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Cancer Survivorship Care: An Emphasis On Rehabilitation Needs In Maine

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Cancer Survivorship Care: An Emphasis On Rehabilitation Needs In Maine

Abstract

The first section of this report addresses the evidence of causation concerning impairments developed as a result of a cancer diagnosis and cancer treatment. The second section investigates the evidence regarding rehabilitation and physical activity as an effective intervention in the prevention and treatment of impairments from cancer diagnosis and cancer treatment. The third section discusses the underlying behavioral change theory for incorporation of our Cancer Survivorship Rehabilitation Algorithm (Appendix 1), which details our proposed use of rehabilitation and wellness services in the continuum of cancer care and includes an outline for a survivorship care plan. This section also discusses the efficacy of delivery of our product to healthcare professionals. The fourth section outlines our proposed methods of evaluation for the utilization of our algorithm.

Disciplines

Health and Medical Administration | Occupational Therapy | Oncology | Other Rehabilitation and Therapy | Physical Therapy | Public Health Education and Promotion | Therapeutics

Comments

The presentation given to stakeholders regarding implementation of this paper's recommendations can be found here:

http://dune.une.edu/dphp_resources/1/

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Introduction:

Each year over 8,000 people in Maine are diagnosed with cancer.¹ In 2007 the age-adjusted incidence of cancer in Maine was 515 per 100,000, the highest in the nation.¹ Fortunately mortality rates have decreased, which means people with cancer are surviving and living longer.^{1,2} However, the impairments caused by cancer diagnoses and treatments may result in cancer survivors experiencing decreased quality of life. A cancer survivor is identified at the time of diagnosis and remains a cancer survivor throughout his or her entire life. This definition is important because it signifies that the end of cancer treatment is not the end of survivorship care. Cancer survivorship must be appropriately navigated and managed to promote improved quality of life and to reduce healthcare costs during the course of treatment and beyond.³ In order to accomplish this, we propose that standardized rehabilitation and wellness services be incorporated into cancer treatment as well as into a personalized plan of care that will be carried out after cancer treatment ends. This personalized plan of care will be outlined in a survivorship care plan.

Rehabilitation services consisting of physical therapy, occupational therapy and speech therapy are essential along the continuum of cancer care. However, in the United States many cancer survivors have rehabilitation needs and do not receive the services.⁴ Through our research we have recognized distinct periods of time where rehabilitation needs should be evaluated and addressed in the continuum of care. Pre-habilitation, which is considered to be rehabilitation during the period of time after diagnosis and before the start of treatment of cancer, helps reduce the incidence and severity of current and potential impairments for patients with cancer.⁵ During pre-habilitation, patients' rehabilitation needs can be established and necessary services can continue throughout treatment. Rehabilitation services should also be a primary concern after cancer treatment ends.⁶ Currently, the state of Maine does not provide standardized rehabilitation care to cancer survivors.¹ Furthermore, there is a need to standardize the utilization and practices of community wellness services provided to Maine cancer survivors. American Cancer Society guidelines highlight the importance of regular exercise and activity to maintain health and reduce risk of impairments for patients with cancer.⁷

This report is divided into four sections. The first section addresses the evidence of causation concerning impairments developed as a result of a cancer diagnosis and cancer treatment. The second section investigates the evidence regarding rehabilitation and physical activity as an effective intervention in the prevention and treatment of impairments from cancer diagnosis and cancer treatment. The third section discusses the underlying behavioral change theory for incorporation of our Cancer Survivorship Rehabilitation Algorithm (Appendix 1), which details our proposed use of rehabilitation and wellness services in the continuum of cancer care and includes an outline for a survivorship care plan. This section also discusses the efficacy of delivery of our product to healthcare professionals. The fourth section outlines our proposed methods of evaluation for the utilization of our algorithm.

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Section 1 - Physical Impairments Associated with Cancer and Cancer Treatment

A person is considered a cancer survivor beginning from the time of his or her cancer diagnosis throughout the course of his or her life. Cancer survivors may experience multiple physical impairments associated with a specific cancer diagnosis and related treatment. Treatments may involve radiation, chemotherapy, hormone therapy, surgery, or a combination of these and will vary according to patient's age, cancer stage and type, and comorbidities. Variations in treatment and cancer type can result in numerous physical impairments, some of the most prevalent including: fatigue, lymphedema, and chemotherapy-induced peripheral neuropathy.^{1, 2,3} Physical impairments from cancer and cancer treatment can negatively affect a patient's quality of life and can persist even after active treatment is complete.³ The articles included in this review are representative of the body of evidence which demonstrates the elevated risk for a multitude of impairments following cancer diagnosis and subsequent treatment. In order to promote the role of physical therapy in oncology, this literature review focuses on the risk of developing physical impairments following cancer diagnosis or cancer treatment and the subsequent impact on a person's quality of life.

Fatigue:

We conducted a literature review using the search engine Medline-Pubmed. We searched for articles using the key words "fatigue," "cancer," and "prevalence." The original search yielded 2525 results. We then restricted the search to dates within the last 10 years, human subjects, and systematic reviews or meta-analyses. The final search yielded 90 results including a systematic review which was selected for this literature review because of the quality of evidence it provided and its correlation to quality of life.

A systematic review conducted by Wagner and Cella² stated that 60-96% of patients who have cancer experience cancer-related fatigue. The International Classification of Diseases-10 defines cancer-related fatigue as "significant fatigue, diminished energy, or increased need to rest, disproportionate to any recent change in activity level."^{2(p.823)} The authors summarized that cancer-related fatigue is caused by five factors: cancer and tumor burden, oncological treatments such as radiation and chemotherapy, psychosocial factors, comorbid medical conditions, and exacerbating comorbid symptoms. Cancer-related fatigue occurred not only during active treatment, but persisted after treatment was complete. One study in the systematic review assessed the impact of cancer-related fatigue and found that fatigue negatively impacted quality of life more than pain. Of the 419 patients interviewed, 49% stated that cancer-related fatigue decreased their quality of life while only 16% of the patients reported a decreased quality of life as a result of pain.

Lymphedema:

We conducted a literature review using the search engine Medline-Pubmed. We searched using key words "risk factors," "lymphedema," and "breast cancer treatment." The original search yielded 164 results. We then restricted the search to studies conducted within the past five

years, human subjects, and systematic reviews or meta-analyses. The final search yielded four results, including a systematic review and meta-analysis which was included in this literature review due to its study design and its recent publication date. We conducted a second search using the search engine SPORTDiscus. We used key words “psychosocial” and “lymphedema.” We restricted the search to scholarly articles published within the past 10 years. This search yielded 247 results, including another systematic review which was included in this literature review due to its study design and recent publication date.

