

ORIGINAL
Research

Rachel A. Millstein, PhD, MHS, Hannah Lee, MS , Alisa Lapioli, BA, Loren Winters, MSN, ANP-BC, OCN, DipABLM, Carol Sullivan, MS, RD, CSO, LDN, Samantha Bateman, RD, Elizabeth Frates, MD, DipABLM , Amy Comander, MD, DipABLM, Stephanie Eisenstat, MD, Jeffrey Peppercorn, MD, MPH, and Elizabeth K. O'Donnell, MD, DipABLM

A Cancer Center Multidisciplinary Lifestyle Medicine Clinic: Description of Program and Patient Population

Abstract:

Background: Cancer survivorship guidelines emphasize Lifestyle Medicine (LM) pillars, including physical activity, healthy eating, restorative sleep, stress management, and avoiding risky substance use. We describe the development and patient population of a multidisciplinary LM clinic in oncology.

Methods: The clinic launched virtually in 2020. Patients had same-day consultations with an oncologist/nurse practitioner, nutritionist, and psychologist. Patients completed a one-time online survey assessing demographics, quality of life, LM pillars, and mental health. Descriptive statistics were used to characterize the population.

Results: Seventy-six patients took the survey (July 2020-January 2023). Most were female, non-Hispanic White, with early-stage cancers. The mean BMI was 30 kg/m². A minority of patients met aerobic physical activity (27.6%) and dietary (28.6%) recommendations.

Two-thirds (67%) reported sleep difficulties, and 30%–36% reported elevated anxiety/depression. Over half (53.3%) gained weight due to



cancer treatment and 78.7% were trying to lose weight.

Conclusion: This paper details the baseline LM needs of cancer survivors seeking lifestyle consultation and describes the development of the clinic to address these concerns. Patients were open to evaluation and treatment in an oncology-focused LM clinic. This clinic model has potential to improve quality of life for survivors.

Keywords: lifestyle medicine; cancer; survivorship; clinical program; program evaluation

Introduction

There are currently over 18 million cancer survivors in the United States,

 “The survivor population was largely composed of people with early-stage cancers, with the most common cancer type being breast cancer.” 

with survivorship projected to increase by 25% by 2032.¹ Treatments for cancer can include surgery, radiation, and systemic chemotherapy, which can lead to unintentional weight loss or gain, depending on cancer type and site.² Cancer survivorship is often a time of heightened worry about cancer recurrence,³ and increasing healthy lifestyle behaviors can improve quality of life (QOL), as well as reduce the risk of recurrence and the development of additional chronic diseases.^{4–8} The six pillars of lifestyle medicine (LM): physical activity,

DOI: 10.1177/15598276231206381. Cancer Center, Massachusetts General Hospital, Boston, MA, USA (RAM, HL, AL, LW, CS, SB, AC, SE, JP); Harvard Medical School, Boston, MA, USA (RAM, EF, EKO); and Dana-Farber Cancer Center, Boston, MA, USA (EKO). Address correspondence to: Rachel A. Millstein, Cancer Center, Massachusetts General Hospital, 125 Nashua St, Boston, MA 02114, USA; e-mail: ramillstein@mgh.harvard.edu.

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a plant predominant diet, restorative sleep, stress management, avoiding risky substances, and social connections, are important for cancer treatment and survivorship.^{5,9-13} Authoritative bodies such as the American College of Lifestyle Medicine (ACLM), the American Cancer Society (ACS), the US Centers for Disease Control and Prevention (CDC), and the American College of Sports Medicine (ACSM) recommend incorporating LM education and practice into the continuum of cancer care to improve QOL and physical functioning.^{10,14} For instance, physical activity guidelines from authoritative bodies such as ACS,¹⁵ NCCN,¹⁶ and ACSM¹⁴ recommend that cancer survivors engage in at least 150-300 minutes of at least moderate intensity aerobic activity and 2 strength training sessions per week. Despite the demonstrated benefits and decisive recommendations of LM interventions in survivorship, few services are established to address the domains of LM for patients with cancer and other populations.¹⁷ Accordingly, our team of oncologists and supportive oncology clinicians developed a multidisciplinary LM clinic for patients with cancer. This paper describes the origin and development of the clinic and the characteristics of its patients.

