An Interdisciplinary Cancer Rehabilitation Program In a Tertiary Care Hospital Setting: A Retrospective Analysis of the Impact on Patients' Health-Related Quality of Life

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ABSTRACT

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A growing number of patients affected by cancer and its treatments need to improve their physical wellbeing and quality of life. To address these vital needs, cancer rehabilitation programs have been developed to help with the patients' symptom burden and physical and psychological status. However, these programs are missing a personalized patient assessment and a systematic categorical intake system placing patients into rehabilitation pathways based upon disease severity. This study retrospectively evaluated the impact of the interdisciplinary Cancer Rehabilitation (CARE) Program on health-related quality of life, by monitoring the following assessments: the abridged Patient-Generated Subjective Global Assessment, Edmonton Symptom Assessment System, Fatigue Symptom Inventory, Distress Screening Tool, and the Modified Community Healthy Activities Model Program for Seniors. Cancer outpatients (n=115) were divided into three pathways (Restorative, Supportive or Cachexia) based on their prognosis and needs. The assessments were measured between and within each pathway; at baseline, pre-post program and over time. Baseline differences by pathway were determined by a series of general linear models. Mixed models were used to examine time differences from pre-post program in all pathways and, as a function of pathway over follow up visits. Overall, patients showed a significant improvement in total malnutrition score and a trend of progress for appetite status, on the account of the program. Quality of life and symptom profile varied across cancer patients at different stages of their disease. Interdisciplinary cancer rehabilitation programs need to be organized around those characteristics to personalize their interventions and significantly improve patient quality of life.

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Table 1. Abbreviations of Terms

ACS	Anorexia-Cachexia Syndrome
ANOVA	Analysis of variance
aPG-SGA	Abridged Patient - Generated Subjective Global Assessment
AUC	Area Under the Curve
BSI-18	Brief Symptom Inventory - 18
CARE	Cancer Rehabilitation
CRP	C-Reactive Protein
DST	Distress Screening Tool
DT	Distress Thermometer
DXA	Dual-energy X-ray Absorptiometry
ECOG	Eastern Cooperative Oncology Group
ESAS	Edmonton Symptom Assessment System
FACT	Functional Assessment Cancer Therapy
FACIT-TS-PS	Functional Assessment of Chronic Illness Therapy - Treatment Satisfaction - Patient Satisfaction
FORD	Free Oxygen Radicals Defense
FORT	Free Oxygen Radicals Test
FSI	Fatigue Symptom Inventory
FU	Follow-up
GIT	Gastrointestinal Tract
GLM	General Linear Model
HADS	Hospital Anxiety and Depression Scale
HRQoL	Health-Related Quality of Life
IES-R	Impact of Event Scale - Revised
JGH	Jewish General Hospital
KPS	Karnofsky Performance Score
m-CHAMPS	Modified Community Healthy Activities Model Program for Seniors
MGH	Montreal General Hospital
MNUPAL	McGill Nutrition Performance Laboratory
MSAS	Memorial Symptom Assessment Scale
MUHC	McGill University Health Centre
NCCN	National Comprehensive Cancer Network
OACIS	Open Architecture Clinical Information System
PG-SGA	Patient-Generated Subjective Global Assessment
POMS-F	Profile of Moods States - Fatigue subscale
QoL	Quality of Life
RVH	Royal Victoria Hospital
SAS	Statistical Analysis Software
SCL-90	Symptom Checklist 90
SD	Standard Deviation
SE	Standard Error
SF-36	Short Form (36) Health Survey
WBC	White Blood Cell

6MWT	6-minute walk-test

1.0 Introduction:

In 2012, the worldwide incidence of cancer increased to approximately 14 million cases per year, and throughout the next 20 years, it is anticipated to progressively increase to 22 million. Although the annual cancer mortality rate has been forecasted to increase from 8.2 to 13 million cases, more people will be living with cancer (Gaudin, 2014). Within Canada, roughly 2 in 5 Canadians will develop cancer, and 1 in 4 will die from it. Perhaps more importantly, nearly two thirds (63%) of Canadians with cancer will survive at least 5 years after their diagnosis, and this survival statistic will most likely increase in the years to come (Canadian Cancer Society, 2015). In the province of Quebec, also in 2015, there were 50,100 newly diagnosed cases of cancer, and about 20,900 people died of cancer (Canadian Cancer Society: Quebec, 2015).