A systematic review and meta-analysis of 79 studies published in 2013 by DiSipio et al⁴ predicted that 21% of the individuals diagnosed with breast cancer globally each year will develop breast cancer-related lymphedema. Specifically, they suspected that North America has a similar cumulative incidence and they predicted that one in five women with breast cancer in North America will develop breast cancer-related lymphedema. Axillary-lymph-node dissection was approximately four times more likely to result in secondary lymphedema than sentinel-lymph-node dissection, with worldwide incidence rates of 19.9% and 5.6%, respectively. DiSipio et al⁴ also identified risk factors for developing secondary lymphedema. Risk factors with high correlation to developing secondary lymphedema included patients who underwent axillary-lymph-node dissection and had a large number of nodes removed, patients who also underwent a mastectomy, and patients with a high body mass index. Factors that convey a moderate risk for developing secondary lymphedema included receipt of chemotherapy or radiation therapy treatments, presence of metastatic lymph nodes, and a lack of regular physical activity.

A systematic review by Fu et al⁵ revealed numerous negative psychosocial impacts affecting quality of life associated with lymphedema or its treatment/management. This systematic review included 23 studies, 19 of which were focused on breast cancer-related lymphedema; therefore the results of the study can be most meaningfully applied to this population. Investigators focused on social and psychological factors separately, as they contribute to the psychosocial impact on quality of life. When compared to individuals without lymphedema, statistically significant poorer social well-being was reported by those patients with lymphedema. Fu et al⁵ identified specific areas associated with poorer social well-being, which included negative patient perception of “body image, appearance, sexuality and social barriers.”^{5(p.1482)} Inconsistent conclusions were found in regards to psychological distress. Investigators recognized the need for lymphedema specific outcome measures to accurately gather information about psychological distress. Fu et al⁵ suggested that existing measures such as SF-36 (36 item Short Form Health Survey) or FACT-B (Functional Assessment of Cancer Therapy-Breast) that measure emotional well-being, do not include potential emotions specific to patients with lymphedema, such as “frustration, anger, fear, worry, guilt/self-blame.”^{5(p.1482)}

Peripheral Neuropathy:

We conducted a literature review using the search engine Medline-Pubmed. We used the key words “chemotherapy induced peripheral neuropathy” and “cancer.” The original search yielded 1885 results. We then restricted the search to within the past 5 years, human subjects,

and systematic reviews or meta-analysis. This final search yielded 25 results, including the systematic review and meta-analysis by Serenty et al⁶, which was included in this literature review due to its high level of evidence and its recent publication date. The search also yielded the systematic review by Mols et al⁷, which was included in this literature review due to its study design, recent publication date, and relevance to quality of life.

Chemotherapy induced peripheral neuropathy (CIPN) is one of the most life altering side effects that can occur after chemotherapy treatment for a plethora of cancer types.⁶ Serenty et al⁶ conducted a systematic review and meta-analysis which was considered to be the first of its kind, investigating the incidence and prevalence of CIPN. After identifying and screening the multitude of research articles concerning CIPN, the authors determined 31 articles (involving 4179 patients) met the eligibility criteria and were included in this review. Of those 4179 patients, 1960 developed CIPN during cancer treatment. The prevalence was 68.1% within the first month of the end of chemotherapy, 60.0% at three months, and 30.0% at six months or later. Four of the studies included in the review discussed clinical risk factors for CIPN such as baseline neuropathy, smoking, abnormal creatinine clearance, and specific sensory changes during chemotherapy treatment such as increased pain or nerve hyperexcitability.

Mols et al⁷ completed a systematic review with a focus on the association between CIPN and quality of life. After completing a computerized search, the authors excluded articles that included patient populations besides cancer, and they included 25 articles in the review. Eleven of those 25 articles assessed the association between CIPN and patients' quality of life. The articles included a large number of patients, assessed quality of life with validated questionnaires, and assessed CIPN both objectively and subjectively. Through a thorough review of the 11 articles, the authors determined that their findings suggest that CIPN is likely to be negatively associated with quality of life.

Quality of life:

We conducted a literature review using the search engine SportDiscus. We used key words "quality of life," "risk factors," and "cancer." The original search yielded 2865 results. We then restricted the search to within the past five years, human subjects, and English only. This final search yielded 67 results, including the two journal articles which were included in this literature review due to their recent publication dates and the fact that they encompass cancer survivors' impairments and quality of life, but do not focus on specific treatments or diagnoses.

In their mini-review, Given and Given³ focused on patients who were finished with active cancer treatment and found that 25% of cancer survivors reported a lower than normal health related quality of life measure up to six months after finishing active treatment. The time at the end of a survivor's active treatment and their return to normal roles and activities is referred to as the transition period.³ Addressing side effects that lead to impairments and decreased quality of life during the transition is an important component of survivorship. Survivorship care plans, which are given to the patient and primary care physician, map out a patient's treatment. These plans often include cancer type and treatment but have little information regarding symptom assessment and management. More adequate information in the survivorship plan

would allow a person to assess if new symptoms are due to a new disease, disease progression, or are lingering effects of treatment. In a cross-sectional design that surveyed over 3,400 cancer survivors, Hansen et al⁸ asserted that a patient's perceived unmet needs in cancer rehabilitation correlated directly with their quality of life. Hansen et al⁸ developed a six question survey asking about any unmet rehabilitation needs in the areas of physical, emotional, family-related, sexual, work-related, and financial. They measured quality of life using the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire C 30, which consists of 30 items used to measure 15 aspects of health-related quality of life in survivors with varying types of cancer. Of the patients evaluated in their study, most had breast, prostate, or colorectal cancer type. Of these patients, 60.1% reported an unmet need of rehabilitation in at least one area. The patients reported unmet needs most frequently in the categories of physical and emotional problems. As stated above, Wagner and Cella,² and Mols et al⁷ also found that cancer-related fatigue and CIPN both affected a patient's quality of life. Fu et al⁵ reported that patients with lymphedema experience a number of issues which impact quality of life.

The body of evidence supports that there are physical impairments resulting from cancer and subsequent cancer treatment such as chemotherapy induced peripheral neuropathy, cancer-related fatigue, and lymphedema. This literature also supports the negative effect of these impairments on patients' quality of life.

