31} In the two yoga studies involving couples, both included patients with stage I–IIIB NSCLC who were receiving radiation therapy.^{30,31} Both studies incorporated a one-arm pre-post study design with one involving a couple-based Vivekananda Yoga (VKC) program that was piloted with 28 patient–partner dyads.³⁰ The VKC program incorporated light seated movements and breathing exercises along with partner engaged poses, relaxation, and meditation training. Fifteen sessions were offered two to three times weekly over a 5- to 6-week period while the patients were receiving radiation therapy.³⁰ The second study involving 10 dyads incorporated Tibetan yoga, which similarly incorporated breath awareness, mindfulness meditation training, and Tsa Lung exercises, described as ancient contemplative gentle movements tied to breath work.³¹ Both studies incorporated patient-reported outcomes including psychological distress, symptom and HRQOL parameters, and cited promising mental health benefits from active participation.^{30,31}

Tai Chi is an ancient Asian practice that involves integrating breath, meditation, and constant aerobic-type exercise movements.³² Tai Chi is based on the Chinese concept of qi recognized as vital life energy that when balanced in the body contributes to balance, improved cardiovascular and immune function, and stress management.³² Although limited studies have examined the benefits of Tai Chi for improving psychosocial functioning in lung cancer, a pilot study involving 32 post-thoracotomy patients with NSCLC suggested that a 16-week Tai Chi intervention impacted cortisol levels (a marker of stress).³²

One study evaluated the feasibility and potential effectiveness of biofeedback-assisted stress management (BFSM) to manage stressors in seven patients with NSCLC who were receiving chemotherapy.³³ The study evaluated heart rate variability biofeedback, inter-beat intervals of heart rate reflecting sympathetic and parasympathetic nervous system activity reflecting vagal nerve action. The aim was to train patients to increase their heart rate variability, evidence of balancing the autonomic nervous system by decreasing heightened sympathetic nervous system activation, utilizing biofeedback during relaxation exercises. The study aimed to recruit 16 patients but was terminated prematurely due to high attrition with only one participant completing all the prescribed BFSM sessions.³³ Although the study was not successful, data suggested positive findings with patients learning to increase heart rate variability.³³

Exercise interventions

Regular exercise has been shown to yield benefits for mental health and QOL in both healthy and ill populations.³⁴ Growing research has examined the role of exercise in improving symptom management and QOL parameters in survivors of lung cancer.^{35–38} Increasing psychosocial well-being has not been the primary focus of this research, but such outcomes may be included as part of a QOL index or part of a symptom assessment. Temel et al did examine mood and anxiety specifically as part of their assessment of feasibility of a structured 8-week hospital-based exercise program involving 25 newly diagnosed patients with advanced NSCLC who were undergoing anticancer treatments.³⁸ Participants did not demonstrate benefits in mood or QOL but had improved lung cancer symptom scores post-study.³⁸ A 6-week pilot hospital-based supervised exercise program that also incorporated progressive relaxation demonstrated that patients with advanced-stage NSCLC IIIB–IV undergoing chemotherapy who completed the program derived psychological

benefit including reduced anxiety and improved emotional well-being.¹⁴ A small 6-week supervised hospital-based group exercise and relaxation program that required 4 hours of weekly attendance and a home-based component for patients with advanced lung cancer who were undergoing chemotherapy and radiation therapy indicated that participants (n=15) derived benefits on well-being.³⁹ The program had 78% adherence to the supervised component but limited adherence to the home-based unsupervised aspect.³⁹ This Danish study was qualitative in nature incorporating semi-structured interviews and one focus group.³⁹ Another study that included patients with mostly stage I disease indicated effectiveness of home-based walking exercise on anxiety and depressive symptoms.⁴⁰