The worldwide, national and local trends of increasingly higher cancer incidence rates, from the last 30 years, are chiefly a result of demographic growth and the aging of the population. With people living longer, there will be a growing number of patients that will fall within a new cohort treatment category of geriatric oncology (Quebec and Canadian Cancer Statistics, 2013). Earlier diagnoses and more effective cancer treatments have resulted in greatly improved survival rates thus allowing patients to live longer with the disease. However, as a consequence of living longer, the survivors are being challenged with other co-morbidities (e.g., cardiovascular disease, diabetes) as well as the burden of numerous cancer-related symptoms and secondary complications related to cancer and its treatments (Custodio, 2011). A larger majority of cancer patients will most likely experience a decline in physical functioning or QoL throughout the course of their disease (Franklin et al., 2010). Considering that cancer is now being recognized as a long-term illness dependent upon disease management, there is a great need for specific rehabilitation interventions for cancer survivors (Spence et al., 2010) with evidence-based practices that combine clinical/professional expertise, patient values and input, and the best research evidence. Figure 1 describes how these important components are interconnected to formulate the evidence-based practices that comprise the better programs.

Figure 1: Evidence-Based Practices (EBP) Process

Image Retrieved from:
http://hatetoloveresearch.blogspot.ca/2010/12/on-using-evidence-based-practice-as.html

There is an accumulating amount of scientific evidence demonstrating that cancer rehabilitation is becoming an essential component of the supportive care to allow patients to experience a better QoL and improve their physical and psychological status (McIntyre, 2012; Gamble et al., 2011). Though, psychological problems are often less evident or acknowledged by the physician or patient, they occur just as often as physical struggles in cancer patients. In addition, physical ability decline oftentimes further provokes psychological distress (Stein et al., 2008).

The health care system recognizes that patients affected by cancer and its treatments, require improvements in functional status and QoL. However, there are minimal resources available and a wide diversity of cancer rehabilitation programs. Many have debated that these programs should be provided outside of the cancer clinics in a tertiary care hospital setting because it is costly with unknown outcomes (Berg et al., 2014). The prominent issues surrounding the lack of available cancer rehabilitation programs include: lack of funding and resources, lack of accessibility, no official definition of cancer rehabilitation services, lack of specific implementation plans, lack of trained cancer rehabilitation physicians and therapists, and failure to educate referring health care professionals (Berg et al., 2014). Additional issues involve a greater focus on well-established preventive or curative treatments, time constraints and a lack of coordination for this type of care (Cole et al., 1999). Seeing as the high demand for cancer rehabilitation is currently not being satisfied by the public health care system, further resources are required (Berg et al., 2014). Private foundations can become more committed to

multimodal care, and scientists should help public funding sources acknowledge the importance of research in multimodal care (MacDonald et al., 2013).

Fortunately, there has been a gradual rise in promoting patient centered cancer care over the past forty years. Health care professionals are starting to take into account patients' concerns, needs and QoL, as opposed to solely focusing on a disease-centered approach with mainly survival-related outcomes. The editorial of Ben-Arye and Samuels further indicates that there is a current unmet need to address the way patients view their disease; the actual cancer treatment process; the interaction with spouses, parents, children and other caregivers; and the barriers of communication with health care providers (Ben-Arye and Samuels, 2015).