Table 1 – Summary of Literature Review Concerning Physical Impairments Associated with Cancer and Cancer Treatment

Author	Publication Date	Purpose	Study Design	Conclusions
Gilchrist et al	March 2009	Identified physical therapy interventions for cancer survivors using the ICF Model	Perspective Paper	The article described the acute and long-term effects of cancer
Wagner and Cella	August 2004	Identified prevalence of cancer related fatigue and ways for diagnosis and to assess the effectiveness of pharmacological and non-pharmacological treatment	Systematic Review	It was found that using an interdisciplinary approach is important to appropriately assess and manage cancer related fatigue it
Given, C and Given, B	December 2013	Assessed acute post-treatment needs for cancer survivors using a post-treatment risk	Mini Review	Some patients required more than the standard survivorship care plan to manage impairments

		model for physical and psychosocial issues		and psychosocial issues during acute post-treatment
Disipio et al	March 2013	Provided the most current estimate of incidence of upper extremity lymphedema after breast cancer.	Systematic Review and Meta-analysis	Out of the 1.38 million women worldwide diagnosed with breast cancer each year, 295,320 (21%) will develop upper extremity lymphedema.
Fu et al	October 2012	Assessed the psychological impact of lymphedema and the factors associated with this impact.	Systematic Review	Patients with cancer-related lymphedema had a statistically significant poorer social well-being
Seretny et al	September 2014	Assessed the incidence, prevalence, and predictors of CIPN	Systematic review with meta-analysis	Of 4179 patients included, CIPN prevalence was 68.1% after the first month of chemotherapy
Mols et al	August 2014	Determined the association between chemotherapy-induced peripheral neuropathy and quality of life	Systematic review	CIPN had a negative association with quality of life in patients with cancer
Hansen et al	October 2012	Analyzed the hypothesis that patient perceived unmet needs of rehabilitation are associated with decreased QOL	Population based study	Unmet needs during rehabilitation were strongly associated with quality of life

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Section 2 – Benefits of Rehabilitation in Patients with Cancer

We conducted a literature review using the search engines Medline-PubMed, CINAHL, SPORTDiscus, and the Cochrane Database of Systematic Reviews and Clinical Trials. We only included articles from scholarly journals and government organizations that were written in English and related to humans. We used the search terms “exercise” and “cancer” in the Cochrane Database, which yielded 25 citations. We chose three articles after review of the titles and abstracts and selected these articles for their content, strength of evidence and because they addressed the effects of exercise interventions in the cancer survivor population. We used search terms “cancer related fatigue” and “exercise” in Medline-PubMed, which yielded 166 citations. We added the filters “abstract,” “10 years,” and “humans,” which reduced the number of results to 100 citations. We chose articles from this search that offered evidence of the benefits of exercise interventions delivered by physical therapists to cancer survivors. We used another search in Medline-PubMed to determine the effects of exercise on chemotherapy induced peripheral neuropathy. We used the search terms “exercise interventions” and “peripheral neuropathy.” This search yielded 146 articles. We added the filters “abstract,” “5 years,” and “humans,” which reduced the number of results to 38. We chose articles from this search based upon the title, level of evidence, and relevance to our topic. We were provided with the citation to the Lasinski et al article during a lecture about lymphedema and found it by searching for the authors’ names in Pub Med. This literature review is based on the inclusion of eight articles published between 2010 and 2014 that are reflective of the current body of evidence related to exercise interventions for cancer survivors. These articles support that physical therapy interventions and fitness and wellness services are beneficial to cancer survivors and are effective at improving overall quality of life by reducing fatigue and other negative effects of cancer and its treatments.

According to the American Cancer Society¹, cancer survivors with breast, colorectal, prostate, and ovarian cancer benefit from physical activity and have a lower risk of cancer recurrence and improved survival compared to those who are inactive. Common ways that regular exercise can help patients during cancer treatment include: improvement in physical abilities, improvement in balance, prevention of muscular atrophy, decrease in the risk of heart disease, decrease in the risk of osteoporosis, improvement in circulation and decrease in the risk of blood clots, improvement in independence of activities of daily living, improvement in self-esteem, decrease in risk of psychological issues such as depression or anxiety, decrease in nausea, improvement in likelihood of keeping social contacts, decrease in fatigue, weight control, and improvement in overall quality of life. This article also suggested that cancer survivors should obtain treatment and/or advice from a movement specialist, such as a physical therapist, to determine appropriate physical activity and guidelines for the cancer survivor.

Fatigue:

Not only is physical activity beneficial to the cancer survivor, appropriate exercise interventions are effective at helping cancer patients achieve better health and quality of life. Having an individualized exercise program, participating in a supervised exercise program, and perceiving the benefits of exercise are all exercise facilitators that aid survivors in overcoming barriers to exercise due to cancer-related fatigue according to a study by Blaney et al.²

Puetz and Herring³ conducted a meta-analysis which determined that the effects of exercise-induced improvements on cancer-related fatigue during and following cancer treatment were varied. The diversity in results of the studies included in this meta-analysis were further examined to analyze how moderating variables may influence the efficacy of exercise in cancer survivors. Seventy studies involving 4881 cancer survivors during and following cancer treatment were selected. The studies included in the meta-analysis used the outcome variable "cancer-related fatigue," which was measured at baseline and post-intervention. The cancer survivors were randomly distributed to two different groups, exercise or no exercise for comparison. The inclusion criteria were: cancer patients undergoing cancer treatment or post-treatment, randomization or the presence of a non-exercise group for comparison, and the presence of a cancer-related fatigue outcome measure with results from before, during, and after treatment. Sixty-two of seventy studies (88.6%) demonstrated a positive effect, indicating that exercise training significantly reduced cancer-related fatigue during and after treatment. During treatment, cancer survivors with lower fatigue scores and higher exercise adherence demonstrated the largest improvements. This meta-analysis indicated that cancer survivors may benefit from exercise to reduce cancer-related fatigue both during and following cancer treatment.

Lymphedema:

A systematic review by Lasinski et al⁴ supported the effectiveness of complete decongestive therapy (CDT), consisting of manual lymphatic drainage (MLD) and compression bandaging, for reducing lymphedema. The review consisted of 26 individual studies, one case study, 14 review articles, and two consensus articles. Of the studies reviewed, 12 of them focused on breast cancer related lymphedema and three of them included both the upper and lower extremities. Measures used in the studies included circumference, volumetry, tissue thickness by ultrasound and calipers, and pressure under the compression bandaging. The review concluded that use of CDT is effective at decreasing pain and swelling and increasing quality of life. This review also concluded that treatment of lymphedema with CDT is more effective than standard therapy without MLD or compression bandaging alone. The use of CDT improved quality of life for patients with varying degrees of lymphedema, in active cancer, and in palliative care situations. During long term follow up after the implementation of CDT, researchers found a slight girth increase but also found increased quality of life. CDT is an appropriate physical therapy intervention for cancer survivors at all stages and has been shown to improve quality of life.

