

ABSTRACT

A Pilot Study: Evaluation of the Effectiveness of a Cooking Class in Increasing Cancer Patients' Self-Efficacy, Sense of Control and Knowledge

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Nutrition and cancer patients' food choices impact treatment outcomes and survival rates. The goal of nutrition education is dietary behavior change, yet it is unclear which educational format is the most effective. The aim of this pilot study was to evaluate the effectiveness of a cooking class in increasing cancer patient's cooking knowledge, self-efficacy and sense of control during treatment and recovery through meal planning and food preparation. A pre-and post-test survey design was implemented on a convenience group. Paired t-tests were performed for pre-and post study comparisons, with independent sample t-tests for between-group comparisons. There was a significant increase in knowledge after the cooking class intervention ($p < .05$). Subjects with a bachelor's degree had a higher sense of control ($p < .10$), compared with those with trade/technical/vocational training. Given the results were validated in a larger patient population, these data suggest that demographic characteristics need to be considered during nutritional educational experiences to enhance the intervention effectiveness.

A Pilot Study: Evaluation of the Effectiveness of a Cooking Demonstration and Nutrition
Education Class on Cancer Patients' Attitude and Self-Perception Change

by

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CHAPTER ONE

Introduction

Cancer is one of the leading causes of mortality and morbidity from noncommunicable diseases all around the world. According to the World Health Organization World Cancer Report 2014, there were approximately 14 million new cancer cases and 8.2 million cancer related deaths in 2012 with an estimation of 22 million in 2032. In 2016, it is estimated that 1,685,210 new cancer cases will be diagnosed in the United States and 595,690 people will die from the disease (Siegel, Miller, & Jemal, 2016). Regardless of cancer type, location, grade and stage, malnourishment is prevalent among cancer patients, ranging from 30% to 90% worldwide (Nitenberg & Raynard, 2000). Good dietary practices assist patients with nutrition, storage, maintenance and relieve nutrition impact symptoms—a series of symptoms including unexpected weight loss, taste and smell alteration, nausea, anorexia, inflammation and cancer cachexia syndrome (Argilés, 2005). As an indispensable component along the cancer treatment and recovery journey, good nutrition also decreases anticancer treatment toxicity, increases response and tolerance to treatment, and improves quality of life and overall survival (P. Ravasco, Monteiro-Grillo, Vidal, & Camilo, 2003). Apart from life-threatening physiological manifestations, cancer patients also face tremendous emotional stress and are prone to neurosis. Cognitive impairment from side effects of anticancer treatment and physical discomforts triggers the onset of psychological issues, leading to increased treatment interruption, lowered morality and cancer treatment response rates, and elevated morality and morbidity rates (Nitenberg &

Raynard, 2000). Good nutrition not only ameliorates physiological symptoms, slows the progression of neurosis and combats the side effects of therapies and medications, but also provides comfort, soothes physiological agony and buffers psychological stress (Chasen & Bhargava, 2009).

As a type of nutrition education, cooking classes create an opportunity for patients to taste, touch and smell nourishing foods and to obtain nutrition knowledge, cooking skills and creative recipes from direct interactions and hands-on trainings. Social interactions, especially with other patients, can potentially increase patients' feelings of social support and decrease psychological distress derived from cancer. Additionally, it has been shown that at the time of disease diagnose, during treatment and post treatment recovery are regarded as "teachable moments," when patients tend to increase their interests in receiving guidance concerning healthy behavior changes (Karvinen, Bruner, & Truant, 2015). The cooking class, in this study, consisted of a health professional lecture, hands-on cooking practice and dining, and printed nutrition education handouts. The purpose of the study was twofold: one goal was to evaluate cancer patients' attitude towards cooking class, and the other was to assess its effectiveness in increasing cancer patient's nutrition knowledge, cooking skills, self-efficacy and sense of control during treatment and recovery by meal planning and food preparation.

Problem Statement

Based on the National Cancer Institute's Physician Data Query, it was estimated that cancer-associated malnutrition is the immediate cause of death in 20-40% of the cancer patients (Manrow, Beckwith, & Johnson, 2014). Patients' nutrition knowledge tends to be overestimated or overlooked by healthcare providers, who may believe that

patients can maintain good nutritional status based on their appetite and hunger (Vetter, Herring, Sood, Shah, & Kalet, 2008; Wynn, Trudeau, Taunton, Gowans, & Scott, 2010). In reality, heavy medication administration and anticancer therapies can trigger a series of adverse effects, such as disordered digestive function, suppressed appetite, and taste and smell alteration. Therefore, it is unrealistic to rely on patients' metabolic and central nervous system feedback mechanisms to meet their nutrition needs. Furthermore, the severe physical discomfort, along with treatment-associated toxicity can induce high levels of anxiety, depression and other psychological disorders, affecting patients' appetite and food intake (Trude Haugland, 2016). Without proper nutrition intervention, this vicious cycle can result in severe weight loss and malnutrition (Andreyev, Norman, Oates, & Cunningham, 1998; Irwin, 2014).

Many cancer patients are unaware of the correlation of nutrition with cancer treatment outcomes and cancer recurrence (Dyer, Fearon, Buckner, & Richardson, 2004; Maunsell, Drolet, Brisson, Robert, & Deschênes, 2002). Patients who heed dietary recommendations and seek knowledge may not necessarily change behaviors, considering that knowledge is no guarantee of dietary changes in the appropriate direction, especially if the health benefits are not observed quickly (Moon et al., 2012; Padgett, Mumford, Hynes, & Carter, 1988). Nutrition, in all stages of medical care, from the diagnostic and therapeutic stage to the extended period of time after treatment (Toles & Demark-Wahnefried, 2008), is crucial to prevent cancer recurrence and enhance quality of life (Chang et al., 2004). Indeed, not only is malnutrition a concern during treatment but also influences patients' well-being years after the completion of treatment (Larsson, Hedelin, Johansson, & Athlin, 2005). Special demographic groups such as

poverty-stricken and elderly patients require more tailored nutrition education. Even with growing recognition and investments in nutrition education, multiple studies indicate that the majority of cancer patients are undereducated about nutrition and the skills needed for preparing healthy meals to survive and thrive during and after cancer (Chen, Diamant, Thind, & Maly, 2008; Dyer, Fearon, Buckner, & Richardson, 2004).

Additionally, both intrinsic and extrinsic barriers hinder the path towards a healthy diet. First, self-initiative behavior changes are not expected among cancer patients (Maunsell, Drolet, Brisson, Robert, & Deschênes, 2002; von Gruenigen et al., 2009). “Forgetfulness” and “lack of ideas for cooking” were found as perceived barriers to adhere to a healthy diet among a diabetic patient group (Brekke, Sunesson, Axelsen, & Lenner, 2004). Financial instability was another barrier among a low-income population (Apostolico, 2013; Campbell, Honess-Morreale, Farrell, Carbone, & Brasure, 1999; Chen et al., 2008; Klohe-Lehman et al., 2006). Cooking competence is also associated with dietary choices, which influences consumers’ attitude towards pre-prepared convenience foods and allows them to be self-reliant and have a healthy diet without creating a stressful home food production process (Ternier, 2010). Perceiving cooking as a time-consuming, physically and mentally draining task can impede people from cooking (Ternier, 2010).

Patient-oriented nutritional education usually comes in the forms of printed materials (flyer, pamphlet, guideline sheet), Internet-based self-monitoring and tutorial tools (such as MyPlate), nutrition counseling (individual, group, telephone, face-to-face) and more collaborative interventions (such as cooking class, food demonstration and game playing). Based on a meta-analysis conducted by Padgett et al. (1988), diet

instructions and approaches built on Social Learning Theory tend to be the most effective intervention for behavior change, which is characterized by social interactions and peer support. However, a more current review of literature indicates cooking classes, as well as other more collaborative nutritional education programs have not been implemented on cancer patients as broadly as on patients with other common chronic diseases.

Cooking classes have shown effectiveness in nutrition knowledge and cooking skills improvement, self-efficacy and sense of control enhancement, and attitude and behavior changes of patients with diabetes mellitus, obesity and cardiovascular diseases (Contento, 2008a; Garrett et al., 2005; Norris, Engelgau, & Narayan, 2001). Considering the promising results from cooking class practices in patients with other diseases, as well as the demanding nutritional education needs among cancer patients, it is of importance to investigate the effectiveness of cooking classes in cancer patients.

Purpose

The purpose of this study was to evaluate patients' baseline knowledge and attitude towards a cooking class, and to assess its effectiveness in increasing cancer patients' nutrition knowledge, cooking skills, self-efficacy in preparing nutritious meals, and a sense of control over cancer treatment and recovery through meal planning and food preparation.

Hypothesis

This cooking class will increase nutrition knowledge, cooking skills, self-efficacy in cooking nutritious meals, and a sense of control over cancer treatment and cancer

recurrence in the recruited cancer patients and survivors. Also, the effectiveness of the cooking class will be influenced by participants' age and educational level.

Definition of Terms

1. Cancer

Cancer is medically defined as a collection of related diseases, caused by uncontrolled growth and division of cells in the human body with the ability to migrate and spread to surrounding tissues.

2. Advanced Cancer

Advanced cancer is termed as primary or secondary cancer that has spread to other organs or parts of the body and is unlikely to be cured.

3. Cancer Patient

Cancer patient refers to a person who is receiving medical treatment for a malignant growth or tumor.

4. Cancer Survivor

A cancer survivor, based on CDC definition, is anyone who has been diagnosed with cancer, from the time of diagnosis through the balance of his or her life.

5. Self-efficacy

Self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1977, 1986, 1997).

6. Cooking class

In this context, it is defined as a class consisting of recipe introduction, hands-on practice and meal tasting with the additional nutrition education lecture relevant to cancer treatment and survival.

7. Cancer Cachexia

Cancer cachexia describes a syndrome of progressive weight loss, anorexia, and persistent erosion of host body cell mass in response to a malignant growth.

8. Psycho-oncology

Psycho-oncology is a field of interdisciplinary study and practice at the intersection of lifestyle, psychology and oncology.

9. Nutrition Impact Symptoms

It is the term used to describe a series of symptoms including unexpected weight loss, taste and smell alteration, nausea, anorexia, inflammation and cancer cachexia syndrome.

10. Nutritional Neuroscience

It is an emerging discipline shedding light on the fact that nutritional factors are intertwined with human cognition, behavior and emotions.

Limitations

This study is restricted in extrapolation to a larger population due to the following limitations: the pilot instrument in the study has not undergone reliability testing of internal consistency, but was developed based on face and content validity as a result of sample and time restrictions. A convenience group of five participants from Baylor Scott and White McClinton Cancer Center, Waco, TX might not be representative to a larger

population or a different demographic group. As the reliability of the instrument is yet to be confirmed, the study results are at high risks of bias. Due to the recruitment protocol, cancer patients were charged after the class and were not obligated to attend all sessions, which rendered analyzing six sessions' data as a whole less likely. Since, in general, four to six sessions are desired to achieve significant attitude and behavior changes, it was not unexpected to observe no significant differences in this study. Additionally, the nature of self-reporting in the survey may not reflect the true thoughts of the patients; response bias could influence the result more easily with small sample sizes. Even though the survey was anonymous, dishonest answers out of fear, intention to please researchers and irresponsibility could hinder the usability and reliability of the data.

Delimitations

Only patients who received cancer treatment from Baylor Scott and White McClinton Cancer Center in Waco, TX were included in the cooking class. Cancer patients under 18 were excluded considering their emotional, intellectual and financial disparities from adults. Small sample size was the result of several unavoidable factors: first, this was a pilot study and further modifications were expected. Second, space and budget restraints limited recruitment of a larger sample. Third, cancer patients' health condition was unstable and unpredictable, leading to a decreased participation rate. Additionally, the \$10 charge per class might have restricted participation— especially to those who were financially drained by the disease.

Assumptions

It was assumed that the subjects had the ability to correctly comprehend the survey content and answered the questions honestly. Subjects were representative of a larger population of cancer patients of similar age and education level. Pre-and post-study surveys were valid and reliable for its measurements.

Significance of This Study

This pilot study focused on cancer patients— a nutritionally vulnerable population. As discussed, more attention needs to be paid to nutritional education implementation in this population, given their high nutrition demands and that their knowledge tends to be overestimated or overlooked by healthcare providers. Compared with cooking class practices in obese, diabetic and cardiovascular disease populations, it is less utilized among cancer patients as a behavior modification tool. Cooking classes, possessing activity engagement and peer interaction, are considered a more effective educational tool according to Bandura's Social Learning Theory, as compared with traditional didactic methods. Meanwhile, cooking classes have the three essential components of Systematic Link Theory (Contento, 2008a) to be effective nutrition education: 1) a motivational component, to increase awareness and motivation through effective communication strategies, which can be achieved via social interactions; 2) an action component, to facilitate people's ability to take action, which can be addressed using hands-on meal preparation; and 3) an environmental component where nutrition educators work with other professionals to create a holistic environmental support. In this study, the cooking class was held in a local kitchen store— involving healthcare providers, local businesspeople, nutrition professionals and cancer patient companions,

potentially enhancing cancer patients' feelings of social support. Also consistently found in multiple studies, nutritional education programs are more likely to be effective by not only focusing on knowledge, but also behavior and action. As a pilot study, first, this activity provided the cancer group with essential cooking skills for nutritious meal preparation related to cancer treatment and recovery. Through hands-on meal preparation, the cancer patients were able to practice and master cooking skills, increasing their self-efficacy and clearing certain perceived barriers to obtaining regular nutritious meals (Moon et al., 2012). Second, it created an opportunity for them to interact with people sharing similar life events, gaining social support and a sense of control. Third, it will add to the body of literature for nutrition educators and researchers regarding nutrition education planning. The new instrument developed in this study could be utilized for future studies and instrument development.