Supportive care/palliative care interventions

It has been recognized that early incorporation of an interdisciplinary supportive care approach to treatment is essential for patients with newly diagnosed lung cancer.^{4,41} Three studies examining supportive care were evaluated. Palliative care management provides an interdisciplinary approach with a focus on comprehensive symptom management and support for psychological, spiritual, and social needs.⁴² Temel et al in a study that randomized 151 newly diagnosed patients with advanced lung cancer to either palliative or usual care found that patients receiving palliative care had better perceived QOL and longer survival despite less aggressive medical management.⁴³ In a study that examined the introduction of interdisciplinary supportive care to patients who received curative surgical resection, findings demonstrated that the patients receiving the intervention reported lower psychological distress and improved HRQOL 1-year following the surgical procedure.⁴⁴ The third study randomized patients with newly diagnosed or recurrent lung cancer to either supportive care or to a usual care condition.⁴⁵ The experimental arm met with a psychosocial nurse on a 1:1 basis (minimum of four meetings) and received follow-up referral based on specific needs if they had distress.⁴⁵ Patient outcomes were recorded at four time points following randomization (last 25 weeks). Only 50% of the sample completed the study. There were no differences between the experimental and the usual care condition on patient-reported outcomes including mental health indices and QOL parameters. Importantly, although overall survival was comparable between the two conditions, participants in the supportive care group were less likely to receive chemotherapy at the end of life.⁴⁵

Discussion

Although a growing number of studies have evaluated psychosocial interventions to improve patient well-being for patients with advanced lung cancer, there remains a strong need for further inquiry. Out of the 20 studies evaluated, nine used a randomized design to evaluate efficacy.^{16,17,19–21,26,40,43,45} Many of the studies incorporating one group or pre-post designs were feasibility pilots with very small sample sizes reducing their potential impact.^{3,18,25,29–31,33,39} Further, some of the pilot studies evaluated complex bundled interventions further reducing the overall effect.^{19,22,39} To improve evaluation of outcomes, randomized studies comparing two active interventions could benefit from using three-group designs incorporating a usual care control. Although several of the studies address treatment fidelity, this remains a limitation in this research.

Only one of the studies incorporated the use of Patient-Reported Outcomes Measurement Information System (PROMIS) to evaluate psychological outcomes.²¹ Use of patient-reported outcome tools that are part of common data elements in psychosocial intervention studies is recognized as essential for cross study comparisons. However, a majority of the instruments used in the reviewed studies including the Functional Assessment of Cancer Therapy-Lung Module (FACT-L), Medical Outcomes Study short form-36 (SF-36), and the European Organization of Research and Treatment of Cancer Quality of Life (EORTC-QLQ-C30) are strongly validated, reliable, and commonly used in lung cancer research.⁴⁶

Many of the studies have targeted patients with advanced disease who are receiving chemotherapy and/or radiation, a time characterized by heightened treatment burden and lowered QOL. Given that most patients are diagnosed with advanced disease, this focus is understandable. However, complexity of the patients who have varying stages of disease and heterogeneous treatment and dosing regimens increases the need for adequate sample sizes and reduces the generalizability of study findings. Further, there is a lack of studies that include patients who are prescribed oral chemotherapy agents that require self-management of complex administration schedules in their samples.

While the need for multipronged approaches that target psychological distress in the context of physical symptom burden is of importance, it creates a challenge to determine both mechanisms and which aspect of the intervention impacts patient outcomes. Although mind-body modalities are psycho-physiological in nature and are aimed at building resilience in the face of distressing mental and physical symptoms, there is limited adoption of physiologic measurement

parameters in this research. The one study incorporating heart rate variability indices was terminated due to attrition.³³

The role of informal caregivers in the management of lung cancer and their impact on the patients' well-being is of strong relevance.^{5,47,48} Six studies^{16,17,21,25,30,31} involved the partner or caregiver in the intervention protocols. Caregivers can derive benefits from learning mind-body strategies such as yoga and meditation which in turn can help them to better support the patient. Further, caregivers may also support and/or deliver the interventions in the home environment, thus improving patient access to supportive modalities and potentially reducing costs of care.⁴⁹ There is a growing demand for intervention research that includes informal caregivers at all phases of the lung cancer survivorship trajectory.