This multidisciplinary LM clinic was the first known of its kind within supportive oncology. This clinic began in 2016 as a single-provider, single consultation clinic with a LM-trained medical oncologist. Based on the initial experience and the referral patterns of patients seen, the LM clinic evolved into a multidisciplinary consult clinic adding a nutritionist and a psychologist focused on health behavior change to the consultation. This multidisciplinary clinic was launched on a virtual platform due to the COVID-19 pandemic in 2020. Due to demand, a second clinic was opened by an ACLM-certified nurse

practitioner and nutritionist who later began a virtual group visit program based on the six pillars of LM. The group visits were born out of the recognition that patients needed and were seeking ongoing education and skills for lifestyle education and behavior change.

The six pillars of LM were used as a foundational structure for the individualized consultations. Patients were encouraged to identify the survivorship topics within LM that were most important to them as the focus of the consultation (e.g., exercise limitations or recommendations).

In the multidisciplinary format, the first appointment was with the medical oncology provider (MD or NP). During this visit, a comprehensive medical history was taken, and patients were screened for limitations on physical activity using the Physical Activity Readiness Questionnaire.^{18,19} The nutritionist then conducted a comprehensive dietary assessment, and personalized recommendations were given. Additional resources, such as referrals to obesity medicine or individual follow-ups, were made as needed. Finally, the behavioral psychologist screened for psychosocial concerns, stressors, and helped patients create a behavior change plan to successfully implement their LM recommendations gained throughout their clinic day. Though the model was initially set-up as a one-time consultation, longitudinal follow-ups with nutrition, LM NP, and psychology were available as indicated. Further, virtual group visits were established in 2022 to offer a structured, longitudinal LM model that would increase access for patients seeking LM support and education. The curriculum for the group visits was based on the established PAVING The Path to Wellness curriculum.^{20,21} Group visits were conducted over zoom

and the program includes a total of six visits based on the six pillars of LM. Each visit was 75 minutes in duration. The topics for the program include Exercise for Wellness and Recovery, Nutrition in Cancer Care, Start and Sticking with Healthy Habits, Better Sleep More Energy, Stress Management Tips and Tools, Making Meaning: Social Connections and Purpose. The curriculum is offered on a rolling basis and participants were encouraged to attend all 6 visits.

To guide assessment within the clinic, all participants presenting for individual consultation were offered a self-administered survey addressing baseline LM domains that was completed prior to their clinic visit. Patients provided information about their sociodemographic, medical, health behavior, and well-being characteristics. Seventy-six patients completed the intake survey between 2020-2023. We present the baseline data collected to demonstrate the types of LM issues and their prevalence reported by patients seeking LM care at a tertiary academic center and provide details of the clinic to help inform LM and cancer survivorship professionals of the options and challenges of building this program for cancer centers and patients.

Methods

Patient Population

Eligible patients included any patients over the age of 18 who had a history of cancer or who were currently undergoing treatment for cancer. All patients were seen at our hospital, but the clinic was open to cancer patients who had been or were undergoing treatment at different institutions. The inclusion criteria were that patients had to have been referred by an oncology provider or self-referred to the clinic, scheduled a visit, and willing to take the survey. There were no exclusion criteria.

Clinic Development and Launch.

The multidisciplinary LM clinic launched during the COVID-19 pandemic as a virtual (online) clinic. Patients had same-day sequential consultations with a medical provider (MD or NP), nutritionist (RD), and a behavior change psychologist (PhD) over the course of 2 hours. During the virtual visits, patients' needs were evaluated, and LM recommendations were made with a particular focus on their LM priority areas.

A goal of the clinic was to provide broad access to consultation and LM resources. Patients were billed and received a co-pay for the MD/NP consultation and group visits, but consultation with nutrition and psychology was not billed to the patient. The cost for the nutritionist was covered within the hospital's operating budget and behavioral psychologist through philanthropy. In addition, the LM clinic providers, in partnership with physical therapy and physical medicine and rehabilitation specialists, developed 8 free, web-based exercise videos designed for cancer survivor use²²). In addition to the individual consultations, patients could opt into the virtual group visits, which were based on a 6-part rolling curriculum, corresponding to the LM pillars. Patients were also referred to additional supportive care programs available at our cancer center or in the community. Patients' insurance was billed for a follow-up visit for each virtual group session and patients were responsible for the co-pay. In 2023, the clinic returned to a single (MD) or dual (NP/RN) provider model, which was largely due to a lack of ongoing funding.