Summary

Cancer-induced and treatment-associated manifestations impair cancer patients' well-being. Effective nutrition education assists cancer patients going through this devastating event by providing social support, nutrition knowledge and cooking skills, with a goal of enhancing self-efficacy and sense of control, and ultimately improving treatment outcomes and quality of life (Chelf et al., 2001; Meloche, 2003). As mentioned earlier, barriers such as low self-efficacy, and lack of knowledge and skills hinder patients from following a healthy diet. With cancer patient nutrition education being in demand, many factors also need to be taken into consideration for educational program design, including but not limited to: cost-effective, financial status, literacy level and personality, in order to cater to the needs of patients with various demographic

backgrounds. So far, considerable space exists for nutritional education strategy improvement for long-lasting dietary behavior changes. Aiming at the exploration of effective education strategies to improve cancer patients' quality of life, this study will make contributions to nutritional education methodology.

CHAPTER TWO

Literature Review

Introduction

Cancer is a major cause of mortality and morbidity all over the world. According to CDC data, every year more than 8 million people die from cancer. Cancer-associated adverse effects of patients under active treatment can last for years after treatment has ceased (Paula Ravasco, Monteiro-Grillo, & Camilo, 2012). Also, the side effects are associated with impaired quality of life, higher cancer recurrence rates, increased risk of developing secondary cancer and co-morbid conditions— especially cardiovascular disease, diabetes and osteoporosis (Chang et al., 2004).

Cancer patients require holistic care from a multidisciplinary team including: physicians, registered nurses, registered dietitians, and family and friends to provide medical, physical, psychological and social support. The role of nutrition in slowing the rates of cancer progression and improving overall survival is well established (Davies, Batehup, & Thomas, 2011; Pekmezi & Demark-Wahnefried, 2011). Nutrition education is an indispensable component in the long-term survival plan for cancer patients and necessary to equip cancer patients with essential nutrition knowledge, modify their dietary habits, and build up levels of self-efficacy and sense of control (Toles & Demark-Wahnefried, 2008). However, with assorted forms of educational programs being employed, the most prudent and effective manner in which to ensure nutrition support is sustainable is unclear.

Malnutrition

Malnutrition is a subacute or chronic nutrition status combining various degrees of over- or under- nutrition, which occurs as a consequence of an imbalance among the nutritional needs of the patient, the demands of the tumor and the availability of nutrients in the body (Argilés, 2005).

1. Prevalence

Nutritional status of cancer patients can be influenced by demographic characteristics (i.e. age, sex, income, education level), length of hospital stay, cancer type, and tumor location and stage. In an assessment of 8895 hospitalized cancer patients, 61% were malnourished (Wie et al., 2010). Others (Ross et al., 2004) found the prevalence rates from 30% to 87%, which were particularly high in patients with liver, pancreas or lung cancer or at an advanced cancer stage. A wide range of cancer-related symptoms contributes to malnutrition. From data collection of 25,047 advanced cancer patients, 53-86% experienced loss of appetite, 60-74% weakness, 17-31% nausea, 34-40% dry mouth, 46-86% weight loss and 22% taste changes. In another study, more than 75% of the cancer patients suffered long-lasting fatigue months or even years after treatment ended (Teunissen et al., 2007). Moreover, certain cancer types trigger the onset of specific problems, such as osteoporosis in prostate cancer patients, which is a common side effect of androgen deprivation treatment (Millar & Davison, 2012). In gastrointestinal cancer patients, it is reported that the prevalence of malnutrition ranged from 42% to 87%, a higher nutrition deprivation rate due to severe GI tract symptoms from physiological effects of tumor progression in the GI tract and chemo-radiotherapy treatment toxicities (Ryan, Healy, Power, Rowley, & Reynolds, 2007; Wakahara et al.,

2007). With an estimation of 80% (Uomo, Gallucci, & Rabitti, 2006), pancreatic cancer patients experienced even higher cancer cachexia rates than other GI tract cancer patients, since the pancreas plays a pivotal role in food digestion and absorption. The insufficient energy intake may stem from physical discomforts such as pain, nausea and early satiety, along with anxiety, depression and other psychological disorders. Cancer cachexia was found in 55% of the advanced colorectal carcinoma patients (Thoresen et al., 2013), and was a predictor of early mortality in patients with esophageal cancer (Lecleire et al., 2006).

Compromised nutritional status is associated with impaired quality of life and increased rates of mortality and morbidity. Thus, more emphasis should be given to providing proper nutrition support for cancer patients to reduce cancer-induced malnutrition.

2. Weight Loss and Cancer Cachexia

Cancer cachexia is a series of symptoms, including progressive weight loss, anorexia and persistent erosion of host body cell mass responding to a malignant growth— a product of inadequate food intake, metabolic alterations from wasting and specific humoral and inflammatory response combined (Kern & Norton, 1988).

Depending on cancer type, treatment and individual susceptibilities, the incidence of cachexia ranged from 30% to 85% of all cancer patients (Tisdale, 2003), with stomach and pancreatic cancer patients, as well as those at advanced cancer stages at the higher end (Bozzetti, 2001).

i. Etiology of Cancer Cachexia

First, tumor growth and cancer progression can increase the host's resting energy expenditure, leading to cumulative negative energy balance and progressive tissue wasting (Paula Ravasco, Monteiro-Grillo, & Camilo, 2007). Norton et al. (1985) summarized the prevalence of increased protein turnover and reduced muscle protein synthesis in cancer patients. The metabolism of protein, fat, carbohydrates, vitamins and trace elements are subject to dysregulation. Rofe et al. (1994) characterized carbohydrate metabolism of cancer patients as glucose intolerance and insulin sensitivity reduction. Increased fat mobilization and oxidation, as part of the metabolic abnormalities, can also yield a depletion of lipid storage (Keller, 1993). The combination of cancer progression and metabolic abnormality raises cancer patients' energy requirement.

Secondly, nutritional deterioration can be derived from anticancer treatment toxicities, GI damage from chemotherapy and radiotherapy, as well as the side effects of antineoplastic drugs. Nutrition impact symptoms include anorexia, nausea, vomiting, diarrhea, constipation, stomatitis, mucositis, dysphagia, alterations in taste and smell, pain, depression and anxiety (Omlin et al., 2013), accelerating the course of cachexia. Anticancer drugs may affect cells of vital organs such as heart, kidney, bladder, lung and the nervous system (Dietrich, Monje, Wefel, & Meyers, 2008), undermining the normal function of organ systems and nutrient absorption. In clinical observation studies, it was reported that over 95% of cancer patients had one or more GI tract symptoms that contributed to compromised nutritional status. Head and neck cancer occurs in the oral cavity, oropharynx, hypopharynx, nasopharynx, larynx, nasal fossa, paranasal sinuses, thyroid, salivary glands and vermilion surfaces, radiation therapy treatments of which

cause dysfunction of the salivary glands (Ki et al., 2009). Without the normal secretion of saliva, the patients are prone to dental cavities, difficulty masticating and swallowing, and mucositis and stomatitis development. Radiotherapy to the oral cavities can cause taste alterations among head and neck cancer patients, described as an overall taste insensitivity or distortion. Moreover, abnormalities were observed in cytokine activity, eicosanoid production, and monocyte and macrophage activation, indicating elevated inflammation and immune system disturbance (Plata-Salamán, 1998). Certain cytokines (IL-1 β and TNF- α) can block olfactory and gustative neurotransmission, thus deteriorating taste and smell ability. The plasma concentration of TNF- α correlates with gustative alteration, especially an increase in bitter taste (Chasen & Bhargava, 2009). From clinical reports, many patients described a bitter, metallic taste and developed food aversion. As a result of these changes in taste, patients are less likely to enjoy food and consume enough food to meet their nutritional needs. Besides discomfort from tumor invasion, chemotherapy can generate a series of toxic symptoms including nausea, vomiting, abdominal cramping and bloating, mucositis and paralytic ileus (Elting, Cooksley, Chambers, & Garden, 2007; Langius et al., 2010; Nitenberg & Raynard, 2000). Altered taste and smell, swallowing and chewing issues, digestive system debilitation, fatigue, malaise and depression all contribute to suppressed appetite, early satiety, lowered energy intake and nutrient malabsorption. The accumulated effect of negative energy balance is severe weight loss and cancer cachexia.

ii. Consequences of Cancer Cachexia

Malnutrition impairs normal organ system function and exacerbates inflammation, indicated by elevated levels of IL-6 and C-reactive protein (Soeters et al.,

2008). Altered nutritional and inflammatory status is correlated with patients' high fragility, low tolerance level to treatment and high risk of severe haematological toxicity from chemotherapy (Alexandre et al., 2003). A therapeutic dilemma often occurs where the cancer cachexia patients have low tolerance to the therapy, while the anticancer therapy is essential to combat cancer progression. Without nutrition intervention, the positive feedback loop can eventually result in decreased treatment response rates, higher therapy-induced toxicities and increased treatment interruption (Langius et al., 2013a). Cancer cachexia patients have been found to suffer more severe toxicities than weight stable patients (Andreyev et al., 1998). Sufficient energy and nutrient intake are essential for weight maintenance and preventing or cushioning the consequences of cancer cachexia.

3. Weight Gain and Metabolic Syndrome

In contrast to weight loss, some cancer patients may experience adverse effects from weight gain and excess adipose tissue. Consistent evidence has shown the association between obesity and cancer risks in the breast, prostate, colon, gallbladder, kidney and endometrium (Bergström, Pisani, Tenet, Wolk, & Adami, 2001; Carroll, 1998; Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005; Rock & Demark-Wahnefried, 2002). In a prospective study of more than 900,000 people, obese men had 1.62 times the relative risk of death from cancer than normal weight men, with a relative risk of 1.51 for obese women. Excess body weight is associated with increased death rates for all cancers combined at multiple sites (Calle, Rodriguez, Walker-Thurmond, & Thun, 2003). Obesity also significantly increased the risk of developing endometrial cancer by 4.5 times (Schouten, Goldbohm, & van den Brandt, 2004).

Not only is excess adiposity a recognized risk factor in developing certain types of cancer, but obese cancer patients also have lower cancer treatment efficacy and higher risks of cancer recurrence than their normal weight counterparts (Calle et al., 2003; Goodwin et al., 2011; Stebbing et al., 2011). Even with diagnosis at an early stage, higher mortality can result from obesity-driven co-morbidities including type II diabetes, hypertension, heart disease, osteoarthritis and pulmonary disease (von Gruenigen et al., 2006). Therefore, dietary modification and weight management of obese cancer patients has a huge impact on their cancer survival. Study results have consistently shown that healthy weight can confer additional improvements in breast cancer survivors after active treatment (Blackburn & Wang, 2007; Irwin, 2014). Studies have also found the association of obesity and poor survival in breast, endometrial and ovarian cancer (M. Protani, Coory, & Martin, 2010; M. M. Protani, Nagle, & Webb, 2012), while in prostate cancer patients, obesity was linked to more aggressive tumor development (S. B. Williams et al., 2012), and increased cancer mortality and recurrence (Cao & Ma, 2011). Elevated colon cancer and breast cancer recurrence and impaired survival were also found in obese patients (M. Protani et al., 2010; Sinicrope, Foster, Sargent, O'Connell, & Rankin, 2010). De Azambuja et al. (2010) showed poorer response to chemotherapy treatment of obese patients compared with normal weight patients. They observed elevated expression of growth factor receptors in obese cancer patients on the membrane of circulating tumor cells. Some anticancer drugs have lipophilic differences and are metabolized at different rates in the fat tissue, which may elicit various treatment efficacy and toxicities in patients with different BMI (Hellawell et al., 2002; Le, Huff, & Cheng, 2009). As has been established, cancer-related fatigue is related to chronic inflammation

and metabolic disorder, which can be exacerbated by excess fat. As a source of inflammatory modulators, adipose tissue releases adipokines and leptin, which enhance the production of inflammatory factors, such as interleukin-6, and trigger a cascade of cellular signaling pathway involving inflammation (Demark-Wahnefried et al., 2012). Excessive adipose tissue may also increase the risk and severity of lymphedema, a chronic condition caused by an accumulation of protein-rich fluid— aggravating inflammation and physical discomfort, contributing to malnutrition status and poor cancer outcomes (Schmitz et al., 2013). Additionally, after being hospitalized, physical inactivity and steroid medications such as cortisol could contribute to more undesirable weight gain, a prelude to metabolic syndrome, featured by more weight gain, central obesity, elevated serum insulin, glucose intolerance and insulin resistance. The vicious cycle of weight gain, without nutrition intervention, is followed by higher morbidity and mortality.