Several of the included studies were conducted internationally with samples from China, Taiwan, Hong Kong, Australia, and Europe. The lack of racial diversity continues to be highly problematic in psychosocial intervention research given the incidence of lung cancer in underserved populations. More studies that utilize an intentional recruitment design to gain more representative samples are imperative. The number of minority patients represented in the US research was in single digits,^{21,26,29–31,44} with only one study reporting a high of 11.6% African Americans.¹⁶

In light of the review findings, there has been growing awareness and concern associated with funding disparities for lung cancer research as compared to other less lethal malignancies such as breast cancer.⁵⁰ Challenges associated with gaining access to funding to conduct psychosocial intervention studies may be one barrier to advancing behavioral science in this regard. Given established causal relationships between cigarette smoking and lung cancer, public health policies aimed at heightening awareness about smoking hazards and denormalizing tobacco use are recognized to have increased the stigmatization associated with lung cancer.^{50,51} Further, therapeutic nihilism, or the perception that treatment is of limited or no benefit, may have widespread adverse consequences for patients with lung cancer impacting both research and practice.^{50,52} Researchers have called for an integrative approach with discourse between tobacco control and lung cancer investigators and practitioners to reduce stigma and nihilistic attitudes,⁵² a strategy that may positively impact implicit stereotyping and build compassion for patients coping with the disease.

Conclusion

The need for well-designed psychosocial intervention studies in the lung cancer population with active control groups

continues to be a challenge. With high attrition rates and feasibility obstacles, research evidence in this area primarily relies on pilot studies and self-reported outcomes. Comparing findings across studies is problematic given variation in outcome measures that evaluate the major study constructs. Research that targets patients at specific points in the survivorship trajectory including end of life is warranted. Further, more studies in lung cancer populations that evaluate baseline psychological distress as an eligibility criteria are needed, a factor that may improve evaluation of intervention benefits over time.

Disclosure

The author reports no conflicts of interest in this work.

References

1. Siegal RL, Miller KD, Jemal A. Cancer statistics, 2017. *CA Cancer J Clin*. 2017;67:7–30.
2. Vodermaier A, Lucas S, Linden W, Olson R. Anxiety after diagnosis predicts lung cancer-specific and overall survival in patients with stage III non-small cell lung cancer: a population-based cohort study. *J Pain Symptom Manage*. 2017;53(6):1057–1065.
3. Chambers SK, Morris BA, Clutton S, et al. Psychological wellness and health-related stigma: a pilot study of an acceptance-focused cognitive behavioural intervention for people with lung cancer. *Eur J Cancer Care*. 2015;24:60–70.
4. Ferrell B, Sun V, Hurria A, et al. Interdisciplinary palliative care for patients with lung cancer. *J Pain Symptom Manage*. 2015;50(6):758–767.
5. Borneman T, Sun V, Williams AC, et al. Support for patients and family care givers in lung cancer. *J Hosp Pall Nurs*. 2015;17(4):309–318.
6. Barrera I, Spiegel D. Review of psychotherapeutic interventions on depression in cancer patients and their impact on disease progression. *Int Rev Psychiat*. 2014;26(1):31–43.
7. Sanders SL, Bantum EO, Owen JE, Thornton AA, Stanton AL. Supportive care needs in patients with lung cancer. *Psychooncology*. 2010;19:480–489.
8. Walker J, Sawhney A, Hansen CH, et al. Treatment of depression in people with lung cancer: a systematic review. *Lung Cancer*. 2013;79:46–53.
9. Hodges LJ, Walker J, Kleiboer AM, et al. What is a psychological intervention? A metareview and practical proposal. *Psychooncology*. 2011;20:470–478.
10. Jacobsen PB, Jim HS. Psychosocial interventions for anxiety and depression in adult cancer patients: achievements and challenges. *CA Cancer J Clin*. 2008;58:214–230.
11. Shennon C, Payne S, Fenlon D. What is the evidence for the use of mindfulness-based interventions in cancer care? A review. *Psychooncology*. 2010; Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/pon.1819.
12. Rueda JR, Solà I, Pascual A, Casacuberta MS. Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. *Cochrane Database Syst Rev*. 2011(9):1–64.
13. Arrieta O, Angulo LP, Nunez-Valencia C, et al. Association of depression and anxiety on quality of life, treatment adherence, and prognosis in patients with advanced non-small cell lung cancer. *Ann Surg Oncol*. 2013;20:1941–1948.
14. Quist M, Adamsen L, Rørth M, Laursen JH, Christensen KB, Langer SW. The impact of a multidimensional exercise intervention on physical and functional capacity, anxiety, and depression in patients with advanced-stage lung cancer undergoing chemotherapy. *Integr Cancer Ther*. 2015;14(4):341–349.