Peripheral Neuropathy:

Chemotherapy induced peripheral neuropathy (CIPN) is a debilitating side-effect of treatment for cancer survivors that can become a limiting factor for rehabilitation. A systematic review by Streckmann et al⁵ analyzed exercise interventions for patients with peripheral neuropathy in order to evaluate the benefits of exercise. Ten randomized controlled trials and eight controlled clinical trials met the inclusion criteria. The studies included examined the effect of exercise interventions in patients with peripheral neuropathy, independent of other interventions such as medication, therapeutic footwear, or the combination of exercise and nutrition. Studies with less than ten participants and without a control group were excluded. The types of exercise interventions were unique to each study. However, one study specifically addressed CIPN in cancer survivors and found that sensorimotor, endurance, and resistance training had a positive effect on motor and sensory side effects of CIPN. The number of participants with reduced symptoms was significant (87.5%) in the intervention group while no changes (0%) were observed in the control group.⁶

Quality of Life:

Researchers have also studied the implementation of exercise during active cancer treatments and its effect on quality of life. Mishra et al⁷ conducted a Cochrane review composed of all randomized controlled trials and quasi-randomized controlled trials that compared exercise interventions with non-exercise interventions and usual care. All of the interventions for these studies were performed either just before the start of cancer treatment or when the survivor was undergoing active cancer treatment. The purpose of the study was to determine the effectiveness of exercise on health-related outcomes among adults during active cancer treatment. The review included 56 trials with 4,826 participants who were randomized to an exercise group or comparison group. The mode of exercise differed in each of the trials. The primary exercise interventions prescribed were aerobic, anaerobic or combinations of the two, focusing on cardiopulmonary, musculoskeletal, and/or neuromuscular conditioning. The study also included trials with cycling, yoga, tai chi, Pilates, walking programs, etc. The prescribed exercise program was group or individual and the majority were supervised or led by other professionals. The intensity of exercise was based upon the rate of perceived exertion (RPE) and/or heart rate (HR). Mild exercise was defined as RPE of six to 11 with HR of 30 to 54% of maximum HR. Moderate exercise was defined as RPE of 12 to 13 with HR of 55 to 70% maximum HR. Vigorous exercise was defined as RPE of 14 to 19 with HR of 71 to 95% maximum HR. The results of the review suggested that exercise interventions have a positive effect on health-related quality of life. Positive effects of exercise interventions were more evident with moderate or vigorous intensity than with mild intensity exercise programs. The outcome measures included: Health Related Quality of Life (HRQoL) self-report and disease- or treatment-related symptoms. Short-term (12 weeks) and long-term (six months) health-related quality of life, physical functioning, social functioning, role function, and fatigue improved with exercise.

Mishra et al⁸ conducted a similar Cochrane review using 40 trials with 3,694 participants to determine the effectiveness of exercise on health-related quality of life among adult post-treatment cancer survivors (from zero to six or more months post-treatment). This study included similar exercises to Mishra et al.⁷ The prescribed exercise program was group or individual and the majority were supervised or led by other professionals. The intensity of exercise was based on the same values, and the outcome measures were the same as the other Mishra study. The results indicated that exercise may have beneficial effects on cancer survivors' health-related quality of life, body image/self-esteem, emotional well-being, sleep disturbance, social functioning, sexuality, fatigue, pain, and anxiety. However, further research to investigate how to maintain the effects of exercise over time could contribute to existing literature on the benefits of exercise for cancer survivors.

Cancer and its treatments often have negative effects on patients' quality of life. Exercise interventions have been proven to help combat many of the negative effects, improving quality of life for the cancer survivor. The profession of physical therapy is dedicated to improving functional ability and quality of life of patients. The body of evidence supports that rehabilitation and exercise can have a positive effect on physical impairments resulting from cancer and cancer treatment such as fatigue, lymphedema, and peripheral neuropathy. This literature also supports the positive effects of rehabilitation and exercise on the patients' quality of life

Table 2 – Summary of Literature Review Concerning Benefits of Physical Activity in Patients with Cancer

Author	Publication Date	Purpose	Data Sources	Conclusions
American Cancer Society	2014	Provided information about physical activity and the cancer survivor including the benefits, precautions, fatigue, etc.	Cancer.org article using research articles as references	Cancer survivors benefitted from physical activity and could also benefit from advice and/or treatment from a movement specialist to determine appropriate physical activity and guidelines
Blaney et al	2010	Explored the barriers to and facilitators of exercise among a mixed sample of patients with cancer-related fatigue.	Single study with 26 participants representative of the cancer trajectory	The exercise facilitators identified in this study provided solutions to these barriers and may assist with the uptake and maintenance of exercise programs. These findings will aid physical therapists in designing

				appropriate exercise programs for patients with cancer-related fatigue.
Puetz et al	2012	Reviewed literature on exercise effectiveness on cancer-related fatigue	Meta-analysis of 70 scholarly articles	Exercise decreased cancer-related fatigue among patients during and following cancer treatment. Exercise was found to have a palliative effect in patients during treatment and a recuperative effect post-treatment
Lasinski et al	2012	Reviewed literature on the effectiveness of individual components of complete decongestive therapy (CDT) and CDT as a whole.	Systematic review of 26 studies consisting of randomized control trials, prospective studies, and retrospective studies	CDT was found to be effective at reducing lymphedema.
Streckmann et al	2014	Reviewed literature on the effects of exercise intervention on peripheral neuropathy	Review of 18 studies (10 randomized controlled studies and 8 controlled clinical trials)	Supervised exercise, such as resistance, balance training, and endurance training, were found to significantly reduce peripheral neuropathy and improve quality of life.
Mishra et al	2012	Reviewed literature on exercise interventions on health-related quality of life during active	Review of 56 randomized controlled trials and quasi-randomized controlled clinical trials	Exercise was found to have beneficial effects on quality of life and domains including physical functioning, role function, social function, and fatigue.

		treatment		
Mishra et al	2014	Reviewed literature on exercise interventions on health-related quality of life for cancer survivors	Review of 40 randomized controlled trials and quasi-randomized controlled clinical trials	Exercise may have beneficial effects on quality of life and domains including cancer-specific concerns, social and emotional well-being, sleep disturbance, fatigue, and pain.

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Section 3 – Behavioral Change Theory

Part A – Description of Algorithm For Improved Utilization of Physical Rehabilitation Within Cancer Survivorship

Physical rehabilitation is a significantly underutilized resource within the realm of cancer survivorship, especially throughout the state of Maine, despite its ability to remediate complications among cancer survivors. Alfano et al¹ reported, “Depending on the specific treatment exposures, survivors of cancer can face numerous adverse consequences of cancer treatment, many of which are amenable to rehabilitation interventions.”^{1(p.905)} Various physical impairments experienced by cancer survivors, whether the result of their cancer pathology itself or subsequent medical interventions, could be minimized with a referral to physical therapy. The efficacy of the various skilled physical therapy interventions discussed in the previous section led to the creation of an algorithm to assist oncologists and primary care physicians (PCPs) in their care for cancer survivors.

The proposed algorithm (Appendix 1) identifies three distinct points in time for a patient following either a curative or palliative diagnosis where we believe a rehabilitation screen would be beneficial. We suggest that as a result of this screen, a patient should be referred to either rehabilitation or community wellness services, depending upon their specific needs. For those patients who are appropriate for rehabilitation interventions, we propose treatment interventions guided by the ICF model (Appendix 1A) and for those appropriate for community wellness programs, we propose two program opportunities (Appendix 1B). Our algorithm also proposes inclusion of a survivorship care plan (Appendix 1C) unique to each patient as he/she transitions to post cancer treatment. This detailed care plan will include guidelines for monitoring and maintaining health. Through utilization of our algorithm, an oncologist and PCP can optimize his/her quality of care and ultimately improve a cancer survivor’s quality of life.