4. Psychological Issues Associated with Malnutrition

Functional and cognitive impairment may derive from physical nutrition impact symptoms and malnutrition status. The plummet of energy and activity limitation take away a source of enjoyment from the patients. Emotional turmoil and distress through feelings of helplessness, hopelessness and stress associated with cancer diagnosis can induce psychological or psychiatric disorders, which can be worsened by physical manifestations during treatment (Prevost & Grach, 2012). Mood change is another prevalent symptom found in cancer patients. Multiple studies (Malik, Makower, & Wadler, 2001) have shown that both fatigue and mood alterations tend to remit following treatments. It has been reported that some patients experienced overeating or loss of

appetite, high levels of anxiety and depression as well as increased interest in alcohol consumption directly generated from emotional disturbance. These behaviors can impede the response to active treatment and indirectly increase morbidity and mortality rates (P. Ravasco et al., 2003). Meanwhile, physiological issues, taste alteration and smell insensitivity, for instance, can lower patients' morality, as home-cooked meals and personally favored brand-named foods often provide individuals with comfort (Comeau, Epstein, & Migas, 2014).

In addition, the side effect of chemotherapy, mental cloudiness— also known as “chemo brain”— is worsened by nutritional deficiencies and steroids, anti-nausea and pain medicines, which can pass the blood brain barrier leading to mental insensitivity, as well as taste and smell deterioration (Asher, 2011). The side effects of anticancer agents, along with metabolic, hormonal abnormalities and inflammatory cytokine activation, accelerate the pathogenesis of neurocognitive dysfunction, increasing the severity of neurosis dysfunction and interfering with cancer patients' food choices and nutrient intake (Wefel, Witgert, & Meyers, 2008). Nutrition can play a key role in the onset, as well as severity and duration of depression (Rao, Asha, Ramesh, & Rao, 2008). In the field of nutritional neuroscience, nutritional factors and food patterns have been observed to intertwine with cognition, behavior and emotion. For instance, high vegetable intake has been found to slow the progression of mental degeneration (Morris, Evans, Tangney, Bienias, & Wilson, 2006), while a diet high in red and processed meat, take-out, and sugary and refined foods are associated with poor mental health (Oddy et al., 2009). For cancer patients, poor appetite, skipping meals and a dominant desire for sweet foods could all increase the risk of developing mental illnesses (Rao et al., 2008); inadequate

intake of carbohydrate, protein, essential fatty acids, vitamins and minerals due to loss of appetite disrupts normal cognitive function. Therefore, nutrition promotion of healthy eating can profoundly benefit cancer patients' mental and physical wellness.

Self-Efficacy, Sense of Control and Cancer

Cancer-associated malnutrition, as discussed above, has tremendous impacts on cancer treatment outcomes. Cancer patients' self-efficacy and sense of control are two other factors that can significantly influence patients' well-being and survival rates.

Self-Efficacy

Defined by Bandura, self-efficacy is "a judgment of one's ability to organize and execute given types of performances." According to Bandura's Social Cognitive Theory, perceived self-efficacy such as through vicarious experience and verbal persuasion is a stronger behavior predictor; while actual ability is secondary compared with the perceived ability (Bandura, 2010).

i. Self-Efficacy and Cancer Outcomes

Besides medical status, it has been recognized that psychological and social factors along with biological status all are contributors in determining cancer patients' disease course, prognosis and quality of life. Self-efficacy may be a critical factor in managing the physical and psychological challenges of cancer patients (Collie et al., 2005; K. Mystakidou et al., 2010). Self-efficacy beliefs buffer cancer-induced physical dysfunction and psychological distress via cognitive, motivational, affective and decisional processes (Bisschop, Kriegsman, Beekman, & Deeg, 2004). Additionally, perceived self-efficacy plays a pivotal role in anxiety arousal. Anxiety and depression

level was negatively correlated with self-efficacy, as found in 76 hospitalized patients (Mata et al., 2015). Similarly, efficacy belief was highly linked to stress level and emotional adjustment in prostate cancer patients (Curtis, Groarke, & Sullivan, 2014). Increased self-efficacy has been recognized to have positive effects on cancer patients' physical and mental health, as cancer patients are more likely to display beneficial behaviors such as healthy dietary choices and high morality (Wiedenfeld et al., 1990). Meanwhile, considering the shift from inpatient to outpatient care in chemotherapy, self-management is of importance for cancer patients' symptom control (Royer, Phelan, & Heidrich, 2009). It has been widely accepted that enhancement in cancer patient's knowledge to modify behavior has limited power, while self-efficacy beliefs are known to be crucial for individual health behavior by influencing individual's persistence and effort level to overcome difficult circumstances (Bandura, 2004). Therefore, cancer patients' levels of self-efficacy should not be neglected but addressed by healthcare providers and nutrition educators.

ii. Factors Associated with Self-Efficacy

Bandura's Social Cognitive Theory establishes a multifaceted causal structure, where self-efficacy beliefs intertwine with goals, outcome expectations and perceived environmental impediments and facilitators. In his theory, Bandura states that self-efficacy belief, as the core of the multifaceted causal structure, affects each step towards behavior change, from raised awareness, motivation, perseverance, resistance to setbacks and relapses to maintenance of the changed behavior. Analyzing the depression and anxiety rates from 4494 prostate cancer patients, the researchers found that the pretreatment, on-treatment and post-treatment depression prevalence rates were 17.27%,

14.70% and 18.44% respectively, while 27.04%, 15.09% and 18.49% respectively for anxiety prevalence rates (Watts et al., 2014). Of 224 cervical cancer patients, the prevalence of depression and anxiety was 52.2% and 65.6% respectively (Yang, Liu, Wang, Wang, & Wang, 2014). The high prevalence alerts health professionals to conduct interventions, since depression and anxiety can lead to poor symptom control, prolonged recovery times and impaired quality of life (Hotopf, Chidgey, Addington-Hall, & Ly, 2002). Mystakidou et al. (2010) revealed that cancer patients with higher efficacious feelings had lower levels of anxiety compared with those who felt inefficacious when assessing 99 advanced cancer patients. Using multiple regression analysis, the study also found a correlation between self-efficacy and demographic characteristics of the cancer patients— including age and sex.

Combined with demographic characteristics, in the coping process along cancer diagnosis, treatment and recovery, social support is strongly negatively related to psychological dysfunctions, as it enables individuals to alter their view towards cancer by cognitive restructure (Ralf Schwarzer & Knoll, 2007). Receiving social support may also strengthen patients' feelings of social identify, self-evaluation and social integration, combating against feelings of loneliness. Moreover, social support was found as a cofactor influencing self-efficacy in a study involving 91 breast cancer patients (Kochaki Nejad, Mohajjel Aghdam, Hassankhani, Asghari Jafarabadi, & Sanaat, 2015). Apart from social support, self-efficacy can be influenced by other factors. In another study (Yuan et al., 2014) that examined the relationship between socioeconomic status and self-efficacy, the researchers stratified 764 cancer patients by age, sex and social support level, and found that social support significantly confounded the observed differences in self-

efficacy between different socioeconomic status groups. In patients with neuroendocrine tumors, increasing self-efficacy and social support was correlated with health-related quality of life improvement (Trude Haugland, 2016). It is therefore recommended that nutrition researchers and educators should not overlook the connection between self-efficacy and other factors— including social support, demographic characteristics and environmental factors, when using nutrition intervention on patients for behavior changes.

Cancer also has a considerable and long-term impact on cancer survivors from physical, psychological and social aspects beyond cancer treatment. In breast cancer survivors, higher self-efficacy was associated with less fatigue time, better emotional wellness and quality of life (Mosher, DuHamel, Egert, & Smith, 2010). Oftentimes, cancer survivors are expected to make lifestyle changes for their health, well-being and survival. Cancer survivors' self-efficacy can be influenced by sociodemographic variables, illness perceptions, depression and social support. Low levels of self-efficacy were observed in breast cancer survivors with high depression levels, low socioeconomic status and weak social support (Foster et al., 2015; Mosher et al., 2010). High depression levels, in return, had negative influences on self-care self-efficacy among gastric and colorectal cancer survivors (Qian & Yuan, 2012). Hence, improving self-efficacy levels of cancer survivors carries significance in preventing cancer recurrence, regulating moods and improving quality of life.

iii. Self-Efficacy from Nutrition Prospect

Nutrition-associated self-efficacy has been shown to be a significant predictor of physical health and nutrition outcome expectancies (E. S. Anderson, Winett, & Wojcik,

2000). For instance, self-efficacy to eat more dietary fiber, fruit and vegetables predicts actual higher intake. The fiber-, fruit- and vegetable-specific predictors are inversely linked to unhealthy food choices (Resnicow et al., 2000; Schnoll & Zimmerman, 2001). In diabetic patients, dietary self-efficacy and perceived spousal support were associated with food choices. Moreover, studies found a connection between nutrition self-efficacy and maintenance of diet in diabetic and breast cancer patients (Pinto et al., 2002; K. E. Williams & Bond, 2002). In summary, self-care and self-management during cancer recovery and survival is a determinant in cancer patient's quality of life. Perceived self-efficacy of cancer survivors may predict the ability to adhere to a healthy diet, implying the necessity to evaluate self-efficacy change as a part of assessing the effectiveness of nutritional education methods.

Sense of Control

Sense of control refers to the belief that life is not ruled by fate but that one is personally able to influence the important events or situations in life (Henselmans, Sanderman, Baas, Smink, & Ranchor, 2009).

The onset of cancer is an important source of stress that can lead to loss of control, helplessness and anxiety. The occurrence of depression and other depressive spectrum disorders is highly prevalent yet undertreated and underdiagnosed among cancer patients (Trill, 2012). Psychological disorders complicate the course and treatment of cancer and affect adherence to treatment such as radiation therapy. Facing uncertainty, worrying about cancer treatment effects, being fearful of cancer progression and death, along with experiencing excruciating chronic pain, cancer patients are prone to high anxiety levels that are beyond normal (Die Trill, 2013). Sense of powerlessness or

lacking sense of control, instead of negative cognition frequency, accounts for anxiety arousal (Kent & Gibbons, 1987). Psychosocial factors including personality, social support, sociodemographic factors and cognition influence perceived control, and is therefore linked to cancer patients' well-being.

Furthermore, perceived control interweaves with self-efficacy and competence to affect individual adjustments and cancer outcomes (Gelabert et al., 2001; López, López-Roig, & Pastor, 2008). The stress buffering effect of personal control was observed in breast cancer patients as they were adjusting to the illness (Henselmans et al., 2009). Maintaining a sense of well-being contributes to better cancer treatment outcomes, which was found to be related to a positive sense of control in a group of 54 breast cancer patients (Astin et al., 1999). In contrast, Mystakidou et al. (2015) demonstrated the associations between depression, sense of control and cognitive functioning in 86 older cancer patients. Thus, feelings of loss of control and lack of control as well as the corresponding maladaptive efforts to regain a sense of control may interrupt treatment, leading to undesirable cancer treatment outcomes.

Nutrition Education

To modulate dietary intake as part of lifestyle modifications after cancer diagnosis, nutrition education is a widely used tool in improving disease outcomes, helping patients regain a sense of control, promoting self-efficacy and decreasing psychological distress. As a versatile tool for health promotion and nutrition practices, it can be delivered in the forms of individual, group or telephone counseling, pamphlet, flyer or other printed materials, Internet-based advocacy as well as more collaborative strategies, such as cooking demonstration, cooking classes and game playing. A higher

quality of life has been consistently reported in cancer patients who received appropriate nutrition education in both retrospective and prospective studies (Bjordal et al., 2001; Gupta et al., 2006; Paula Ravasco, Monteiro-Grillo, Vidal, & Camilo, 2004).

1. Nutrition Education Gap

In order to test the baseline dietary knowledge, attitudes and potential barriers towards dietary changes in cancer patients, Dyer et al. (2004) recruited 50 colon cancer patients. The results showed that only four patients were aware of an association between diet and cancer while half were unable to identify why healthy eating was important, indicating the urgency for raising awareness and enhancing nutrition education in cancer patients. Breast cancer patients, in general, are undereducated in nutrition knowledge, particularly those with low-income or low-literacy level (Chen et al., 2008). Maunsell et al. (2002) found that of 250 breast cancer patients, less than half made any dietary changes on their own initiative a year after initial treatment. In their study, age was an influential factor, as younger cancer survivors appeared more likely to increase their fruit and vegetable intake and reduce meat consumption. Similarly, the majority of endometrial cancer patients, without nutrition education, were unlikely to modify their nutrition behaviors after diagnosis and treatment, especially those who were overweight or obese (von Gruenigen et al., 2009), implying that health professionals should not expect spontaneity of cancer patients in lifestyle changes.