Survey Development and

Administration. Prior to attending the clinic, patients were sent an online self-report survey assessing all domains of LM, demographics,

quality of life, and cancer-specific items (e.g., site, time of diagnosis). The survey was optional, and their care at the clinic was not contingent upon survey completion.

Data in the present sample were collected from July 2020 through January 2023. All responses to each survey item were used to calculate the scores, such that respondents with missing data were still included when they supplied any data (pairwise deletion). Study data were collected and managed using REDCap electronic data capture tools hosted through our healthcare system.^{23,24} REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies. All survey procedures were IRB approved.

Survey Development and Measures.

The online survey was developed by a multidisciplinary team of physicians, nurses, psychologists, and research staff. It was designed to take a comprehensive approach to assessing the pillars of LM and related constructs for this patient population. When appropriate, validated and cancer-specific surveys were included. When validated measures were not available, items were created specifically to gather information about lifestyle behaviors of clinical relevance to the planned LM visit. The details of each measure are described below.

Demographics

Participants reported their date of birth (from which age was calculated based on survey response date), gender, race, ethnicity, education, employment, and marital status.

Medical Variables

Participants were asked to report their height, weight, cancer type, stage, and treatment, and additional medical diagnoses.

Physical Activity, Diet, and Sleep

To assess physical activity, participants completed PACE measures,⁴ reporting the number of minutes of aerobic and strength physical activity, as well as sedentary time, per day and week. Sedentary activities included time spent commuting, on screens, phones, reading, and hobbies. To assess dietary quality, participants were asked to report the number of servings of fruit, vegetables, and red meat they ate each day and week. Sleep was assessed using 6 items created by our team for this survey, including items on difficulty falling asleep, staying asleep, and sleep duration.

Weight and Body Image

Participants were asked to rate three items created by our team for this survey assessing how they felt about their body size, if they were trying to lose weight, and if their weight changed because of cancer treatment.

Substance Use

Participants completed the 3-item AUDIT-C to assess alcohol use.²⁵ One item from the AUDIT-C was used to assess adherence to alcohol recommendations (e.g., less than 2 drinks/day for men and 1/day for women): "How many standard drinks containing alcohol do you have on a typical day? (One drink is defined as 12 oz beer, 5 oz wine, or 1.5 oz liquor (e.g., vodka).)" Adherence to tobacco recommendations was assessed using 6 items about current and historical tobacco use, and interest in quitting smoking if applicable, based on the National Comprehensive Cancer Network's (NCCN) survivorship guidelines.²⁶

Quality of Life

The 27-item Functional Assessment of Cancer Therapy-General (FACT-G) was used to assess cancer-specific physical, social, emotional,

and functional well-being.²⁷ The FACT-G contains four sub-scales for physical (7 items), social/family (7 items), emotional (6 items), and functional (7 items) well-being. These self-reported measures possess strong psychometric properties and have been validated for patients with cancer. Higher total and subscale scores indicate better QOL.

Anxiety and Depression

The 20-item Hospital Anxiety and Depression questionnaire (HADS)²⁸ is a well-validated tool used in many studies with medical patients, which derives scale scores for anxiety and depression. Scores on each subscale range from 0 to 21, with a cutoff of 8 or greater denoting clinically meaningful anxiety or depression. The measure has good psychometric properties in patients with cancer [19, 20].

Data analysis. Stata 17.0 was used to calculate descriptive statistics of the patient population and survey measures.

Results

Data collection was frozen for analysis in January 2023. In this sample, there were 76 patients who began the survey, 76 patients who completed the most commonly answered question (gender), and 70 who completed the least commonly answered questions (HADS). See Table 1 for demographic, psychosocial, and medical characteristics at baseline. Patients were primarily White (92.1%), non-Hispanic (97.4%), female (89.5%), married or partnered (64.5%), highly educated (79.0% had a college or higher degree), and employed (60.5%). The mean age was 53.6 years (SD: 11.7). Mean BMI was in the obesity range at 30.0 kg/m² (SD: 8.7). Breast cancer was the most common diagnosis (66.7% of respondents). Cancer stages were

primarily early stage, evenly distributed between stages I-III (30%, 25.3%, 25.3%, respectively), with a minority having stage IV cancer (2.7%). A majority (53.3%) reported weight gain as a result of cancer treatment. The most common additional medical diagnoses were overweight/obesity (64.6%), a mental health condition (49.2%; e.g., anxiety, depression, eating disorder, substance abuse, bipolar disorder), and heart disease (33.8%).