15. Greer JA, Traeger L, Bemis H, et al. A pilot randomized controlled trial of brief cognitive-behavioral therapy for anxiety in patients with terminal cancer. *Oncologist*. 2012;17:1337–1345.
16. Porter LS, Keefe FJ, Garst J, et al. Caregiver-assisted coping skills training for lung cancer: results of a randomized clinical trial. *J Pain Symptom Manage*. 2011;41(1):1–13.
17. Mosher CE, Winger JG, Hanna N, et al. Randomized pilot trial of a telephone symptom management intervention for symptomatic lung cancer patients and their family caregivers. *J Pain Symptom Manage*. 2016;52(4):469–482.
18. Greer JA, MacDonald JJ, Vaughn J, et al. Pilot study of a brief behavioral intervention for dyspnea in patients with advanced lung cancer. *J Pain Symptom Manage*. 2015;50(6):854–860.
19. Chan CWH, Richardson A, Richardson J. Managing symptoms in patients with advanced lung cancer during radiotherapy: results of a psychoeducational randomized controlled trial. *J Pain Symptom Manage*. 2011;41(2):347–357.
20. Schofield P, Ugalde A, Gough K, et al. A tailored, supportive care intervention using systematic assessment designed for people with inoperable lung cancer: a randomised controlled trial. *Psychooncology*. 2013;22:2445–2453.
21. Badr H, Smith CB, Goldstein NE, Gomez JE, Redd WH. Dyadic psychosocial intervention for advanced lung cancer patients and their family caregivers: results of a randomized pilot trial. *Cancer*. 2015;121:150–158.
22. Tian J, Jia LN, Cheng ZC. Relationships between patient knowledge and the severity of side effects, daily nutrient intake, psychological status, and performance status in lung cancer patients. *Curr Oncol*. 2015;22(4):E254–E258.
23. Deng GE, Rausch SM, Jones LW, et al. Complementary therapies and integrative medicine in lung cancer diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2013;143(Suppl 5):E420S–E436S.
24. Kabat-Zinn J. *Full Catastrophe Living: Using The Wisdom Of Your Body And Mind To Face Stress, Pain, and Illness*. 15th ed. New York: Delta Trade Paperbacks; 2009.
25. van den Hurk DGM, Schellekens MPJ, Molema J, Speckens AEM, van der Drift MA. Mindfulness-based stress reduction for lung cancer patients and their partners: results of a mixed methods pilot study. *Palliat Med*. 2015;29(7):652–660.
26. Lehto RH, Wyatt G, Sikorskii A, Tesnjak I, Kaufman VH. Home-based mindfulness therapy for lung cancer symptom management: a randomized feasibility trial. *Psychooncology*. 2015;24(9):1208–1212.
27. Schellekens MPJ, van den Hurk DGM, Prins JB, et al. Study protocol of a randomized controlled trial comparing mindfulness-based stress reduction with treatment as usual in reducing psychological distress in patients with lung cancer and their partners: the MILON study. *BMC Cancer*. 2014;14(3). DOI: 10.1186/1471-2407-14-3.
28. Desikachar K, Bradgon L, Bossart C. The yoga of healing: exploring yoga's holistic model for health and wellbeing. *Int J Yoga Ther*. 2005;15(1):17–39.
29. Fouladbakhsh JM, Davis JE, Yarandi HN. A pilot study of the feasibility and outcomes of yoga for lung cancer survivors. *Oncol Nurs Forum*. 2014;40(2):162–174.
30. Milbury K, Mallaiah S, Lopez G, et al. Vivekananda yoga program for patients with advanced lung cancer and their family caregivers. *Integr Cancer Ther*. 2015;14(5):446–451.
31. Milbury K, Chaoul A, Engle R, et al. Couple-based Tibetan yoga program for lung cancer patients and their caregivers. *Psychooncology*. 2015;24:117–120.
32. Wang R, Liu J, Chen P, Yu D. Regular tai chi exercise decreases the percentage of type 2 cytokine-producing cells in postsurgical non-small cell lung cancer survivors. *Cancer Nurs*. 2013;36(4):E27–E34.