There is a growing body of research supporting the relationship between cooking skills and food choices. Lack of ideas for cooking (Brekke et al., 2004) and low self-efficacy in preparing nutritious meals have been associated with low vegetable and fruit intake (Moon et al., 2012). The popularity and prevalence of convenience food also

reduces people's cooking ability and lower their cooking self-efficacy (Smith, Ng, & Popkin, 2013).

Additionally, in primary care, Vetter et al. (2008) evaluated the attitude, self-perceived proficiency and knowledge of physicians in patient nutrition counseling and found a lack of confidence and knowledge, though nutrition counseling was perceived as a priority by the physicians. Wynn et al. (2010) also investigated physicians' attitudes towards nutrition counseling. According to their findings, there were considerable gaps between the numbers of patients who would benefit from nutrition counseling and those who actually received such counseling. Nutritional education methods featured by problem-solving skills and peer group support, and focusing on behavior and action rather than knowledge, have more long-lasting effectiveness on behavior change (Padgett et al., 1988). However, based on the search of literature, nutrition education implementation in the form of cooking classes and other collaborative types on cancer patients is far from as extensive as on patients with other diseases— including diabetes, obesity and cardiovascular diseases. Hence, more studies are desired to evaluate the effectiveness on the cancer population and promising results can be expected.

2. Psycho-oncology and Nutrition Education

From a Psycho-oncology prospective, a high proportion of cancer patients are eager for nutrition information when diagnosed with cancer, a time called “teachable moment” (Demark-Wahnefried et al., 2005; McBride, Clipp, Peterson, Lipkus, & Demark-Wahnefried, 2000). As quoted from Bandura's Social Cognitive Theories and Weinstein's precaution adoption model, “situational cues (referred to as ‘teachable moments’), such as a life-threatening health event, might prompt increases in perceptions

of personal vulnerability, and in return, motivation to reduce associated risks” (McBride et al., 2000; Tangney, Young, Murtaugh, Cobleigh, & Oleske, 2002). By providing desired nutrition information in appropriate forms, cancer patients can reduce feelings of helplessness, gain a feeling of mastery or control and enhance their self-efficacy (Fawzy, Fawzy, Arndt, & Pasnau, 1995). Elevated spirits and morality can also help patients fight against cancer, yielding more promising treatment outcomes.

3. Nutrition Education along the Cancer Treatment Continuum

Food has physical, emotional and sociological impacts on one’s well-being (Acreman S, 2009). For cancer patients who are undergoing a life-threatening and emotionally-shattering event, the functions of food may be amplified in: nourishing and soothing; mitigating physical discomfort and emotional trauma; augmenting the immune function by increasing cytotoxic activity, and the percentage of large granular lymphocytes and natural killer cells (Fawzy FI, Kemeny ME, Fawzy NW, & et al, 1990). As chemotherapy and radiotherapy are necessary components in cancer management and treatment, therapies and drug-induced neurotoxicity are not likely to be avoided. The induced psychological issues such as dementia, can lead to considerable distress and depression (Dietrich et al., 2008). Researchers have obtained positive results from nutrition education for disease prevention and management. Nutrition education such as promoting the consumption of vegetables, resulted in a slower rate of cognitive decline (Morris et al., 2006).

i. Nutrition Education in Practice

Previous educational programs have yielded positive outcomes in patients’ attitude and behavior change. Extensive studies have shown the effectiveness of dietary

counseling on nutritional status, quality of life and mortality in patients with head and neck cancer, based on a systematic review of twelve studies by Langius et al. (2013a). Nutrition education with cooking tips encouraged fruit and vegetable intake in radiation oncology outpatients (Cho et al., 2014; Isenring, Bauer, & Capra, 2007). Healthy diet promotion and education for colon cancer survivors, mainly advocating higher intake of fruits, vegetables, poultry and fish while lowering the consumption of meat, saturated fat, refined grains and dessert, was inversely associated with cancer recurrences and mortality (Meyerhardt JA, Niedzwiecki D, Hollis D, & et al, 2007). In a six-week study, colorectal cancer patients who received individualized nutritional counseling and telephone counseling on general food intake during chemotherapy, had higher calorie and total protein intake and improved serum albumin percentage compared with those without counseling (Park & Choi-Kwon, 2012). In breast cancer patients, telephone counseling and printed materials of healthy food promotion, effectively improved lipid files and increased fruit and vegetable consumption (Pierce et al., 2004; Schiavon et al., 2015). Face-to-face counseling boosted fruit and vegetable consumption and reduced saturated fat intake in overweight breast cancer survivors (Chlebowski et al., 2006; Cho SangWoon et al., 2014; Thomson et al., 2010) and head and neck cancer patients who were undergoing active treatment (Falciglia, Whittle, Levin, & Steward, 2005).

When comparing group versus individual nutritional education programs for 170 diabetic patients, both had similar improvements in knowledge, BMI, health-related quality of life and attitudes, while HbA_{1c} improvement was marginally greater in subjects assigned to group education versus individualized education (Rickheim, Weaver, Flader, & Kendall, 2002). As effective as one-on-one settings may be in providing effective

interventions, group settings can be performed at a lower cost. The ultimate goal of nutrition education is long-term lifestyle and dietary improvement. Though various forms of nutrition education show effectiveness on patients' dietary behavior, whether the change in behavior is sustainable, is unclear. Thus, it is of importance to investigate and explore educational strategies to achieve this goal.

ii. Andragogy

Andragogy is the form of adult learning, termed by Malcolm Knowles, the developer of the Adult Learning Theory. According to his theory, characteristics of adult learners are different from child learners in regard to motivation, self-concept, orientation, readiness and experience. Based on Knowles' five assumptions, adult learners are self-directed, internally motivated, socially role related, problem centered in learning, and expect immediacy of application. He also suggested applying four principals when designing an adult education program. First, adults need to be involved in the planning and evaluation of their instruction. Second, adult learners' experience, including mistakes, should provide the basis for learning activities. Third, adults are most interested in learning subjects that have immediate relevance and impact on their personal life. And lastly, adult learning is problem-centered rather than content-oriented. Knowles's Adult Learning Theory, along with Bandura's Social Cognitive Theory, established the grounds for cooking classes as a nutritional education method investigated in this study.

iii. Cooking Classes

It has been found that approaches which enhance problem solving skills and peer group support, such as cooking classes, have promising outcomes in reducing symptoms

of cancer (L. A. Anderson, 1990; Kumar, 2012). For patients lacking cooking knowledge and skills, it is difficult to practice the education contents in the printed materials without detailed explanations or demonstrations on how to prepare meals (Government of Canada, 2010). Other studies (Engler-Stringer, 2010; van der Horst, Brunner, & Siegrist, 2011) also agreed that limited food preparation and cooking skills can put a restraint on people's food choices, potentially affecting one's well-being; thus nutrition education focusing on cooking skills can be an effective way to promote healthy eating. Research (Larson, Story, Eisenberg, & Neumark-Sztainer, 2006; Ternier, 2010) also found that a dislike of cooking is associated with lower fruit and vegetable intake, as well as a lowered propensity to meet dietary guidelines.

Self-efficacy and perceived barriers of cancer patients can significantly influence their food choices and dietary habits. According to Systematic Link Theory (Contento, 2008a), for a nutritional education program to be effective, it should raise the awareness and motivation of cancer patients, facilitate their ability to prepare meals on their own, and create a supportive environment. Moreover, behavioral change is facilitated by individual's sense of control. Providing social support assists cancer patients to regain a sense of control and ameliorate their psychological distress (DSW, Joanne E. Mantell MSW, PhD, & DSW, 1989). It has been found that communication in regard to cancer patients' own illness and challenges, as well as advice they received and recommendations they made to others, plays a role in effectively coping with cancer because it gives patients a sense of control during this extremely difficult time in their life (Bulsara, Ward, & Joske, 2004).

Many community-based cooking class programs follow a session-by-session format with each session covering one topic relevant to the targeted cancer patients. A one-to-three hour session usually consists of topic introduction, cooking practices, tasting, evaluation and discussion. Featured class topics for cancer patients include but are not limited to maintaining a healthy weight, and using food to alleviate cancer-induced symptoms (potential changes in taste, nausea and digestive system disturbance). Cooking schools may also provide long-term culinary medicine cooking classes. As a nutrition education tool, cooking classes have produced promising results with regards to attitude and behavior changes among various populations, such as low-income, the obese, the elderly and college students (Chelf et al., 2001; Condrasky, Griffin, Catalano, & Clark, 2010; Hartmuller & Desmond, 2004; Pierce et al., 2007). It have been shown to increase subjects' self-efficacy, cooking skills, and fruit and vegetable intake (Gatenby, Donnelly, & Connell, 2011; Hersch, Perdue, Ambroz, & Boucher, 2014; Winkler & Turrell, 2010).

Compared with paper or electronic nutrition education materials, cooking classes are characterized by higher participant engagement and less dialectic lecture, which might be more appealing to patients with different demographic backgrounds such as low-literacy. Unlike telephone or individual counseling, cooking classes create an environment for patients to interact with people sharing similar experience, thus developing social bonds and increasing peer support. Compared with cooking demonstrations, cooking classes include hands-on practice and have shown greater effectiveness in improving attitudes and behavior towards cooking (Heim, Stang, & Ireland, 2009; Levy & Auld, 2004). Collaborative interventions have yielded better

outcomes than didactic interventions when it comes to disease management (Norris et al., 2001). In nutritional education programs for diabetes management, patients in interactive small groups reported significant improvements in knowledge, feelings of control and behavior, compared with those who merely received a diabetes self-care book (Garrett et al., 2005), the results of which might be expected in cancer patients.

Study Methodology

Likert Scale-based pre-and post-study design is a common model for descriptive studies in regard to attitude, behavior and knowledge assessments, for various demographic groups such as college students, children, low-income, low-literacy, and patients, who were followed for this study (Campbell et al., 1999; Hearty, McCarthy, Kearney, & Gibney, 2007; Heim et al., 2009; Zawila, Steib, & Hoogenboom, 2003). However, no well-established instruments applicable to this study were available, the surveys for this study therefore were newly developed.

According to Bandura's Social Cognitive Theory, self-efficacy is one of the predictor of human behavior and key determiner to shape behavior, affecting not only the amount of efforts to put in behaviors change but also emotional states such as anxiety and depression level. People tend to pursue tasks they believe they can accomplish, and avoid those they perceive as beyond their capabilities (AbuSabha & Achterberg, 1997). Therefore, measurements of self-efficacy were included in the process of Likert Scale construction.

Increasing knowledge, experiences and familiarity of certain tasks result in higher self-efficacy (DeWolfe & Shannon, 1993), which was hypothesized to be achieved by cooking classes, as it helps patients gain skills and knowledge by performing cooking

tasks. Although increased self-efficacy by preparing nutritious meals is a stronger predictor for behavior change than a pure nutritional knowledge gain, obtaining essential knowledge is a prerequisite for self-efficacy (Fawzy et al., 1995). For these reasons, four items in the Likert Scale were designed to measure subjects' baseline knowledge and monitor any changes after attending the class.

Patients' sense of control over cancer treatment also influences their attitude towards the cancer-fighting journey. Many cancer patients rely heavily on healthcare providers and anti-cancer treatment for survival, in the absence of an awareness that their food choices have a tremendous impact on cancer outcomes (Norman, 1995). For this purpose, items to measure sense of control were also included in the instrument.

As for attitude subscales, it has been found that effects of educational programs are of limited value if they do not lead to attitude and motivational change in the long run (Korhonen et al., 1983), which is critical to cancer survival. Other researchers (Lockington, Farrant, Meadows, Dowlatshahi, & Wise, 1988) have found that improved attitude and motivation have a greater effect than mere knowledge gain on dietary behaviors. Attitudes toward cooking have also been identified as a predictor of cooking self-efficacy, as it can be seen as a barrier to acquiring or improving cooking skills (Soliah, Walter, & Antosh, 2006).

Lastly, self-confidence is a generalized trait of self-efficacy in describing overall rather than specific task related ability. General assessments of self-image, in this case, self-confidence, are not a successful predictor of specific behavior and should be avoided in creating survey questions (AbuSabha & Achterberg, 1997; Maibach & Murphy, 1995). Instead of stating "I am confident that I can exercise regularly," "I am confident in my

ability to exercise regularly” is more predictive of behavioral change. That is why there was no measurement of self-confidence and the participants were asked whether they are “confident in their ability to obtain useful cooking and meal planning skills from this class” rather than whether they are “confident about obtaining useful cooking and meal planning skills from this class” in the study surveys.

The instrument was tested for face and content validity. Four nutrition professors at Baylor University evaluated the reasonableness, appropriateness and logical sequence of the items. The instrument was revised based on their comments and suggestions. The pre-study survey consisted of 11 items using the Likert Scale, with five categories: “strongly agree,” “moderately agree,” “neither agree or disagree,” “moderately disagree,” and “strongly disagree,” and four subscales: attitude, knowledge, self-efficacy and sense of control. In addition, a multiple-choice question was given on participants’ intentions to attend the cooking class, to provide additional information of their attitudes towards the cooking class. In the post-study survey, besides the 11 items pairing with the pre-study survey, two multiple-choice questions were added for attitude appraisal as well. Three open-ended questions contained contents about class learning description, sense of control level evaluation and comments about the cooking class. The main purpose of both multiple-choice and open-ended questions was to collect additional information about the participants’ attitudes, sense of control and knowledge changes, assisting future cooking class improvement and compensating for the dubious reliability of the Likert Scale. Demographic information was also collected— including age, cancer status (under active treatment or cancer survivor), education level and sex, which have all been recognized as

cofactors affecting learning ability, attitude, self-efficacy and the effectiveness of cooking classes.