Table 3 – Summary of Literature Review Concerning Algorithm For Improved Utilization of Physical Rehabilitation Within Cancer Survivorship

Author	Publication Date	Purpose	Data Sources	Conclusions
Alfano CM, Ganz PA, Rowland JH, and Hahn EE	March 2012	Described the importance of advancing cancer rehabilitation through the implementation of a multidisciplinary approach that addresses all aspects that impact a survivor’s quality of life.	Peer reviewed, commentary journal	Determined that a multidisciplinary approach is beneficial for minimizing barriers between cancer survivorship and rehabilitation.

Part B - Description of Underlying Theories of Behavioral Change in Medical Professionals

This review of literature explored the evidence for underlying theories of behavioral change that have impacted changes in practice among oncologists and PCPs. We conducted the search using the following search engines: Medline-PubMed and Medline-EBSCO. In the search we used the keywords “oncologist,” “primary care physician,” “theories,” “behavior change,” and “exercise.” We began by imposing the limit, scholarly journals only. In Medline-PubMed, the search yielded 15,800 articles. Therefore, we applied further limits including: English language, full text, and articles published after 2000. With the new limits applied the search yielded 3,481 articles. In Medline-EBSCO, there were numerous articles identified as well. The number of identified articles decreased to 436 articles after limits were applied for English language and full text availability. We augmented the literature search by reviewing the references of selected articles. The following narrative includes two research studies and two systematic reviews. These four articles were chosen because of their recent publication dates and their focus on theories of behavioral change that have been shown to impact the attitudes and practice behavior of medical professionals.

Bellizzi et al² conducted a cross-sectional observational study using the National Health Interview Survey to determine the lifestyle behaviors among a sample of cancer survivors. The examination of these subjects began at the time of their diagnosis. In terms of physical activity, only 29.6% of cancer survivors met the CDC/ACSM recommendations for physical activity. “Almost three fourths of cancer survivors are not meeting recommendations for physical activity.”^{2(p.8891)} Although physical activity had been proven to improve the health of cancer survivors and there were guidelines on nutrition and physical activity, it seemed as if the physicians rarely made their patients aware of those recommendations. “Oncologists can capitalize on their influential position and play a critical role in the uptake and maintenance of positive health behaviors by simply providing survivors with the knowledge that they are at an increased risk for developing long-term complications from their treatment and offering guidance and appropriate referrals for managing those risks.”^{2(p.8892)} Chambers et al³ conducted an exploratory cross-sectional survey, which made use of the theory of planned behavior to understand the attitudes and intentions of health professionals towards referrals. It was discovered that limited advice and recommendations from primary providers along with a lack of both referrals and awareness of services were the main barriers that prevented patients from using community support services. A lack of awareness among health professionals and support services was originally thought to be the main barrier towards referrals, even though those professionals aware of services were unlikely to make referrals as well. Almost half of the medical professionals did not refer patients to specific services, even though they rated them as beneficial.

Smith⁴ introduced the concepts of evidence-based quality assessment (EBQA), which is a new and promising approach to improve physician adherence to guidelines within their clinical environment. Smith reported, “The four steps of EBQA are analogous to the four steps of the quality improvement cycle: set priorities (plan), set guidelines (do), measure performance (check), and improve performance (act).”^{4(p.95)} When using the EBQA for improved

performance, those looking for change must concentrate on important clinical problems while indicating optimal practice, create efficient guidelines to answer questions appropriately, design performance indicators to consistently measure the adherence of physicians to the desired practice, and develop strategies to ultimately maintain this improved physician performance. Altering a physician's behavior is a difficult task because their behavior has already been significantly shaped through many years of schooling, residencies, continuing education, and their own interests.

The most common approaches to change the behavior of physicians included continuing medical education (CME), academic detailing, reminders, evidence-based guideline development and economic incentives. CME is an educational opportunity for physicians, who have already contemplated behavior change, to test the reliability and validity of new innovations or information. Although this method is commonly used, passive education has not been proven as an effective method, unless paired with secondary reinforcement methods.

Academic detailing, which evolved from the work of pharmaceutical representatives and stemmed from social influence/power theories, occurs when physicians and trained staffing meet to discuss behavior change. This has been thought to be a relatively effective method, but has yet to be thoroughly evaluated and is expensive.

Smith⁴ stated "...social cognitive theory and the health belief model, suggest that an individual's health behavior change is governed by his or her goals and perceptions, which are in turn manipulated by internal and external forces that may be malleable." ^{4(p.105)} As a result, the concept of physicians receiving reminders as an external stimulus is likely to control a physician's behavior. Whether the reminders should be paper or electronic has yet to be determined, but this method has proven to be one of the most effective in changing physician behavior.

The development of evidence based guidelines, which has stemmed from the cognitive theory, uses well-trained physicians to provide information on optimal practices to other physicians for changed behavior. Although guidelines are a necessary strategy for improved performance, the physician must be willing to seek the information and make the decisions.

The last of these approaches is economic incentives, which is based on the health economists' theory, and believes that some physicians may change their behavior for personal gain. Incentives may have been proven as beneficial in some studies, but the controversy surrounding ethical problems has obviously limited its use.

In conclusion, the social cognitive theory (SCT) could be used to prompt behavioral change among oncologists and physicians. With the combination of an algorithm supported by evidence-based practice, this would empower oncologists and physicians to make appropriate referrals to the most beneficial resources, and ultimately optimize the treatment for cancer survivors. Glanz and Bishop⁵ stated, "Key constructs of SCT that are relevant to health behavior

change interventions include observational learning, reinforcement, self-control, and self-efficacy,”^{5(p.403)} which are demonstrated by the previously stated articles.

Table 4 – Summary of Literature Review Concerning Underlying Theories of Behavioral Change in Medical Professionals

Author	Publication Date	Purpose	Data Sources	Conclusions
Bellizzi KM, Jeffery DD, McKneel T, and Rowland JH	December 2005	Investigated several factors of cancer survivors, to determine the prevalence of their health behaviors, including smoking/alcohol use and physical activity	Examine the prevalence of alcohol use and smoking among cancer survivors, and whether they meet their recommended physical activity, using the National Health Interview Survey (NHIS)	Determined the prevalence of risky behaviors among cancer survivors, and reported that oncologists are in the most optimal position, to promote physical activity and provide referrals
Chambers SK, Keith Kam LY, Knott VE, and Wilson C	December 2010	Investigated the pattern of referrals among oncologists to psychosocial support services within the community through using the theory of planned behavior	Exploratory cross-sectional survey of 72 professionals within the field of oncology	Indicated that it was uncommon for a health professional to refer their patients to psycho-social support services
Smith WR	2000	Investigated the most effective theories to change physician behavior and improve physician performance	Meta-Analysis and Structured Reviews	Determined that the development of guidelines and implementation of methods should be evidence-based and related to theories (EBQA)
Glanz K and Bishop DB	2010	Investigated the conceptual framework and theories that lead to the successful	Meta-Analysis and Annual Review	Determined the ability to integrate relevant theories of behavioral change, established clear

		development or implementation of health interventions.		communication, and determined that validity of interventions that could effectively promote health changes
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Part C – Description of Evidence for Proposed Methods of Program Delivery

We conducted this literature review using the search engine Medline-PubMed. We used key words including “physician,” “algorithm,” and “implementation.” Limits imposed included the English language, full text, and articles published after 2000. We only included scholarly journal articles and the search resulted in a reasonable number of articles. We augmented the literature search by viewing the reference lists within our selected articles. The following narrative consists of one observational study and one randomized controlled trial which were published between the years of 2012 to 2014 and both investigated various methods of program delivery. These articles were selected because their methods used to implement a new practice were feasible possibilities to deliver an algorithm to oncologists for increased referrals to physical therapy.