33. Greenberg BR, Grossman EF, Bolwell G, et al. Biofeedback assisted stress management in patients with lung cancer: a feasibility study. *Appl Psychophysiol Biofeedback*. 2015;40:201–208.
34. Smith BA, Yahiaoui A, Voss JG. Effect of exercise on cardiac and metabolic outcomes in people living with HIV. In: Smith BA, editor. *Annual Review of Nursing Research: Exercise in Health and Disease*. New York: Springer Publishing; 2013.
35. Solberg NL, Liu H, Patten CA, et al. Physical activity level and quality of life in long term lung cancer survivors. *Lung Cancer*. 2012;77:611–616.
36. Lin Y, Rau K, Lin C. Longitudinal study on the impact of physical activity on the symptoms of lung cancer survivors. *Support Care Cancer*. 2015;23:3545–3553.
37. Granger CL, McDonald CF, Berney S, Chao C, Denehy L. Exercise intervention to improve exercise capacity and health related quality of life for patients with non-small cell lung cancer: a systematic review. *Lung Cancer*. 2011;72:139–153.
38. Temel JS, Greer JA, Goldberg S, et al. A structured exercise program for patients with advanced nonsmall cell lung cancer. *J Thorac Oncol*. 2009;4(5):595–601.
39. Adamsen L, Stage M, Laursen J, Rørth M, Quist M. Exercise and relaxation intervention for patients with advanced lung cancer: a qualitative feasibility study. *Scand J Med Sci*. 2012;22:804–815.
40. Chen HM, Tsai CM, Wu YC, Lin KC, Lin CC. Randomised controlled trial on the effectiveness of home-based walking exercise on anxiety, depression and cancer-related symptoms in patients with lung cancer. *Br J Cancer*. 2015;112:438–445.
41. Otis-Green S, Sidhu RK, Del Ferraro C, Ferrell B. Integrating social work into palliative care for lung cancer patients and families: a multidimensional approach. *J Psychosoc Oncol*. 2014;32(4):431–446.
42. Ferrell B, Koczywas M, Grannis F, Harrington A. Palliative care in lung cancer. *Surg Clin North Am*. 2011;91:403–417.
43. Temel JS, Greer JA, Muzikansky A, et al. Early palliative care for patients with metastatic non-small cell lung cancer. *New Eng J Med*. 2010;363:733–742.
44. Raz DJ, Sun V, Kim JJ, et al. Long-term effect of an interdisciplinary supportive care intervention for lung cancer survivors after surgical procedures. *Ann Thorac Surg*. 2016;101:495–503.
45. Geerse OP, Hoekstra-Weeber JEHM, Stokroos MH, et al. Structural distress screening and supportive care for patients with lung cancer on systemic therapy: a randomised controlled trial. *Eur J Cancer*. 2017;72:37–45.
46. Pearman T. Psychosocial factors in lung cancer: quality of life, economic impact, and survivorship implications. *J Psychosocial Oncol*. 2008;26(1):69–80.
47. Fujinami R, Sun V, Zachariah F, Uman G, Grant M, Ferrell B. Family caregivers' distress levels related to quality of life, burden, and preparedness. *Psychooncology*. 2015;24:54–62.
48. Mosher CE, Jaynes HA, Hanna N, Ostroff JS. Distressed family caregivers of lung cancer patients: an examination of psychosocial and practical challenges. *Support Care Cancer*. 2013;21:431–437.
49. Frambes D, Given B, Lehto R, Sikorskii A, Wyatt G. Informal caregivers of cancer patients: review of interventions, care activities, and outcomes. *Western J Nurs Res*. Epub 2017 Apr 1. DOI: 10.1177/0193945917699364.
50. Tran, K. Delicaet, K, Tang, T, et al. Perceptions of lung cancer and potential impacts on funding and patient care: a qualitative study. *J Canc Educ*. 2015;30:62–67.
51. Shen, MJ, Hamaan, HA, Thomas, AJ, Ostroff, JS. Association between patient-provider communication and lung cancer stigma. *Support Care Cancer*. 2016; 24: 2093–2099.
52. Chambers, SK, Dunn, J, Occhipinti, S, et al. A systematic review of the impact of stigma and nihilism on lung cancer outcomes. *BMC Cancer*. 2012;12:184.

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