In an attempt to address the previously mentioned unmet needs of cancer patients, the MUHC has been instrumental in initiating a unique cancer nutrition rehabilitation program and throughout the last 14 years, the program has evolved and underwent significant change with the most recent version of the program centralized within the Division of Supportive and Palliative Care at the MGH and MNUPAL. The program now known as CARE endeavors to help each cancer patient maximize their physical, nutritional and cognitive functioning, after the debilitating effects of the disease and its treatment. The goal of this program is to have patients take better control of their lives by improving their functional status and QoL, through the help of an interdisciplinary team. Using a personalized approach of information delivery, patients will be educated regarding symptom control, prescription of exercises, suggestions for behavioral modification, and psychological support by specifically trained health care professionals. Patients and their family will be empowered to improve their QoL and performance during different stages of their cancer trajectories.

2.0 Literature Review

Table 2a summarizes certain key features of rehabilitation programs taking place in Europe and Australia.

Table 2a. Europe and Australia cancer rehabilitation programs

Study ID	Program Name & Location	Population Sample	Study Design/ Purpose	Time Period	Results	Conclusion
Vasile et al., 2014 *Title: Dedicated supportive care team at the oncology unit: a model of simult-aneous care for cancer patients.*	Integrative supportive care program - In the ambulatory room integrated into the oncology unit Pisa, Italy	- 700 oncology unit patients with complica-tions from cancer treatment	To manage the symptoms & toxicities suffered by cancer patients	- Data collected for 8 months - Team works 6 days/ week	- only 5.5% of patients required further in-hospital stay ↓cancer inpatient costs	- only 10% patients would need un-scheduled hospital visits - To ↑ patient admission, localize ambulatory for supportive care into the oncology unit
Bertheusse n et al., 2012 *Title: Feasibility and changes in symptoms and functioning following inpatient cancer rehab-ilitation.*	- Inpatient rehab program Trondheim, Norway	- 163 (mainly breast) cancer survivors having completed primary care treatment	- An open prospect-ive interven-tion study Multidisci-plinary program of: physical training patient education group sessions	Subject assess-ments at: - 3 week primary stay (TO) - 1 week FU stay 8-12 weeks later (TO) - 6 months after T1 (T2)	T0-T2: ↑ physical exercise level & work status T0-T1: ↑ symptoms & functioning ↓ fatigue ↑ exercise & physical perform-ance	- Feasible rehab program
Glare et al., 2011	Multi-disciplinary Cancer	- 41 (mainly lung &	- Open prospect-ive pre-	- 2 month particip-	Improve-ment in: - median	- Beneficial program for patients

Title: Establish-ing a cancer nutrition program for ambulatory patients attending an Australian cancer center.	Nutrition Rehab-ilitation Program (CNRP) Camper-town, Australia	GIT) cancer patients	post evaluation To manage the ACS with individual-ized inter-ventions in: - nutrition - exercise - symptom manage-ment	ation was evaluat-ed - Endpoint of the study was at a 2 month FU	weight - KPS -endurance - strength - ESAS score - CRP levels	with advanced cancer & ACS

The Italian integrative supportive care program of Vasile et al. is in an ambulatory room incorporated into an oncology unit. This particular team worked 6 days/week and saw planned and unplanned cancer patients with treatment complications. Interesting conclusions from this study include: only 5.5% of patients were further hospitalized, 10% of patients would need unscheduled hospital access for supportive care, and having an ambulatory for supportive care localized into the oncology unit encourages a more rapid admission of patients for management of symptoms and toxicities (Vasile et al., 2014). The 3+1 week multidisciplinary inpatient cancer rehabilitation program that Bertheussen et al. studied assessed its feasibility for cancer survivors. The program included physical training, patient education and group sessions. The study concluded that this program was not only feasible, but the patients' symptoms and functioning stabilized after rehabilitation (Bertheussen et al., 2012). The goal of the 8-week Australian CNRP was to manage the ACS with individualized interventions in nutrition, exercise, and symptom management. The staff consisted of a physician, dietitian and physical therapist. Moderate improvements were found in median weight, KPS and ESAS scores, strength and endurance, and CRP levels (Glare et al., 2011).

Table 2b summarizes certain key features of rehabilitation programs taking place in Texas, United States.