Chung et al⁶ investigated the implementation of a hand-washing program within a hospital and reported, “Our study aimed to investigate factors associated with improved hand hygiene compliance, especially whether hand hygiene compliance is associated with change in beliefs and perceptions in medical personnel.”^{6(p.166)} This hospital-based study observed various medical professionals, throughout a quarterly basis, and ultimately compared the results of a quarter in 2009 to another in 2012. “The campaign included a poster campaign, monitoring and performance feedback, and education with special attention to importance of perception of being a role model for other colleagues.”^{6(p.167-168)} The posters were placed in high-traffic areas of the hospital, every medical professional that treated patients was observed on a daily basis for one to two weeks of each quarter by infection control nurses who noted every opportunity to perform hand-washing, and educational sessions were performed twice per year with emphasis placed on perceived subjective normative value. As a result, the hand hygiene among doctors and nurses improved from 19.0% to 74.5% and 52.3% to 91.2% respectively.

Aron et al⁷ conducted a one to one randomized, controlled, non-blinded trial to “determine the impact of a multimodal educational program on the application of guideline-based treatment regimens for patients with heart failure compared with passive dissemination of educational materials alone without training.”^{7(p.246)} The study design split the physicians within four clinics into two separate groups. Those in the trained (T) group received a “direct” preceptorship for additional training on top of attending didactic modules, whereas those in the control (C) group only received American Heart Association/American College of Cardiology guidelines and performance measures. Ultimately, the researchers were looking for two separate end points

for “optimal medical therapy,” that would both demonstrate improved adherence by physicians. Aron et al reported, “... a didactic program of HF quality improvement coupled with a preceptorship changed practice patterns only modestly, as evidenced by reduction in loop diuretic doses in the setting of Veteran Affairs (VA) primary care physicians.”^{7(p.252)} Although the results were not decisive, it appeared as if there were several factors that could have altered the outcomes, the training sessions seemed to be more effective on physicians that practiced within the hospital.

The implementation method that has been chosen to effectively promote changes in health behaviors, among oncologists and PCPs, is the incorporation of continuing education on the use of an algorithm to deliver successful cancer survivorship plans for patients. The application of continuing education courses will promote confidence among the clinicians, and provide them with the pertinent information and resources that will compliment their clinical decision making skills, to ensure that the treatment care plans provided for cancer survivors are of the highest quality.

Table 5 – Summary of Literature Review Concerning Evidence for Proposed Methods of Program Delivery

Author	Publication Date	Purpose	Data Sources	Conclusions
Chung MJ, Kang HJ, Kim YK, Lee J, Lee JH, Lee SS, and Park SJ	2014	Investigated any improved compliance with handwashing, secondary to hand hygiene programs, that could alter the perception of medical professionals	Direct observation of medical professions within the hospital, on a quarterly basis, and self-perception questionnaires	Determined that medical personnel within the hospital demonstrated improved perception following the hand hygiene program
Aron D, Bruckman D, Davidson M, Gee J, Hitch J, Lance C, Ober S, Piña IL, Schaub K	2012	Investigated whether the NHeFT education program would change the practice of PCPs that treated patients with heart failure	1:1 Randomized Controlled Trial (Non-Blinded)	Determined that the NHeFT education program improved the treatment of patients with heart failure and modestly changed practice patterns

References:

1. Alfano CM et al. Cancer Survivorship and Cancer Rehabilitation: Revitalizing The Link. *Journal of Clinical Oncology*. 2012: 30(9): 904-906.

2. Bellizzi KM et al. Health Behaviors of Cancer Survivors: Examining Opportunities for Cancer Control Intervention. *Journal of Clinical Oncology*. 2005; 23(34): 8884-8893.
3. Chambers SK et al. Using the Theory of Planned Behavior To Understand Health Professionals' Attitudes and Intentions To Refer Cancer Patients For Psychosocial Support. *Psycho-Oncology*. 2012; 21: 316-323.
4. Smith WR. Evidence for The Effectiveness of Techniques To Change Physician Behavior. *CHEST Journal*. 2000; 11(8): 8S-17S.
5. Glanz K and Bishop DB. The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annual Review of Public Health*. 2010; 31: 399-418
6. Chung MJ et al. Improved Hand Hygiene Compliance Is Associated With The change of Perception Toward Hand Hygiene Among Medical Personnel. *Infection and Chemotherapy*. 2014. 46(3): 165-171.
7. Aron D et al. Quality Improvement In Heart Failure: A Randomized Educational Intervention To Change Provider Behavior. *Congestive Heart Failure*. 2012; 18: 245-253.

Section 4 - Outputs and Outcomes

Outputs:

The planning group performed a needs assessment for cancer survivorship care in the state of Maine with the Maine Cancer Consortium and 15 Maine hospitals with oncology services (Appendix 2) via phone calls and email communication (Appendix 3). The group also interviewed the Executive Director of Casco Bay branch of the YMCA of southern Maine and the Director of Mission Services at the Cancer Community Center in South Portland to assess current utilization and practices of community wellness services. The group determined proposed best practices for delivering quality care to Maine cancer survivors by interviewing staff at the Dana Farber Cancer Institute and Maine Medical Center Cancer Institute and also by conducting literature searches. The collective information from these interviews and literature searches served as the foundation for the Cancer Survivorship Rehabilitation Algorithm for cancer survivors in Maine (Appendix 1). The group will present the algorithm to their partners (Appendix 4) who are the relevant stakeholders. We will measure this output by the number of partners who attend our presentation.

Outcomes:

Please refer to Maine Cancer Care Logic Model for complete list of short, medium and long term outcomes (Appendix 4).

Short Term:

Learning and awareness will be measured by questionnaires administered pre and post educational sessions. These questionnaires will assess knowledge on the scope of rehabilitation and wellness services in order to have confidence in making the appropriate referral as well as prompting the patient to take advantage of such resources.

Medium Term:

The integration of rehabilitation and wellness services will be measured by the number of healthcare professionals who adopt our Cancer Survivorship Rehabilitation Algorithm, the number of referrals to rehabilitation and wellness services generated and patient attendance/commitment to these services.