Physical Activity and Sedentary Time

Patients reported completing a mean of 113.5 (SD: 116.7) minutes of moderate-vigorous physical activity per week and a mean of 27.7 (SD: 48.7) minutes of strength training per week (Table 2). The mean sedentary time was 534.7 minutes/day (SD: 228.0), or 8.9 hours/day. The most common barriers to physical activity were being limited by their physical conditions/illness (34.7%), not having enough free time (32.0%), and pain (30.7%).

Diet and Substance Use

Participants reported eating a mean of 1.56 (SD: 1.04) servings of fruit per day, a mean of 2.08 (SD: 1.30) servings of vegetables per day, and a mean of 1.45 (SD: 1.48) servings of red meat per week (Table 3). Only 28.58% of participants consumed 35 fruits or vegetables per day, as is commonly recommended. Alcohol use, as measured by the AUDIT-C item on quantity of drinks, was below recommendations, with a mean amount of drinks/day of .17 (SD: .58). A minority of participants (35.6%) had ever smoked, and 2.7% were current smokers.

Sleep, Quality of Life, and Mental Health

The mean reported sleep duration was 6.8 hours (SD: 1.3) (Table 4). Almost half (43.1%) of participants reported difficulty falling asleep, and

a majority (66.7%) reported difficulty staying asleep; 31.9% were taking a sleeping aid medication. Cancer-specific quality of life as assessed by the FACT-G indicated relatively low physical well-being (mean: 7.1, SD: 5.0) and emotional well-being (mean: 8.3, SD: 3.6), and moderate social well-being (mean: 19.3, SD: 5.5) and functional well-being (mean: 16.4, SD: 5.6). Using clinically meaningful cutoff scores of 8 on the HADS-A and HADS-D, 35.8% of patients had an elevated anxiety score and 29.8% had an elevated depression score. A majority (77.3%) of participants reported being dissatisfied with their body size and trying to lose weight (78.7%).

Discussion

This paper highlights the characteristics, concerns, and needs of cancer survivors seeking LM consultation in a newly developed multidisciplinary LM clinic from 2020-2023. Most importantly, this paper demonstrates major lifestyle health concerns among patients with cancer and a willingness of patients to seek care within a dedicated LM clinic to address these needs. The survivor population was largely composed of people with early-stage cancers, with the most common cancer type being breast cancer. We found that most patients did not meet physical activity and diet (fruit and vegetable) recommendations for cancer survivors,^{9-13,29} which LM interventions can address. This study also shows poor sleep quality, low physical and emotional cancer-specific QoL, prevalent body size dissatisfaction, and weight loss intentions among this population. Cancer survivorship clinics, such as this one, can play an important role in the cancer care trajectory to improve the many mental and

Table 1.

Demographic and Medical Characteristics (n = 76).

Variable	Mean (SD) or N (%)
<i>Sociodemographics</i>	
Median age (years) (range: 22-79)	54.5
Gender	
Female	68 (89.5%)
Male	8 (10.5%)
BMI (kg/m ²)	30.0 (8.7)
Race (not mutually exclusive)	
African American or Black	2 (2.6%)
Asian	3 (3.9%)
Alaska Native, Native Hawaiian, Pacific Islander	0 (0.0%)
White	70 (92.1%)
Other	2 (2.6%)
Ethnicity	
Hispanic	2 (2.6%)
Non-Hispanic	74 (97.4%)
Relationship status	
Single, never married	14 (18.4%)
Married/Living with partner	46 (64.5%)
Widowed, Divorced/Separated, or Other	13 (17.1%)
Education	
Some high school, high school graduate, or 2-year college degree	16 (21.0%)
College graduate or post-college degree	60 (79.0%)
Employment status: Employed full- or part- time	
Unemployed, retired, student, unable to work due to caregiving or disability	24 (31.6%)
Other	6 (7.9%)
<i>Medical variables (n=75)</i>	
Cancer type(s) (top 3 sites; n=75)	
Breast	50 (66.7%)
Sarcoma	3 (4.0%)

(continued)