Table 2b. Texas cancer rehabilitation programs

Study ID	Program Name & Location	Population Sample	Study Design/ Purpose	Time Period	Results	Conclusion
Rhondali et al., 2014 *Title: Association between supportive care interventions and patient self-reported depression among advanced cancer outpatients*	Outpatient Interdisciplinary Supportive Care Center Houston, Texas, USA	- 444 patients advanced GIT cancer patients	- An open prospective study <u>Types of clinic visits:</u> - new consultations - FU visits - walk-in visits for symptom management - Follow a standardized management plan	- Data collected for 2 years on consecutive patients with at least 1 FU visit	- 50% of patients with moderate/ severe patient self-reported depression improved after an initial visit	
Shin et al., 2011 *Title: Inpatient cancer rehabilitation*	- MD Anderson Cancer Center Acute inpatient interdisciplinary rehab unit Houston, Texas, USA	- 427 cancer patients from a wide variety of tumor types (mostly primary neurologic & hematologic based tumors)	Retrospective review of inpatient medical records <u>Main goal:</u> discharging patient to home setting	- Data collected for 1 year from consecutive inpatients Mean length of stay: 11 days	- 76% of patients were discharge	- Active inpatient rehab unit within a national comprehensive center discharges more than ¾ of its patients

Rhondali et al. studied an outpatient Supportive Care Clinic for 2 years. The team consisted of physicians and registered nurses specialized in palliative care, pharmacists, nutritionists, chaplains, social worker, psychiatric nurse-counselor and wound care nurse. Interestingly enough, more than half of the cancer patients with moderate to severe self-reported depression significantly improved after one visit (Rhondali et al., 2014). Shin et al. studied the acute inpatient interdisciplinary rehabilitation unit in the MD Anderson Cancer

Center for 1 year. This unit had the main goal of discharging cancer patients to their home setting. With the help of a physiatrist; nurse practitioner and rehabilitation nursing specialist; physical, occupational and speech therapist; nutritionist; pharmacist; case manager and chaplain, the clinic was able to successfully discharge home 76% of its patients (Shin et al., 2011).

Table 2c summarizes certain key features of rehabilitation programs taking place in Ontario and Quebec.

Table 2c. Ontario and Quebec cancer rehabilitation programs

Study ID	Program Name & Location	Population Sample	Study Design/ Purpose	Time Period	Results	Conclusions
Chasen et al., 2013 *Title: An interprofessional palliative care oncology rehab-ilitation program: effects on function and predictors of program completion*	- Palliative Interprofessional Rehabilitation Program Ottawa, Ontario, Canada	- 116 advanced cancer patients who had finished anti-cancer therapy	- To ameliorate disease effects and improve patient functioning	- Data collected before & after 8 week program - 3 hour initial assessment, each professional has 30 minutes with the patient	↑physical performance &endurance ↓ symptom severity ↓symptom inference with functioning ↓fatigue ↑nutrition ↑mobility & balance	- Program completion can be predicted by a normal level of CRP
Gagnon et al., 2013 *Title: A prospective evaluation of an interdisciplinary nutrition-rehab-ilitation program for patients with advanced cancer*	- McGill Cancer Nutrition Rehabilitation Program Montreal, Quebec, Canada	- 188 advanced cancer patients	Uncontrolled prospective intervention study	- Data collected pre-post to the 10-12 week interdisciplinary program for 3.75 years - 3 hour initial assessment, each	↓severity of weakness, depression & distress ↑ 6MWT, maximum gait speed, coping ability & QoL ↑↑physical & activity dimensions of fatigue	- This program benefits advanced cancer patients and should be considered part of standard palliative care