To establish a successful cooking class format in this study, six sessions were planned to provide cancer patients with the following topics: 1) thriving through treatment— how nutritional meals can support patients in the success of their treatment; 2) taste changes— creative ways to use herbs and spices to manage treatment-related taste changes; 3) nausea— quick and easy foods to lessen the impact of nausea through the use of the culinary pharmacy and quick and easy recipes; 4) weight management— ways to balance nutrition and calories to achieve a healthy weight; 5) farm to table— education on how to integrate farm to table eating into one’s daily meal preparation; 6) more than smoothies— variations in assembling highly nutritious and tasty smoothies. Due to restrictions on time, however, only the first session was analyzed in this study. Analysis of the remaining five sessions will be continued in future studies.

Summary

The purpose of this study was to evaluate patients’ baseline knowledge and attitude towards a cooking class, and to assess the class’s effectiveness in increasing nutrition knowledge and cooking skills, enhancing self-efficacy in the preparation of nutritious meals, and increasing a sense of control over cancer treatment and recovery through meal planning and food preparation. This study was also a response to the requests from cancer patients and their family members at McClinton Cancer Center and from their healthcare providers, who were facing challenges in the exploration of effective educational methods. This pilot study will add to the body of existing practices of nutrition education and provide future researchers and nutrition educators with

guidance and references. The instrument in this study can be utilized and improved for future study evaluation and assessment. The study has been reviewed and approved by the Baylor Institute Review Board as an exempted study.

CHAPTER THREE

Method

Design

This descriptive study consisted of pre-and post-surveys in each cooking class session, during which the participants were asked to complete the pre-study survey before the class started and the post-study survey after the class. For both the pre-and post-surveys, there were 11 items in a 5-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly agree). The 11 items were composed of four items measuring knowledge, two items measuring sense of control, two items measuring self-efficacy, and three items for attitude measurement. Only data in the first cooking class were included in this study due to the cooking class timeline, though all six sessions will be analyzed in future studies.

Subjects

The scope was narrowed to the Baylor Scott and White McClinton Cancer Center in Waco, TX. Either cancer patients or survivors over 18 years old with a sufficient literacy level to complete the survey were recruited through word of mouth in the hospital. Patients were excluded if they were non-English speakers or not able to engage in physical activities of food preparation and cooking.

Procedure

The cooking class was held in a local kitchen store. In the first session included in the study, subjects were given a brief explanation of the study and asked to fill out the pre-study survey before the lecture started. A nutrition professor at Baylor University gave a 15-minute nutritional education lecture, mainly focusing on the importance of eating healthy during and after cancer treatment, and using stories and informational handouts for meal planning. Then, one or two subjects were paired with either a health professional or a nutrition student, assigned to one specific procedure of the meal preparation. All of the subjects worked as a team to complete the meal. During the 45-minute meal preparation, the subjects were given take-home nutrition tips about time, cost and food choices balance, and healthier ingredient substitutes with pleasing textures and flavors. The subjects were free to ask any questions of concern. Food was consumed and evaluated by all participants and final thoughts were discussed. In the end, the post-study survey was delivered to the subjects. All five future sessions will follow the same pattern, addressing different issues prevalent among cancer patients.

Data Analysis

Data were analyzed using Microsoft Excel for Mac 2011 (Version 14.6.1). For Likert Scale data analysis, in the pre-study survey, items #2, 3, 5, 11 were coded reversely from “strongly agree”=1 to “strongly disagree”=5, while the rest of the items were coded nonreversely from “strongly disagree”=1 to “strongly agree”=5. In the post-study survey, items #2,3,11 were reversely coded while the rest were coded nonreversely. Mean, standard deviation and Likert Scale response percentages were calculated as descriptive statistics. The Kolmogorov-Smirnov Normality Test was used to test data

normality distribution before conducting paired t-tests (two-tailed) for comparisons of pre-and post-study Likert Scale scores in all participants, stratified age groups and stratified education level groups, respectively. To detect if there were any baseline differences, independent t-tests were applied to compare the pre-study scores of the two age groups and two education level groups, respectively. To examine whether the cooking class had different effectiveness on subjects with different education levels and different ages, respectively, independent t-tests were conducted. Qualitative data were analyzed by theme and linked with responses from Likert Scale and multiple-choice questions. Responses were carefully reviewed to help researchers understand the underlying meaning.

CHAPTER FOUR

Results

While fourteen patients signed up for the class, only five attended, one of whom was accompanied by her sister. Table 4.1 presents the demographic information of the subjects including number, cancer status, sex, age and education level. All five subjects were female with an average age of 60 ± 7.81 years. The response percentages for each question in the pre- and post-surveys are listed in Appendices C and D. The 11 items in the pre-and post-study surveys are subcategorized into four subscales in Table 4.2.

Due to the small sample size, the Wilcoxon Signed-Rank Test, the non-parametric equivalent to the paired t-test, could not be performed; therefore, paired-t tests were used instead. The Kolmogorov-Smirnov Normality Test was conducted first to confirm the normal distribution of the data, the values of the D statistic listed in Table 4.3. There is no D statistic for attitude subscales because of identical pre-and post-study scores in attitude measurement.

As shown, the values of the D statistic are less than the critical value (0.565), so distribution normality is confirmed; hence the data are qualified for paired t-tests on total score, and scores of self-efficacy, knowledge and sense of control. The mean, standard deviation and *p* value are presented in Table 4.4 and Figure 4.1. The significant level was set at .05.

Table 4.1

Demographic Characteristics of the Subjects

#	Cancer Status	Sex	Age	Education Level
1	CS	F	68	Bachelor's Degree
2	UAT	F	63	Trade/Technical/Vocational Training
3	CS	F	49	Bachelor's Degree
4	CS	F	65	Bachelor's Degree
5	UAT	F	55	Trade/Technical/Vocational Training

Note. CS= Cancer Survivor. UAT= Under Active Treatment. F=Female.

Table 4.2

Four-Subscale Measurements of the Pre-and Post-Study Surveys

Subscales	Item Numbers	Number of Items
Self-Efficacy	#4, 7	2
Knowledge	#1, 3, 5	3
Sense of Control	#2, 10, 11	3
Attitude	#6, 8, 9	3

Table 4.3

Results of Kolmogorov-Smirnov Normality Test (n=5)

Measurements	D value
Total	0.030
Self-Efficacy	0.039
Knowledge	0.046
Sense of Control	0.083
Attitude	-- ^a

Note. ^a No value of the D statistic

Table 4.4

Pre-and Post-Study Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores of the Subjects (n=5)

Scales	Mean±SD (Pre)	Mean±SD (Post)	P Value
Total	41.6±4.28	46.4±3.58	0.0372*
Self-Efficacy	9.2±1.30	9.4±0.55	0.7040
Knowledge	9.4±1.52	12.8±1.64	0.0175*
Sense of Control	8.40±2.07	9.60±1.67	0.2080
Attitude	14.6±0.89	14.6±0.89	-- ^a

Note. * $p < .05$, $\alpha = .05$.

^a No p value.

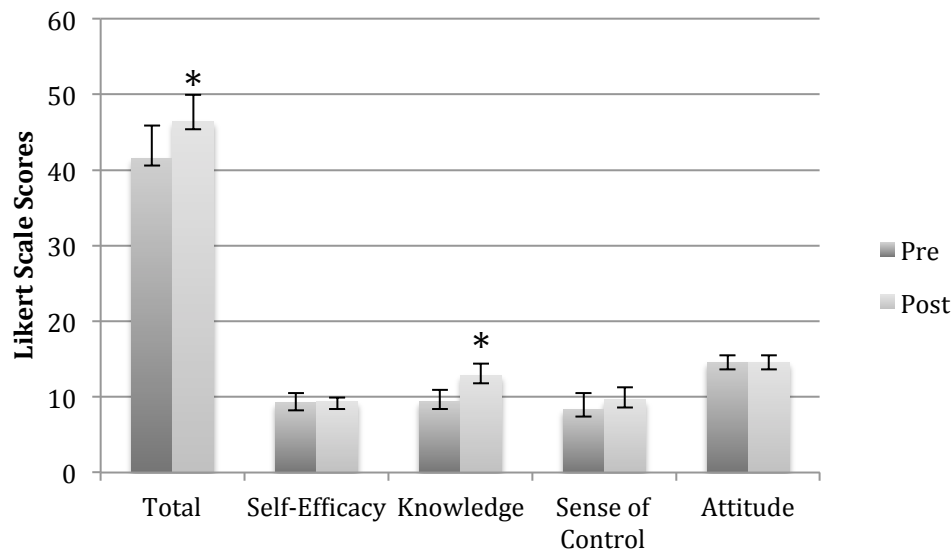


Figure 4.1 Pre-and post-study total and four subscales scores (Mean±SD) of all subjects

Note. * $p < .05$, $\alpha = .05$.

Next, the samples were stratified by age with the cutoff at 60 years, examining whether the class had different impacts on the two age groups. The data analysis was performed on the group older than 60 years and younger than 60 years following the same test procedure as above. The data are normally distributed from the results of the Kolmogorov-Smirnov Normality Test. Table 4.5 and 4.6 present the mean, standard

deviation and *p* value of subjects older and younger than 60 years, respectively. In Figure 4.2, the two age groups are clustered together, demonstrating between-group baseline differences, pre-and post-study in-group changes and between-group post-study differences.

Table 4.5

Pre-and Post-Study Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores of the Subjects Older than 60 Years (n=3)

Scales	Mean±SD (Pre)	Mean±SD (Post)	P Value
Total	42.67±4.04	46.00±3.00	0.2893
Self-Efficacy	9.67±0.58	9.33±0.58	0.4226
Knowledge	9.33±2.08	12.33±1.53	0.0955
Sense of Control	8.67±2.08	9.33±2.08	0.6349
Attitude	15.00±0.00	15.00±0.00	-- ^a

Note. ^a No *p* value.

Table 4.6

Pre-and Post-Study Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores of the Subjects Younger than 60 Years (n=2)

Scales	Mean±SD (Pre)	Mean±SD (Post)	P Value
Total	40.00±5.66	48.00±5.66	-- ^a
Self-Efficacy	8.50±2.12	9.50±0.71	0.5000
Knowledge	9.50±0.71	13.50±2.12	0.2952
Sense of Control	8.00±2.83	10.00±1.41	0.2952
Attitude	14.00±1.41	14.00±1.41	-- ^a

Note. ^a No *p* value.

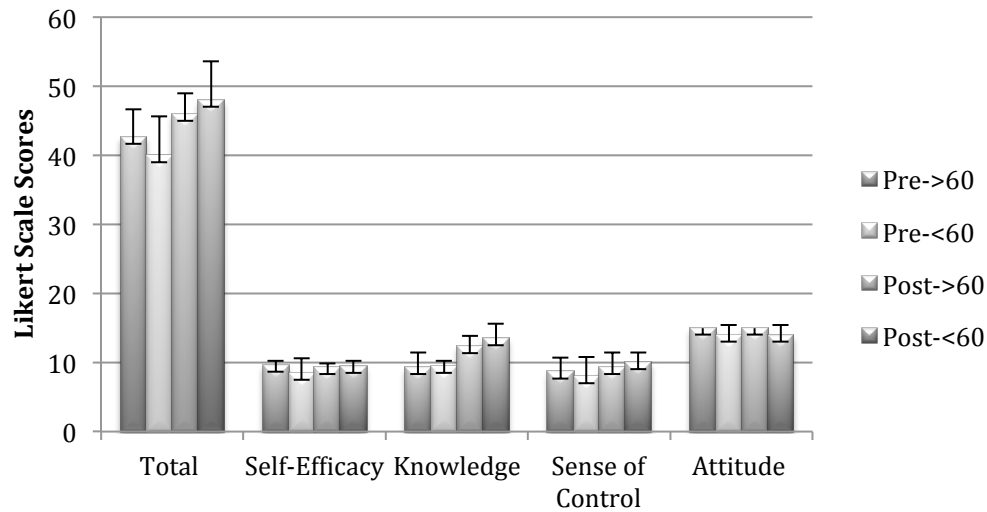


Figure 4.2 Comparison between subjects of two age groups in pre-and post-study scores (Mean±SD)

Note. Pre->60: pre-study score of subjects older than 60; Pre-<60: pre-study score of subjects younger than 60; Post->60: post-study score of subjects older than 60; Post-<60: post-study score of subjects younger than 60.

Next, parallel tests based on education level stratification were performed to compare subjects with a bachelor's degree and those with trade/technical/vocational training, for the purpose of investigating whether education level could influence the outcomes, shown in Table 4.7, 4.8 and Figure 4.3.