Table 1. (continued)

Lymphoma	3 (4.0%)
Other	19 (25.3%)
Cancer stage	
I	24 (32.0%)
II	19 (25.3%)
III	19 (25.3%)
IV	2 (2.7%)
Unknown	1 (14.7%)
Weight changes due to cancer	
Lost weight	13 (17.3%)
Gained weight	40 (53.3%)
Stayed about the same	22 (29.3%)
Other medical problems	
Arthritis	17 (26.2%)
Diabetes	1 (1.5%)
Heart disease	22 (33.8%)
Lung disease	13 (20.0%)
Mental health condition	32 (49.2%)
Overweight/Obesity	42 (64.6%)
Underweight	1 (1.5%)

physical health concerns following treatment.^{8,25}

Meeting physical activity recommendations is associated with reduced risk of cancer recurrence^{30,31} and mortality³²⁻³⁴ in cancer survivors. In addition, physical activity is associated with reduced rates of lymphedema,³⁵ fatigue,³⁶ cardiovascular disease,¹⁸ and depression,³⁷ all of which can be debilitating side effects of cancer treatment. This study found that cancer survivors in the LM clinic engaged in an average of 113.6 minutes of moderate-to-vigorous intensity aerobic exercise and 27.7 minutes of strength training

per week, though number of bouts of strength training was not assessed. The most reported barriers to exercise were physical and time limitations. A clear gap between physical activity recommendations (e.g., 150 minutes of moderate-vigorous activity/week) and patients' experiences and abilities to engage in physical activity is demonstrated in these findings. While many patients were engaging in regular activity, the self-reported averages in this study do not meet national-level recommendations. By providing guidance and education around physical activity, clinicians, such as those in the LM clinic, may

help patients come closer to meeting recommendations, thereby increasing the likelihood of positive oncologic outcomes while mitigating side effects of treatment. Further, specific, focused consultations with behavior change specialists, such as psychologists and health coaches, may help patients overcome their barriers to initiating and sustaining physical activity.

Dietary guidelines for cancer survivors all emphasize consuming a variety of plants and plant-based foods, limiting red and processed meat, limiting sugar intake, and eating whole grains.³⁸⁻⁴¹ Adhering to these guidelines in survivorship has

Table 2.

Physical Activity and Sedentary Time (n = 73-76).

Variable	Mean (SD) or N (%)
Moderate-vigorous physical activity (min/week) (range: 0-540)	113.5 (116.7)
Strength training (minutes/week) (range: 0-280)	27.7 (48.7)
Sedentary time (leisure/screen time hours/day)	
1-1 hour	13 (17.8%)
2-3 hours	36 (49.3%)
4+ hours	24 (32.9%)
Sedentary time (total minutes/day)	534.7 (228.0)
Barriers to being active (not mutually exclusive)	
Limited by conditions/illness	26 (34.7%)
Not enough free time	24 (32.0%)
Pain	23 (30.7%)
No barriers	16 (21.3%)
Don't like exercise	15 (20.0%)
Other, including exercise is boring, expensive, unsure how to exercise	31 (57.3%)

been associated with reduced risk of all-cause and cancer-specific mortality,⁴²⁻⁴⁴ reduced obesity,^{45,46} and improved quality of life.⁴⁷⁻⁴⁹ Specifically, with respect to the present findings, guidelines support consuming at least five servings of fruits or vegetables per day, and eating no more than three servings of red meat per week.²⁹ Data from the present study indicated that patients consumed a mean of 3.6 servings of fruits or vegetables per day, and 1.4 servings of red meat per week. Patients appear to be meeting the recommendation to lower red meat consumption, but they are not meeting the recommendations for fruits or vegetables. Assisting patients in incorporating more fruits or vegetables into their diets is a clinical and public health priority that a clinic such as this one can promote. Referrals to—or an embedded—nutritional consultation are a key to LM clinics' abilities to

meet patients' needs for nutrition education, advice, and targeted dietary change recommendations.