				profess-ional has 30 minutes with the patient		
Eades et al., 2013 *Title: Effect of an interdiscip-linary rehab-ilitation program on quality of life in patients with head and neck cancer: review of clinical experience.*	- Cancer Rehab-ilitation Service (RVH) Montreal, Quebec, Canada	- 27 head & neck cancer patients	- A pre-liminary un-controlled study	- Data collected before & after an 8 week interdiscip-linary (nutrition-rehab-ilitation) program - 3 hour initial assess-ment, each profess-ional has 30 minutes with the patient	(clinically meaningful) ↓severity of insomnia, pain, weakness, anorexia, depression & distress ↑ QoI ↑ 6MWT	- 78% of patients maintained/ ↑ body weight - No change in symptom interference with function
Kasymjanova *et al., 2013*	- Peter Brojde Lung Cancer Centre program (JGH) Montreal, Quebec, Canada	- 33 lung cancer patients	- a prospect-ive, un-controlled observa-tional study	- All patients received 45-minute sessions of acu-puncture, 1–2 times weekly for a minimum of 4 sessions	<u>Pre-post acu-puncture</u>: (statistically significant) ↓ pain ↑appetite ↓nausea ↓nervous-ness ↑well-being	- First study to show that acupuncture may improve symptoms, especially pain and well–being (*clinically important improvement*)

Chasen et al. studied the 8-week interprofessional Palliative Rehabilitation Program in Ottawa, with the main goal of improving patient functioning. The team comprised of a physiotherapist, occupational therapist, social worker, dietitian, nurse and physician. Some improvement was shown in decreasing symptom burden and daily interference, and increasing nutritional, physical and functional status. Additionally, normal CRP levels were shown to predict program completion (Chasen et al., 2013). In Montreal, Gagnon et al. studied a similar type of program for 3.75 years, which yielded similar results. That team concluded that an interdisciplinary program of that nature should be considered as a standard part of palliative care, as it shows some benefits for advanced cancer patients (Gagnon et al., 2013). Lastly, the 8-week interdisciplinary Cancer Rehabilitation Service at the RVH studied by Eades et al. was also quite similar to the two previous programs. The head and neck cancer patients had clinically meaningful improvements in symptom burden, distress, QoL and the 6MWT. However, there was no change in symptom interference with function. The study concluded that this type of interdisciplinary program can be of benefit to the head and neck cancer patients after treatment, however a controlled trial should be performed to better evaluate its effects (Eades et al., 2013).

The Jewish General Hospital's Peter Brojde Lung Cancer Centre presented a novel and diverse way of interpreting rehabilitation by combining integrative oncology, traditional Chinese medicine and the discipline of nursing. The whole idea behind this program was to provide patients with the opportunity of getting involved in a variety of holistic activities, under the supervision of a team of health care professionals who are familiar to the patients. Patients involved in this program had access to a family room, a conference room, a larger Qi Gong room for physiotherapy sessions, qi gong, yoga, patient and family support groups, and learning sessions on various topics such as nutrition, healthy lifestyles, Chinese herbs and supplements, meditation, music, and art. The idea of having this program within the hospital setting was to ensure patient safety and program compliance. If these complementary therapy services were located elsewhere, perhaps, patients would be less inclined to attend (Grossman et al., 2012). Kasymjanova et al. from the Peter Brojde Lung Cancer Centre program, took a holistic approach to alleviate patient sequelae and were the first to show that acupuncture might be effective at relieving certain symptoms in lung cancer patients. Patients who received 45-minute sessions of acupuncture, once or twice weekly for a minimum of 4 sessions, showed improved ESAS scores for pain and well-being (Kasymjanova et al., 2013).

Cancer survivors of all ages, from young adolescents to older adults, have difficulty performing the same level of physical activity, as they once were able to complete. Murnane et al. were able to demonstrate that the adolescents and young adults unable to perform physical activity guidelines showed a worse QoL (Murnane et al., 2015). In terms of the pediatric and older adult cancer population, evidence from previous research has shown that there is an association between physical activity and improved QoL, health-related fitness and survival outcomes (Conn et al., 2006; Cramp & Daniel, 2008; Schmitz et al., 2005; Knols et al., 2005; Huang & Ness, 2011). In addition, when exercise was prescribed either throughout or after cancer treatment, it was shown to be an effective intervention, whereby, it ameliorated cardio-respiratory fitness, treated side effects (e.g., fatigue) and enhanced QoL and psychological well-being for adult cancer patients (Dimeo et al., 1999; Galvao & Newton, 2005; Jacobsen et al., 2007; Hayes et al., 2009). For those reasons, interventions encouraging and educating physical activity and healthy lifestyle behaviors is of utmost importance to QoL of cancer survivors in the long-term (Murnane et al., 2015).