Table 4.7

Pre-and Post-Study Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores of the Subjects with a Bachelor's Degree (n=3)

Scales	Mean±SD (Pre)	Mean±SD (Post)	P Value
Total	44.33±2.52	48.67±2.52	0.2457
Self-Efficacy	9.67±0.58	9.33±0.58	0.4226
Knowledge	10.00±1.00	13.67±1.53	0.1276
Sense of Control	9.67±1.53	10.67±0.58	0.4778
Attitude	15.00±0.00	15.00±0.00	-- ^a

Note. ^a No p value.

Table 4.8

Pre-and Post-Study Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores of the Subjects with Trade/Technical/Vocational Training (n=2)

Scales	Mean±SD (Pre)	Mean±SD (Post)	P Value
Total	37.50±2.12	43.00±0.00	0.1695
Self-Efficacy	8.50±2.12	9.50±0.71	0.5000
Knowledge	8.50±2.12	11.50±0.71	0.2048
Sense of Control	6.50±0.71	8.00±1.41	0.5000
Attitude	14.00±1.41	14.00±1.41	-- ^a

Note. ^a No *p* value.

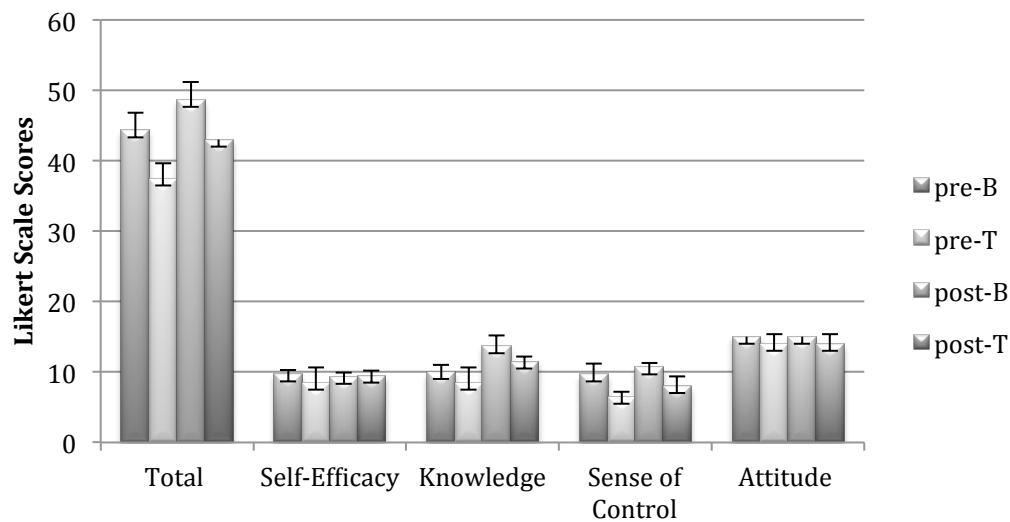


Figure 4.3 Comparison between subjects of two educational levels in pre-and post-study scores (Mean±SD)

Note. Pre-B: pre-study score of subjects with a bachelor's degree; Pre-T: pre-study score of subjects with trade/technical/vocational training; Post-B: post-study score of subjects with a bachelor's degree; Post-T: post-study score of subjects with trade/technical/vocational training.

The Mann-Whitney U test was not conducted because of the inadequate sample size; thus, two independent sample t-tests were performed for analyzing any baseline difference between the two age groups and the two education level groups, respectively, and examining whether the cooking class differed in the effectiveness between the two

educational level groups and two age groups, respectively. The F-tests confirmed the equal variance of all data sets. Table 4.9 and 4.10 present the baseline comparison between subjects older and younger than 60 years, subjects with a bachelor's degree and trade/technical/vocational training, separately. The significant level was set at .10.

Table 4.9

Pre-Study Results of Two Independent Samples t-tests (Two-tailed) and Descriptive Statistics Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores by Age

Outcome	Group								
	>60 years old			<60 years old			<i>t</i>	<i>p</i>	<i>df</i>
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>			
Total	42.67	4.04	3	40.00	5.66	2	0.63	0.57	3
Self-Efficacy	9.67	0.82	3	8.50	2.12	2	0.97	0.40	3
Knowledge	9.33	2.08	3	9.50	0.71	2	-0.10	0.92	3
Sense of Control	8.67	2.08	3	8.00	2.83	2	0.31	0.78	3
Attitude	15.00	0	3	14.00	1.41	2	1.34	0.27	3

Table 4.10

Pre-Study Results of Two Independent Samples t-tests (Two-tailed) and Descriptive Statistics Total, Self-Efficacy, Knowledge, Sense of Control and Attitude Scores by Education Level

Outcome	Group								
	Bachelor's Degree			Trade/Technical/Vocational Training			<i>t</i>	<i>p</i>	<i>df</i>
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>			
Total	44.33	2.52	3	37.50	2.12	2	3.13	0.052*	3
Self-Efficacy	9.67	0.82	3	8.50	2.12	2	0.97	0.400	3
Knowledge	10.00	1.41	3	8.50	2.12	2	1.12	0.340	3
Sense of Control	9.67	2.16	3	6.50	0.71	2	2.64	0.077*	3
Attitude	15.00	0	3	14.00	1.41	2	1.34	0.270	3

* $p < .10$, $\alpha = .10$.

In Table 4.11 are the results of the score differences before and after attending the cooking class between the two subgroups stratified by age, while Table 4.12 present the results by education level.

Table 4.11

Two Independent Samples t-tests (Two-tailed) Results in Comparison of the Study Effectiveness Difference between Two Age Groups

Outcome	Group						<i>t</i>	<i>p</i>	<i>df</i>
	>60 years old			<60 years old					
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>			
Total	3.33	4.04	3	7.00	0	2	-1.22	0.31	3
Self-Efficacy	-0.33	0.57	3	1.00	1.41	2	-1.55	0.22	3
Knowledge	3.00	1.73	3	4.00	2.83	2	-0.51	0.64	3
Sense of Control	0	1.00	3	2.00	1.41	2	-1.90	0.15	3
Attitude	0	0	3	0	0	2	-- ^a	-- ^a	3

Note. ^a No *p* value.

Table 4.12

Two Independent Samples t-tests (Two-tailed) Results in Comparison of the Study Effectiveness Difference between Two Educational Level Groups

Outcome	Group								
	Bachelor's Degree			Trade/Technical/Vocational Training			<i>t</i>	<i>p</i>	<i>df</i>
	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>			
Total	4.33	4.62	3	5.50	2.12	2	-0.32	0.77	3
Self-Efficacy	-0.33	0.57	3	1.00	1.41	2	-1.55	0.22	3
Knowledge	3.67	2.52	3	3.00	1.41	2	0.33	0.76	3
Sense of Control	1.00	2.00	3	1.50	2.12	2	-0.27	0.80	3
Attitude	0	0	3	0	0	2	-- ^a	-- ^a	3

Note. ^a No *p* value.

In the pre-study survey, when responding to, “Why did you decide to attend this class?” all five subjects checked “want to learn”; one also checked “the price is reasonable” and “out of curiosity.” In the post-study survey, all subjects selected “yes”

when asked if they would recommend this class to others; 100% felt the class was “exactly what they need” when answering “to what extent this class was up to their expectation.” Table 4.13 summarizes subjects’ response to the three open-ended questions in the post study survey.

Table 4.13

Subjects’ Responses to Open-ended Questions in the Post-Study Survey

Questions	Responses
1. Which part of the class you learn the most from? Please describe the things you learned in details.	"food preparation"; "talk to us how to eat well"; "I learned healthy ingredients and options to use in recipes. Learning to cook with others is more enjoyable than learning to cook alone"; "the information 1 sheet"; "I already know, but they showed that it is important to eat healthy"
2. In related to the information content, demonstration clarification & structure, class design & style and ambience, please write down any things you would love to be changed.	No response
3. How do you feel about your level of control over your cancer outcome and treatment after attending this class?	"better control"; "the more I can learn to help take control over the outcome of my treatment from attending a class like this, the better off i will be"; "I feel like I can control the dietary aspect"; "I know that I have to eat better"

CHAPTER FIVE

Discussions

The study population consisted of five participants (all females) from Baylor Scott and White McClinton Cancer Center in Waco, TX, with an average age of 60 ± 7.8 years, ranging from 49 to 68. Of the five participants, two were under active treatment, while three were cancer survivors. The three cancer survivors had a bachelor's degree while the two under active treatment patients had trade/technical/vocational training. The results of the Likert Scale in the pre-and post-study surveys are regarded as the assessments of patients' baseline knowledge, attitudes towards the cooking class, and the effectiveness of the cooking class in improving cancer patients' nutrition knowledge, cooking skills, self-efficacy and sense of control. Higher Likert Scale scores in four subscale measurements (attitude, knowledge, self-efficacy and sense of control) represent more positive attitude, more nutrition knowledge and cooking skill possessions, and higher levels of self-efficacy and sense of control respectively. There is no statistically significant difference in self-efficacy and sense of control before and after the class, though scores are higher in the post survey. Post-study total and knowledge scores are significantly higher than pre-study scores at the significant level of .05. Of all four measurements, it is not unexpected that only the knowledge level shows significant increase since, as argued in the former chapter, given that longer study length is necessary to observe self-efficacy, attitude and behavior changes (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Lytle, 2005; Webb, Joseph, Yardley, & Michie, 2010).

There are statistically significant differences, at the significant level of .10, between participants with a bachelor's degree and those with trade/technical/vocational training in pre-study total and sense of control scores, but no differences in attitude, knowledge and self-efficacy. The participants who had a bachelor's degree scored higher in both total and sense of control measurements.

Before the class, 60% of the subjects agreed (either strongly or moderately) that they had control over cancer treatment and outcomes, compared with 100% after the class. All participants strongly agreed that food choice could impact their response to cancer therapies in the pre-study survey, indicating their raised awareness and established baseline knowledge before attending the class. In regard to knowledge change, one subject changed from "moderately disagree" to "strongly disagree" and one from "neither agree or disagree" to "moderately disagree" responding to the instrument item "I have no knowledge regarding cooking practices to improve cancer outcomes." And after the class, fewer subjects felt limited by their cancer diagnosis and treatment on their food choices. Four out of five subjects reported not spending much time thinking about food choices in the pre-study survey, even though all of them agreed that food choices could impact their cancer treatment outcomes. This is consistent with previous studies which suggested that knowledge and awareness are not sufficient for behavior change (Kristal, Bowen, Curry, Shattuck, & Henry, 1990; Maunsell et al., 2002; Norman, 1995; Padgett et al., 1988). In the post survey, all of them strongly agreed that they planned to spend more time thinking about food choices. According to the Likert Scale rating, participants thought that the cooking class was an enjoyable way to learn cooking skills and nutrition knowledge; in the open-ended question in the post-study survey, one also wrote, "Learning to cook with

others is more enjoyable than learning to cook alone.” All subjects confirmed that the class was up to their expectations, helpful and worth the time and money.

There was no significant difference between pre and post scores in either the older age or younger age group. Self-efficacy was lowered in those older than 60 years while increased in the younger group after the cooking class. Aside from causes of response bias or chance, this may be explained by the task differences. The older group may have happened to take charge of more complicated procedures such as deboning chicken, while the younger counterparts were responsible for washing and cutting vegetables. Higher levels of self-efficacy at the baseline may be partially due to more years of cooking practice in the older age group. The participants who had lower self-efficacy before the study showed an increase in self-efficacy after the cooking class. When asked what part of the class they learned the most from, their responses of “food preparation” and “Learning to cook with others is more enjoyable than learning to cook alone” may indicate that improving cooking skills and meal preparation techniques can increase cancer patients’ self-efficacy. As supported by former studies (Brekke et al., 2004; Moon et al., 2012), low self-efficacy in meal preparation can thwart cancer patients from making dietary changes. There is no baseline difference between the two age groups in regard to their levels of knowledge and sense of control. Both groups held a highly positive attitude toward the cooking class, which was also reflected in their answering, “want to learn” when asked, “Why they decided to attend this class?” in the pre survey multiple-choice question.

The pre-study total score of participants with a bachelor’s degree is significantly higher than those with trade/technical/vocational training at the significant level of .10.

Those with higher education levels also have a stronger sense of control over cancer treatment at baseline. Multiple studies (Chelf et al., 2001; Pignone, DeWalt, Sheridan, Berkman, & Lohr, 2005) investigating the effectiveness of nutritional education programs on different literacy levels showed a correlation between self-perceived competency and education level. The results imply no statistical significance regarding the effectiveness of cooking class on either group. Lacking sufficient sample size, correlation coefficient tests could not be performed to investigate whether demographic characteristics impacted the cooking class outcomes.