In terms of sleep, substance use, and stress, we found that patients reported poor sleep quality, low sleep duration, very limited use of alcohol and cigarettes, and rates of anxiety and depression symptoms higher than those of the general population. As sleep has restorative properties that can improve survivors' QoL, it is an important area of targeted interventions. Cognitive Behavioral Therapy for Insomnia (CBT-I) is an evidence-based non-pharmacological treatment for several sleep problem areas⁵⁰ and should be considered as a strong referral option for LM providers, given its efficacy for cancer patients and survivors.⁵¹ It is encouraging that this patient population engages in very little use of harmful substances, though anyone who smokes or uses alcohol excessively

would benefit from collaborations with smoking cessation and psychology resources. By intervening in cases of risky substance use, our providers may assist patients in promoting positive outcomes and preventing the development of further illnesses. In the US adult population, the prevalence of anxiety symptoms was 8.1% and depression symptoms was 6.5%,⁵² whereas our clinic population reported elevated anxiety (35.8%) and elevated depressive symptoms (29.8%). The HADS is not a clinical diagnostic tool, however, these findings indicate elevated mental health and stress concerns among the cancer survivors presenting to this clinic. Close referral sources to mental health specialists are encouraged for any LM clinic.

As this is primarily a descriptive study, there are inherent limitations. First, the clinic population was based

Table 3.

Diet and Substance Use Variables (n = 73-75).

Variable	N (%)
Servings of fruit/Day	
0	9 (12.0%)
1	33 (44.0%)
2	14 (18.7%)
3	16 (21.3%)
4 or more	3 (4.0%)
Servings of vegetables/Day	
0	5 (6.7%)
1	25 (33.3%)
2	21 (28.0%)
3	13 (17.3%)
4 or more	1 (14.7%)
Servings of red meat/Week	
0	20 (26.7%)
1	25 (33.3%)
2	15 (20.0%)
3	10 (13.3%)
4 or more	5 (6.7%)
Smoking status: Ever smoked	26 (35.6%)
Current smoker	2 (2.7%)
Alcohol use (AUDIT-C): Drinks per drinking day (range: 0-4)	.17 (.58)

on referrals, so the patients seen reflect the referring oncology specialties (e.g., predominantly breast cancer). If there had been more outreach and advertisement to other specialties, there may have been more patients presenting for sleep, substance use, or other LM pillars. This clinical sample was largely white, female, well-educated, and employed. Thus, it is not yet clear if these results would generalize to other populations, indicating a need to expand this

clinic and survey over time and in new clinical settings or hospitals. Future research will include pre-post clinic evaluations to assess for change over time related to these LM interventions. Moving forward, we aim to collect additional survey data on patient experiences with the LM clinic to complement the existing demographic and descriptive statistics. Such surveys could inform program development, for example, what an optimal number of group and individual sessions might be for

patients to attain long-term benefits. Patient satisfaction with the LM clinic, overall quality of life, and attitudes towards ongoing medical care are also important metrics to consider as this clinic continues to grow. Self-reported data on what topics in LM the patients found most useful and where they have experienced the most growth would allow the LM team to adapt the group curriculum and individual sessions to best meet patient needs. This paper summarizes the

Table 4.

Psychosocial and Sleep Variables (n = 70-75).

Variable	Mean (SD) or N (%)
Sleep duration (hours)	6.8 (1.3)
Taking any sleep medications	23 (31.9%)
Sleep difficulty: Falling asleep	31 (43.1%)
Staying asleep	48 (66.7%)
Quality of life: FACT-G physical well-being (range: 0-19)	7.1 (5.0)
Quality of life: FACT-G social well-being (range: 2-28)	19.3 (5.5)
Quality of life: FACT-G emotional well-being (range: 1-18)	8.3 (3.6)
Quality of life: FACT-G functional well-being (range: 4-28)	16.4 (5.6)
Clinically meaningful anxiety (HADS-A ³⁸)	28 (35.8%)
Clinically meaningful depression (HADS-D ³⁸)	24 (29.8%)
Body size satisfaction: Very satisfied	5 (6.7%)
Somewhat satisfied	12 (16.0%)
Not satisfied	58 (77.3%)
Current weight goals: Lose weight	59 (78.7%)
Gain weight	3 (4.0%)
Stay about the same/not trying to change weight	14 (17.3%)

successful development of a LM clinic to meet the many needs of cancer survivors to improve their overall health and well-being. This clinical model may encourage more providers and healthcare systems to offer LM services for cancer survivors.

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ORCID iDs

Hannah Lee  <https://orcid.org/0000-0003-3158-2333>

Elizabeth Frates  <https://orcid.org/0000-0002-1156-7745> 

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