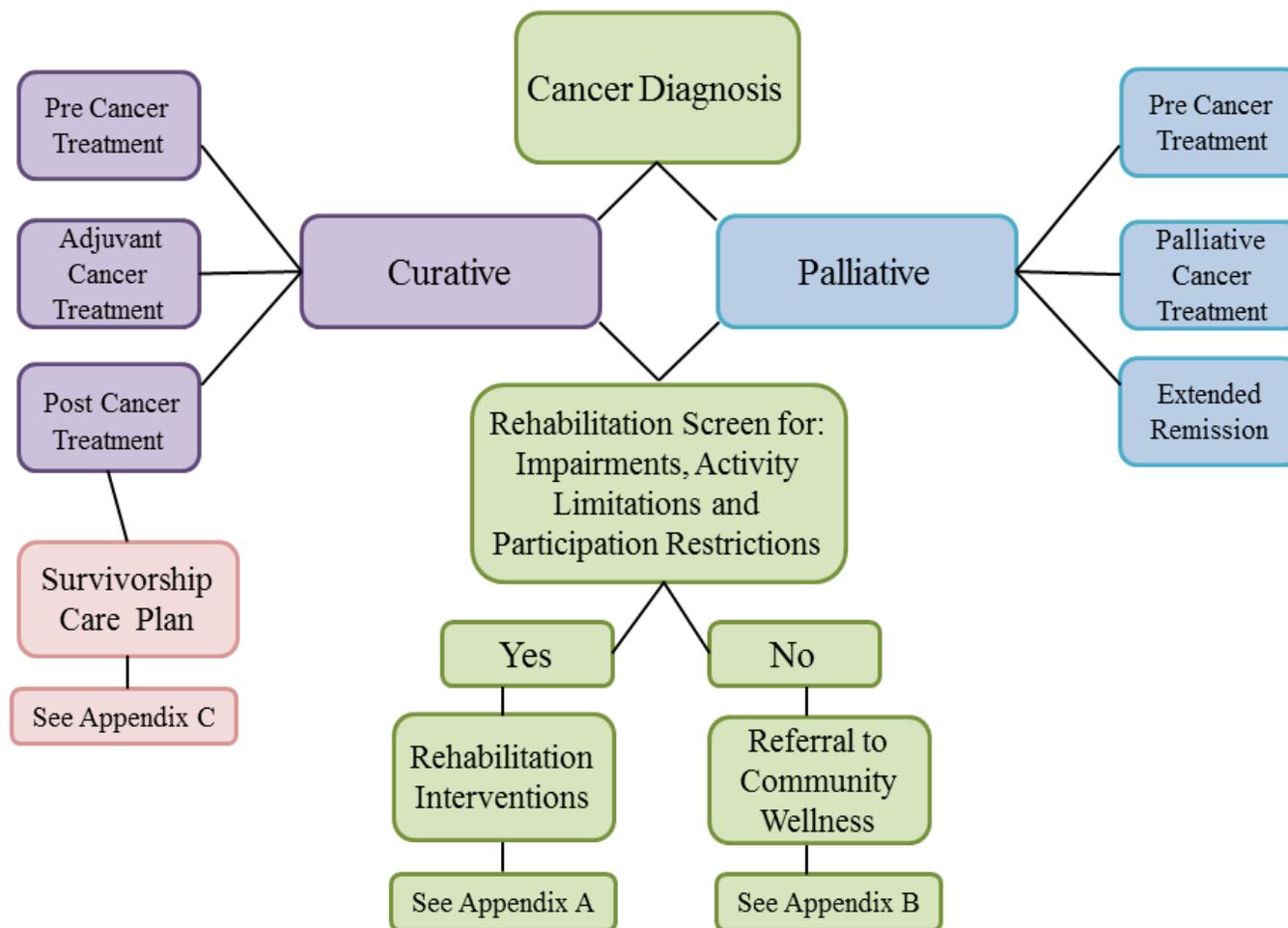
Long Term:

Standardization of rehabilitation and wellness services will be measured by reassessing baselines in 2020 for goal 14 in the Maine Cancer Control Plan. Assessments will be made through the Maine Cancer Consortium's Activity Tracker, as well as phone calls and emails to cancer treating hospitals, as needed.

Decreased public healthcare financial burden will be measured by annual economic assessments.

The quality of life of cancer survivors will be measured by annual quality of life outcome assessments.

Cancer Survivorship Rehabilitation Algorithm



The branches off curative and palliative show that there are 3 distinct points in time in which rehabilitation is appropriate for a cancer survivor. It is important to acknowledge which stage a patient is in to understand what their impairments may be.

Appendix 1A – ICF Model

International Classification of Functioning, Disability and Health (ICF) Model for Oncology

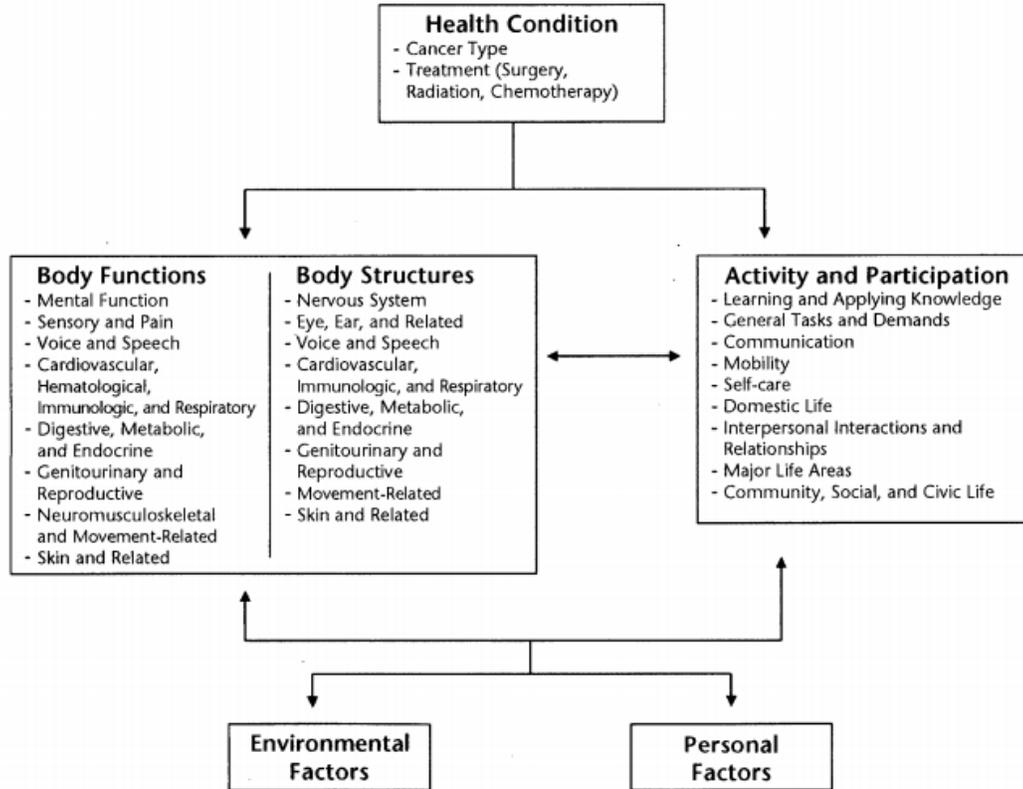


Figure. International Classification of Functioning, Disability and Health (ICF) model²⁴ modified for populations of people with cancer. Modified and reprinted with permission of the World Health Organization from: *International Classification of Functioning, Disability and Health: ICF*. Geneva, Switzerland: World Health Organization; 2001.