To explain the results, first, response bias can skew the results more easily with such a small sample size. For instance, one subject selected “strongly agree” in each item and responded only with “talk to us how to eat well” in the post-study survey open-ended questions. Some items were deliberately designed to be mutually exclusive; thus, it is plausible to assume that she either did not care much about the survey completion, or had a low level of literacy, or was pressured to attend the cooking class while personally unwilling. She was the only participant accompanied by a family member. Her surveys were included in the data analysis, though, considering the small sample size. Secondly, it is unrealistic to expect significant changes through one cooking class, particularly when the subjects already have a certain amount of related knowledge (Faul, Erdfelder, Lang, & Buchner, 2007). The subjects in this study showed their baseline knowledge, based on their agreement that food choices can influence cancer outcomes in the pre-study survey. Also, one subject responded to the question “which part of the class you learned the most from” with “I’ve already know, but they showed that it is important to eat healthy.”

Thirdly, the instrument is in a pilot phase of testing and is not well established or fully tested, creating the potential of question misinterpretation and low reliability.

When asked, “how do you feel about your level of control over your cancer outcome and treatment after attending this class?” the subjects answered “better control,” “the more I can learn to help take control over the outcome of my treatment from attending a class like this, the better off I will be,” and “I feel like I can control the dietary aspect,” in agreement with other study findings that cooking classes help patients gain a sense of control with essential nutrition knowledge and cooking skills (Contento, 2008b; Langius et al., 2013b; Lockington et al., 1988). Sense of control relies partially on how much knowledge the patients are equipped with (Rock & Demark-Wahnefried, 2002; Wrieden et al., 2007). No information was collected for improvement of the class. In general, limited information was given by the participants in the open-ended questions. Factors, such as age, the effort expended in writing, negative attitudes towards filling out the survey can all contribute to response scarcity.

Limitations

The instrument was tested with face and content validity, while pilot study testing for reliability was not conducted prior to the study, though it will be part of future development. Items in the pre-and post-study survey are not completely identical and a few items are controversial in their measurements. As both a pre-and post-study survey item, #4 was meant to measure self-efficacy; the post-study survey item #4 can also be regarded as a measurement of knowledge. In this study, it was used as a measurement of self-efficacy in both surveys. Similarly, item #8 is regarded as a measurement of attitude but can count as a measurement of knowledge in the post-study survey.

The convenience group only consisted of five female participants with two education levels, and from one location: Baylor Scott and White McClinton Cancer Center, limiting the possibility to broader implication. Paired t-tests and two independent sample t-tests were substituted for the Wilcoxon signed-rank test and the Mann-Whitney U test respectively, which may be more reliable tests for Likert Scale statistics. Correlation coefficient tests to detect the influence of demographic characteristics on the cooking class effectiveness could not be implemented due to the small sample size. As part of the recruitment protocols, cancer patients were charged after class and were not obligated to attend all six classes. Thus, the data were analyzed by session independently. Additionally, the limited space where the cooking class was held restricted larger sample recruitment. Generally, four to six sessions are necessary to expect any significant attitude and behavior change; it is less likely to observe any significant changes from one class. Lastly, the nature of self-reporting may not reflect the true thoughts of the patients, and survey response bias can skew the results, especially when the sample size is small.

Future Directions

The purpose of this study was to evaluate patients' baseline knowledge and attitude toward a cooking class, and to assess its effectiveness in increasing cancer patients' nutrition knowledge and cooking skills, enhancing self-efficacy for preparing nutritious meals, and a sense of control over cancer treatment and recovery through meal planning and food preparation. The study will continue with the remaining five sessions and be modified as follows. The instrument items will be simplified for readability and redesigned to be identical in the pre-and post-study surveys. Referring to Schwarzer and Renner (2000), self-efficacy measurement items will be considered to follow the structure

“I am certain that I can... even if I...” For instance, the current item “I feel confident in my ability to prepare nutritious meals for myself regularly” will be replaced with “I am certain that I can prepare nutritious meals for myself regularly, even if I have to rethink my entire way of nutrition.” More items will be geared towards measuring self-efficacy and cooking skills changes. A sample of cancer patients with various education levels will be invited to share their views about the fluency and understandability of the items before the future study (Kelishadi et al., 2012). Reliability tests will be conducted and power tests will be applied to guide future sample sizes. Inter-item correlation and item-total statistics will be performed to assess Likert Scale item redundancy and consistency respectively. The Content Validity Index (CVI) (Polit, Beck, & Owen, 2007) with a 4 point Likert ordinal scale from 1 (not relevant) to 4 (highly relevant) CVI for items (I-CVI) (Lynn, 1986) will be adopted when assessing the content validity of the instrument with psychometrics specialists.

To encourage more attendees and increase the participation rate, more intense and diverse advocacy strategies will be considered, such as using flyers with positive feedback from this study session in the hospital, contacting former cancer patients via phone and email, lowering the attending fee, and charging the participants before the class. Moreover, demographic diversity will be addressed in future recruitment. For instance, inviting couples may be an effective strategy to include more males in the study. Open-ended questions will be qualitatively analyzed to identify themes and codes based on grounded theory principles (Chong & Yeo, 2015).

Encountering a life-threatening disease, cancer patients are traumatized physically and psychologically. Dietary behavior changes tremendously affect their cancer treatment

outcomes, quality of life and cancer recurrence (Hebert et al., 2001; Jager-Wittenaar et al., 2011; Paula Ravasco, Monteiro-Grillo, & Camilo, 2003). For future researchers and nutrition educators, it is important to look at improvement in cancer patients' self-efficacy and sense of control, not just at knowledge gain, when implementing nutrition education for attitude and behavior modification. More thought should be devoted to how to practice nutrition education with quality rather than quantity (Lytle, 2005). Cooking classes, based on Bandura's Social Learning Theory, involving activity engagement and peer interaction, and possessing the three essential components (Contento, 2008a) of effective nutrition education, should be more widely applied and tested in different regions with different cancer populations as an alternative to group counseling. This pilot study, though it has limitations, can provide guidance for future research. The new instrument developed in this study can be referred to for future study utilization and instrument development.

It is suggested that future research be pursued to validate the instrument and emphasize sample size and sample varieties. Learning and practicing cooking skills should be considered an essential part of nutrition education, as lacking meal preparation skills hinders self-efficacy and behavior change (Moon et al., 2012) and the ability to prepare food and follow a recipe influences peoples' food choices (Engler-Stringer, 2010).

Besides information from the surveys, feedback throughout the cooking class also provided valuable information relating to participants' individual concerns. In this study, some subjects reported lack of time and ideas for cooking while others complained about food flavor and about not being good at cooking. In these cases, the professionals shared

their tips such as making soup with wild rice instead of white rice, so that it not only had better texture and froze better but also added extra nutrients. The professor who shared her cancer stories also mentioned her weekend meal preparation plan for the whole week, some useful recipe websites, and her own recipes developed specifically for the cancer situation. For instance, to keep a creamy texture, she substituted onion, olive oil and chicken stock for a dairy base, which could upset the GI tract. Cancer patients showed active engagement during the cooking class, sharing personal stories. From the health professional observer's aspect, the cooking class created an enjoyable learning environment for cancer patients.

Conclusions

In summary, this pilot study evaluated patients' baseline knowledge and attitudes towards a cooking class, and it assessed the class's effectiveness in increasing cancer patients' nutrition knowledge and cooking skills, self-efficacy in preparing nutritious meals, and a sense of control over cancer treatment and recovery through meal planning and food preparation. At the significant level of .05, the results showed a significant increase in knowledge but no difference in self-efficacy, attitude and sense of control. Subjects with a bachelor's degree had a higher sense of control compared with those with trade/technical/vocational training before the study at the significant level of .10. There was no significant difference in the cooking class's effectiveness between groups of different ages or education levels. Larger sample sizes and more class sessions are necessary to observe significant changes. Instrument modification is expected to confirm validity and reliability.

APPENDICES

APPENDIX A

Pre-Study Survey

DATE: _____

CLASS TOPIC: _____



Pre- Study Evaluation

Please check one:

☐ Cancer Survivor

☐ Under active treatment

Other: _____

Sex:

☐ Male

☐ Female

Age: _____

Code: _____

Education:

☐ Some high school, no diploma

☐ High school graduate, diploma or the equivalent (GED)

☐ Some college credit, no degree

☐ Trade/technical/vocational training

☐ Bachelor's degree

☐ Masters/Doctoral degree

Please rate your level of agreement with the following statements

	Strongly Disagree	Moderately Disagree	Neither agree or disagree	Moderately Agree	Strongly Agree
1. My food choices can impact my response to cancer therapy and treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Success or failure in cancer treatment mostly depends on my healthcare giver and medication.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I have no knowledge regarding cooking practices to improve cancer outcomes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I am confident in my ability to obtain useful cooking and meal planning skills from this class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I don't spend much time thinking about food choices in my daily routine.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. It is worth my time and money coming to this class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I feel confident in my ability to prepare nutritious meals for myself regularly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. I expect this class to provide me with helpful information relevant to my understanding of nutrition and health in cancer treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I think this cooking class will be an enjoyable way to learn skills related to cooking and nutrition for cancer treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I have control of my treatment and cancer outcome.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My cancer diagnosis and treatment has limited my food choices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Why did you decide to attend this class?

- 1) Price is reasonable
- 2) Fit my schedule
- 3) Out of curiosity
- 4) Want to learn
- 5) Others _____

Thank you for completing this evaluation. We appreciate your feedback as we make every effort to grow and improve our Supportive Oncology Program.

APPENDIX B

Post-Study Survey

DATE: _____



CLASS TOPIC: _____

Post- Study Evaluation

Please check one:

☐ Cancer Survivor

☐ Under active treatment

Other: _____

Sex:

☐ Male

☐ Female

Age: _____

Code: _____

Education:

☐ Some high school, no diploma

☐ High school graduate, diploma or the equivalent (GED)

☐ Some college credit, no degree

☐ Trade/technical/vocational training

☐ Bachelor's degree

☐ Masters/Doctoral degree

As a result of attending this presentation, rate your level of agreement with the following statements:

	Strongly Disagree	Moderately Disagree	Neither agree or disagree	Moderately Agree	Strongly Agree
1. My food choices can impact my response to cancer therapy and treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Success or failure in cancer treatment mostly depends on my healthcare giver and medication.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I have no knowledge regarding cooking practices to improve cancer outcomes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. This class has given me the skills necessary to make healthy food choices that can improve my cancer treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I plan on spending more time thinking about food choices in my daily routine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. It was worth my time and money coming to this class.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I feel confident in my ability to prepare nutritious meals for myself regularly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. This class provided me with helpful information relevant to my understanding of nutrition and health in cancer treatment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. I think this cooking class was an enjoyable way to learn skills related to cooking and nutrition for cancer treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I have control of my treatment and cancer outcome.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. My cancer diagnosis and treatment has limited my food choices.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Would you recommend this class to others? Yes No Maybe

Did you feel the class was up to your expectation? Exactly what I need somehow not at all

Which part of the class you learn the most from? Please describe the things you learned in details.

In related to the information content, demonstration clarification & structure, class design & style and ambience, please write down any things you would love to be changed.

How do you feel about your level of control over your cancer outcome and treatment after attending this class?

Thank you for completing this evaluation. We appreciate your feedback as we make every effort to grow and improve our Supportive Oncology Program

APPENDIX C

Pre-Study Survey Response Distribution

Question	n	Strongly agree	Moderately agree	Neither agree or disagree	Moderately disagree	Strongly disagree
1. My food choices can impact my response to cancer therapy and treatment.	5	100%	0%	0%	0%	0%
2. Success or failure in cancer treatment mostly depends on my healthcare giver and medication.	5	60%	0%	20%	0%	20%
3. I have no knowledge regarding cooking practices to improve cancer outcomes.	5	20%	40%	20%	20%	0%
4. I am confident in my ability to obtain useful cooking and meal planning skills from this class.	5	80%	0%	20%	0%	0%
5. I don't spend much time thinking about food choices in my daily routine.	5	20%	60%	20%	0%	0%
6. It is worth my time and money coming to this class.	5	100%	0%	0%	0%	0%
7. I feel confident in my ability to prepare nutritious meals for myself regularly.	5	60%	40%	0%	0%	0%
8. I expect this class to provide me with helpful information relevant to my understanding of nutrition and health in cancer treatment.	5	80%	20%	0%	0%	0%
9. I think this cooking class will be an enjoyable way to learn skills related to cooking and nutrition for cancer treatment.	5	80%	20%	0%	0%	0%
10. I have control of my treatment and cancer outcome.	5	20%	40%	20%	20%	0%
11. My cancer diagnosis and treatment has limited my food choices.	5	20%	0%	80%	0%	0%

APPENDIX D

Post-Study Survey Response Distribution

Question	n	Strongly agree	Moderately agree	Neither agree or disagree	Moderately disagree	Strongly disagree
1. My food choices can impact my response to cancer therapy and treatment.	5	100%	0%	0%	0%	0%
2. Success or failure in cancer treatment mostly depends on my healthcare giver and medication.	5	20%	60%	0%	20%	0%
3. I have no knowledge regarding cooking practices to improve cancer outcomes.	5	20%	40%	0%	20%	20%
4. This class has given me the skills necessary to make healthy food choices that can improve my cancer treatment.	5	80%	20%	0%	0%	0%
5. I plan on spending more time thinking about food choices in my daily routine	5	100%	0%	0%	0%	0%
6. It was worth my time and money coming to this class.	5	100%	0%	0%	0%	0%
7. I feel confident in my ability to prepare nutritious meals for myself regularly.	5	60%	40%	0%	0%	0%
8. This class provided me with helpful information relevant to my understanding of nutrition and health in cancer treatment.	5	80%	20%	0%	0%	0%
9. I think this cooking class was an enjoyable way to learn skills related to cooking and nutrition for cancer treatment	5	80%	20%	0%	0%	0%
10. I have control of my treatment and cancer outcome.	5	60%	40%	0%	0%	0%
11. My cancer diagnosis and treatment has limited my food choices.	5	20%	0%	60%	20%	0%

APPENDIX E

Cooking Class Information Sheet

Week 1

Topic: Thriving through Treatment

Description: How nutritional meals can support patients in being successful during treatment

Introduction

Dr. Greathouse – her story of how healthy eating improved her energy and treatment response

Eating Well During Cancer Therapy – make it a priority

Choosing the right foods and fluids during and after your cancer treatment can make a tremendous impact on your physical and mental well-being, as well as, your response to cancer treatment. Your body is being ravaged by cells that are growing out of control and your cancer treatment targets those cells that are rapidly dividing and kills them, but this also included normal cells. During this time your body's immune system is weakened by the cancer and the cancer treatment, leaving you drained of energy, nauseous and GI

discomfort. In order to combat these effects and help your body's immune system stay strong, you need to be a food warrior – these are the tools YOU can use to fight cancer.

The Basics*

The optimal diet for cancer patients and survivors emphasizes fruits and vegetables, because they contain many factors, like antioxidants, that can help prevent excessive cellular damage and improve your body's ability to use the food for energy. Your diet should also emphasize whole grains, legumes, and foods rich in healthy fats, such as omega-3 fatty acids and lean protein.

Vegetables/Fruit:

Eating as many vegetables and fruits at every meal, should be a top priority. They are one of your best weapons in boosting your immune system, reducing inflammation, promote cancer cell death and support your liver's ability to counteract the toxic effects of the cancer treatment.

Protein:

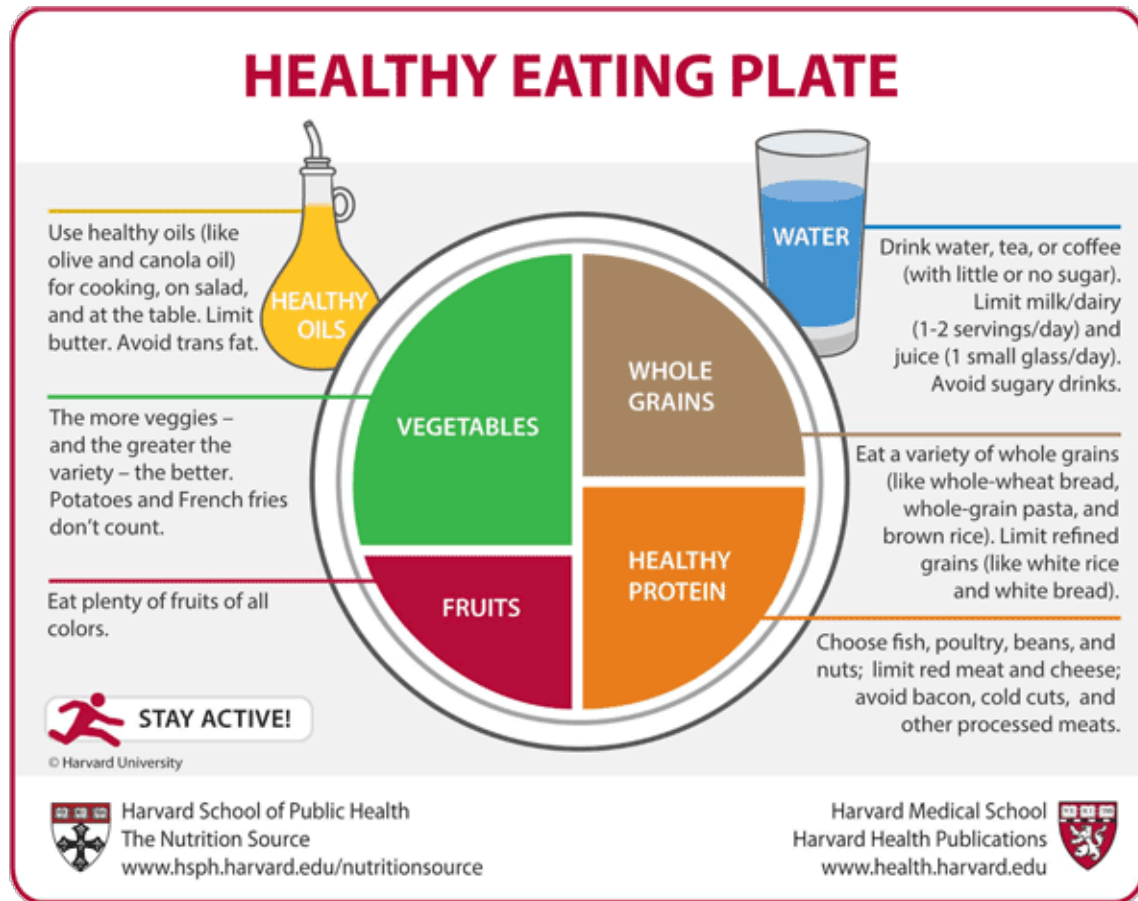
Protein keeps you satisfied longer than a meal of just carbohydrates, builds and repairs tissues, and maintains lean muscle mass. Examples of protein rich foods include: meat, chicken, low fat cheese, yogurt, eggs, soy products (tofu, edemame), seafood, beans, and nuts.

Carbohydrates (starchy foods): carbohydrates are our body's most easily utilized energy source. Starch can be found in a wide variety of foods items. When planning your meals, opt for fiber-rich, unrefined/unprocessed, options. Examples of optimal carbohydrate food sources include: whole grain pastas, whole grain breads, fruit, oats, quinoa, and bulgur.

What should your plate look like

You should strive to balance your meals with the following selections:

- 1/2 vegetables and/or fruits
- 1/4 protein
- 1/4 whole grains
- A small amount of healthy fats
- Plenty of water**



Try to eat 5-10 servings of fruits and vegetables per day. One serving is equal to:

- 1 cup of leafy greens, berries, or melon chunks;
- 1/2 cup for all other cut, cooked, or sliced fruit or vegetable;
- 1 medium-sized fruit or vegetable (e.g., apple or orange);
- 1/4 cup dried fruit;
- 3/4 cup or 6 ounces of 100% juice or fresh juice.

Tips on meal planning and prepping during cancer treatment

The importance of meal planning during cancer treatment

Often during cancer treatment you will feel tired or sick and unable to prepare adequate amounts of nutrition food. Therefore, when you ARE feeling well enough to cook and prepare meals, you should have meal plans ready to go and have a stocked pantry with easy to prepare items. To prevent eating less healthy options, having meals ready to eat or in the freezer ready to heat up, can help you avoid the temptation to grab less healthy options.

How to choose easy and healthy meals

During these sessions we will be giving you meal suggestion and tips on how to create your own meals that are easy and healthy. The main factors you are looking for are 1) easy of preparation, 2) a short list of ingredients and 3) ingredients that are staples in your pantry. Another great tip is to look for meals that can prepared in a crock pot/slow cooker or casserole type dishes. (See “Meal Planning Guide” handout)

Resource: *Ask The Nutritionist: Recipes for Fighting Cancer* app for your smart phone

Getting your pantry organized for meal prep

- Clean your pantry: get rid of foods that are out of date, spices that are more than 6 months old, purge less-healthy snack foods
- Re-stock your pantry with staples: white/wild rice, oatmeal/oats, honey, plain popcorn, dried/canned beans, peanut butter, quinoa, chickpeas, canola/olive oil, dried fruit, nuts/seeds, seasonings (Italian, paprika, cumin, turmeric, cayenne/red pepper, cinnamon, allspice)
- Disposable or re-usable Tupperware containers that can be used in the freezer

Planning your meal prep time

- Make decisions about which meals you want to prep ahead of time (see “Resources”)
- When you have energy buy enough perishable items to make a weeks worth of meals
- Cut foods in portions that can be cooked quickly and fit into your re-usable containers
- After all of your food is cooked and cooled, divide up the food into equal portions and store in your refrigerator, and what ever is left over you can store in the freezer
- Try making concentrated smoothies for those times you have little energy and nauseous but still need to eat healthy
- Find silicone muffin cups or muffin trays
- Make a concentrated smoothie “Coconut Green Smoothie Cups” - just add water (or coconut water) and two smoothie cups from the freezer and blend – the ginger will help counteract the nausea too!



2 cups water (or coconut water)

1/3 cup almonds

2 cups spinach

2 celery stalks, chopped

1/4 cup fresh mint

1/2 orange

1 tablespoon honey

1/2 teaspoon ginger powder

2 cups frozen mango cubes

Place the ingredients in the order listed in a blender container and whirl until smooth.

Divide mixture among 12 muffin cups and freeze until solid. When ready for a refreshing drink, place 1 cup coconut water or regular water in a blender followed by two of the green cups and whirl. If you don't have a powerful blender, you might need to cut the frozen smoothie cups into quarters first. (www.muffintinmania.com)

*Adapted from http://www.dana-farber.org/Adult-Care/Treatment-and-Support/Patient-and-Family-Support/Nutrition-Services.aspx#Meal_Planning

Week 1 Recipes:

Easy Crock Pot Chicken

Cook chicken on high for 4 to 4 1/2 hours depending on size of chicken and strength of your slow cooker. Times will vary, so use a food thermometer to ensure the chicken has reached 165 degrees. Let your chicken rest on a cutting board for about 20 minutes before carving.

Ingredients

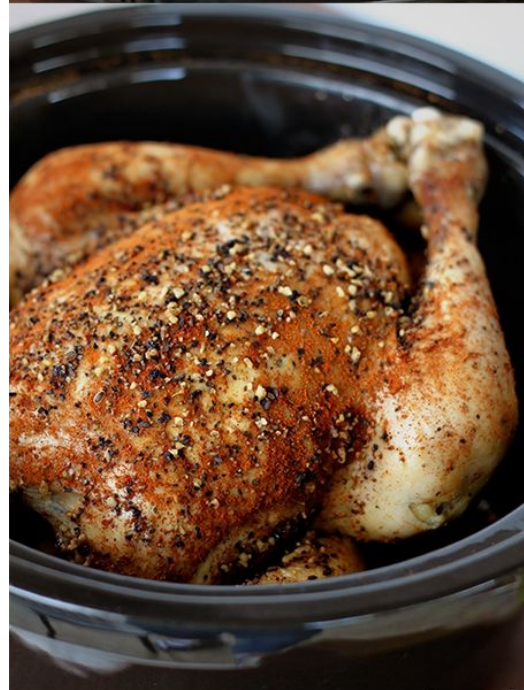
- 1 whole chicken around 5 pounds, insides removed and washed and patted dry
- 1 tablespoon of paprika – more or less to taste
- 3 Tablespoons of steak seasoning – more or less to taste
- Salt and Pepper
- Directions
- Season chicken, inside and out. Cook in slow cooker lined with foil balls on high for 4 to 4 1/2 hours. Chicken should be cooked to 165 degrees.

Recipe notes:

Use the juices at the bottom of the slow

cooker to baste the chicken while it is resting, just to add even more flavor.

Though the skin is flavorful, it doesn't really get super crispy with this cooking method.



This Is Why Im FULL www.thisiswhyimfull.com

I use a 5 quart slow cooker, and my chicken fits perfectly.

Resist opening the lid to check progress, slow cookers take a long time to come back up to temperature and cooking time will need to be extended.

Resource: number-2-pencil.com

KEY! Use the chicken the recipe above to make the lemon chicken kale soup

Creamy Crockpot Lemon Chicken Kale Soup

Ingredients

- 4 cups of shredded chicken (I used one rotisserie chicken de-boned)
- 6 cups chicken or vegetable broth
- 1 bunch of kale (I used dino kale)
- 1 cup chopped carrots
- 1 cup plain or wild rice
- 3 lemons (I used meyer lemons)
- 2 Tbls fresh lemon juice
- 1 cup onions (large onion)
- 1/2 cup olive oil
- Salt to taste



Instructions:

Wash kale and working in two batches, stack the kale leaves and slice in 1/2 inch strips. Set aside. Add 2 cups of stock, the chopped onion and olive oil to blender. Blend for a minute or two, or until it is completely smooth. Add that to the crock pot and add the remaining 4 cups of broth, kale, shredded chicken, zest of all three lemons and the 2 tlbs of fresh lemon juice. Add a pinch of salt. Let cook for 6 hours on low crock pot setting, stirring once or twice.

Meal Prep: Once cooled, divide up portions into re-usable containers and put in fridge or freezer

Resource: <http://aiplifestyle.com/creamy-crockpot-lemon-chicken-kale-soup/>

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