Gilchrist LS, Galantino ML, Wampler M, Marchese VG, Morris GS, Ness KK. A framework for assessment in oncology rehabilitation. *Phys Ther*. 2009;89(3):286-306.

Appendix 1B – Community Health and Wellness Assessment

Community Health and Wellness Programs

Examples of programs currently available to the Casco Bay community:

Livestrong program at Freeport YMCA:

- 12 week program
- 2 meetings per week for 75 minutes
- Maximum class size of 12 participants with 2 trainers
- Includes a complimentary 12 week family membership to the Freeport YMCA
- Staff trained in supportive cancer care help participants to gain strength, flexibility, endurance, and energy and to lose unwanted weight
- Supportive environment
- Free of charge

Cancer Community Center in South Portland:

- Program calendar includes several styles of yoga, circuit training, Pilates, stability ball, Tai Chi, dance, meditation, crafts, and support groups
- Supportive community environment
- Programming offered to survivors, family, and friends
- Free of charge

Appendix 1C – Survivorship Care Plan

What is a survivorship care plan?

A **Survivorship Plan** is an individualized care packet that includes guidelines for monitoring and maintaining a patient’s health as they move beyond their cancer treatment. It aides in recording the details of cancer treatment, discussing post treatment needs with a health care provider, gaining awareness of short and long term side effects post treatment and developing a plan to address needs and concerns of post treatment survivorship and follow-up care.

What should a Survivorship Plan include?

Diagnostic tests performed and results.

- Tumor characteristics (e.g., site(s), stage and grade, hormonal status, marker information).
- Dates of treatment initiation and completion.
- Surgery, chemotherapy, radiotherapy, transplant, hormonal therapy, gene or other therapies provided, including agents used, treatment regimen, total dosage, identifying number and title of clinical trials (if any), indicators of treatment response, and toxicities experienced during treatment.
- Psychosocial, nutritional, and other supportive services provided.
- Full contact information on treating institutions and key individual providers.
- Identification of a key point of contact and coordinator of continuing care.

Standards of Care

Upon discharge from cancer treatment, every patient and their primary health care provider should receive a written follow-up care plan incorporating available evidence-based Standards of care.

This should include, at a minimum:

- The likely course of recovery from treatment toxicities, as well as need for ongoing health maintenance/adjuvant therapy
- A description of recommended cancer screening and other periodic testing and examinations, and the schedule on which they should be performed (and who should provide them).
- Information on possible late and long-term effects of treatment and symptoms of such effects.
- Information on possible signs of recurrence and second tumors.
- Information on the possible effects of cancer on marital/partner relationship, sexual functioning, work, and parenting, and the potential future need for psychosocial support.
- Information on the potential insurance, employment, and financial consequences of cancer and, as necessary, referral to counseling, legal aid, and financial assistance.
- Specific recommendations for healthy behaviors (e.g., diet, exercise, healthy weight, sunscreen use, virus protection, smoking cessation, osteoporosis prevention). When appropriate, recommendations that first degree relatives be informed about their increased risk and the need for cancer screening (e.g., breast cancer, colorectal cancer, prostate cancer).

- As appropriate, information on genetic counseling and testing to identify high risk individuals who could benefit from more comprehensive cancer surveillance, chemoprevention, or risk reducing surgery.
- As appropriate, information on known effective chemoprevention strategies for secondary prevention (e.g. Tamoxifen in women at high risk for breast cancer; aspirin for colorectal cancer prevention).
- Referrals to specific follow-up care providers, support groups, and/or the patient's primary care provider.
- A listing of cancer-related resources and information (Internet-based sources and telephone listings for major cancer support organizations).

Cancer Survivorship Care Planning. *Institute of Medicine of the National Academies*. November, 2005.

Appendix 2 – 15 Maine Cancer Treating Hospitals Reached

1. Aroostook Medical Center, Presque Isle
2. Blue Hill Memorial Hospital, Blue Hill
3. Cary Medical Center, Caribou
4. Eastern Maine Medical Center, Bangor*
5. Franklin Memorial Hospital, Farmington
6. Maine Medical Center, Portland*
7. Mayo Regional Hospital, Dover-Foxcroft
8. Mercy Hospital, Portland*
9. Midcoast Hospital, Brunswick
10. Penobscot Bay Medical Center, Rockport*
11. Southern Maine Health Care, Biddeford*
12. St. Mary's Regional Medical Center, Lewiston*
13. Stephen's Memorial Hospital, Norway
14. Waldo County Hospital, Belfast
15. York Hospital, York*

*American College of Surgeons Accredited Cancer Centers in Maine (as of November 2014)

Appendix 3 – Questions to Maine Cancer Treating Hospitals

1. Does your organization either coordinate or attend any educational programs or workshops for practitioners related to cancer rehabilitation or survivorship. And if so, can you provide some specifics (such as who, what, where and when)?
2. Do you have rehabilitation services? What is your relationship with the PT department?
3. Do you have a patient navigator? If no, do you have plans to create one or do you have anyone who assists patients and families throughout all phases of the cancer experience...and what is their title?
4. Does your cancer team use quality of life measures (distress, pain, ect)?
-If so, what tool or template do you use? How do you use that information?
5. Do you offer any transportation or lodging to your cancer survivors to access treatment? Do you offer or refer your patients to wellness programs such as Livestrong Program at the YMCA?
6. How do you define “cancer survivorship”?
7. Do you offer other services to cancer survivors such as access to psychosocial services, nutritional services or physical activity programs?
8. What services do you offer for children and adolescent cancer survivors and their families?
9. Do you use patient satisfaction measures? What measures do you use?
10. Do you provide a written survivorship care plan to patients AND primary care providers at the end of treatment? If so, can you provide us with the template you use?
11. Have you been tracking your activity, such as educational lectures, health fair involvement or advocacy efforts, with the Maine Cancer Consortium Activity Tracker? Found at:
<http://www.maineccancerconsortium.org/cancer-plan/report-on-your-past-activity/>

Appendix 4 – Maine Cancer Survivorship Care: an Emphasis on Rehab Logic Model

Maine Cancer Survivorship Care: An Emphasis on Rehabilitation Logic Model