Looking at the Gudbergsson et al. review of a multitude of published randomized controlled trials from 1990 to 2011 on cancer rehabilitation, their main findings include that: program content and patient samples were not homogeneous; there were a scarce number of studies that use a combination of rehabilitative efforts to accommodate the many disabilities of patients; a lack of adequately described baseline disease and functional impairments; a lack of statistical power and large enough sample sizes to perform group comparisons; there were no determined long-term beneficial or unfavorable effects associated to interventions mostly due to lack of or brief FU duration; lack of attrition analyses and external validity issues (Gudbergsson et al., 2015). Recommendations from both Scott et al. and Gudbergsson et al. to researchers creating randomized controlled trials for cancer rehabilitation programs, involve providing more systemic and specific details on the sampling, statistical power, attrition, and disease/treatment characteristics (e.g., time from diagnosis to interventions, cancer treatment received, and disease/treatment status during the intervention period) (Scott et al., 2013 & Gudbergsson et al., 2015). Several conclusions derived from Gudbergsson's review were that overall studies looking at cancer rehabilitation programs need to be: more methodologically detailed; multidimensional; under a stricter type of organization and systemic data collection; as well as, evaluate and look more closely at outcomes concerning the cancer patient's actual physical, psychological and social limitations versus tending mostly to secondary prevention, lifestyle changes and

supportive care (e.g., addressing risk factors for a future disease burden caused by the cancer and/or its treatment) (Gudbergsson et al., 2015).

Silver et al. published a review looking at the management of palliative care programs, as well as assessing physical function. Research has shown that palliative care has only recently been integrating a physical rehabilitation component to their programs (Silver et al., 2015). Salakari et al. reviewed thirteen randomized controlled trials published in 2009-2014, and found the following significant improvements in advanced cancer patients receiving both physical rehabilitation and palliative care: physical performance, general well-being, QOL, fatigue, general condition, mood, and coping with cancer (Salakari et al., 2015). Other studies suggest that palliative care services may lead to less emergency department visits, rehabilitation may prevent hospital-acquired disability, and prehabilitation may improve outcomes and decrease costs. The overall consensus is that more data needs to accumulated and more randomized controlled trials need to be published, however, the current information available to us suggest that rehabilitation may be recommended for cancer patients (Silver et al., 2015).

Loh and Musa conducted a systemic review, also in 2015, concerning the rehabilitation of breast cancer patients after surgery. They concluded that the currently used programs have concentrated more on performance based and/or physical components (e.g., physical impairments/ dysfunctions), and evidence does show that exercise-focused programs helped breast cancer patients with shoulder mobility and lymphedema. On the other hand, the review demonstrated that those same programs displayed unconvincing improvements in non-physical sequelae (e.g., psychosocial, cognitive, occupational, and broader lifestyle performance factors) (Loh and Musa, 2015).

In essence, a noteworthy number of patients affected by cancer and its treatments are in need of improving their physical, functional and QoL status. In order to address these crucial needs, cancer rehabilitation programs have been developed to help deal with the patients' symptom burden, functional loss, and physical and psychological status. The majority of rehabilitation programs used a combination of self-reported questionnaires and functional tests to assess the overall wellbeing of the patient. Although these programs have reported marginal to moderate levels of success in terms of the overall improvements in a mixed patient population, what appears to be missing is a more personalized approach to patient assessment along with a systematic categorical intake system that places patients into assessment streams based upon disease severity.

3.0 History and Development of the CARE Program

The first 4 years (2002-2006): In 2002, the McGill Cancer Nutrition-Rehabilitation Service was established with the ambitious goals to care for cancer patients suffering from poor appetite, malnutrition, weight loss, fatigue and loss of function. The team behind this program believed that nutritional counseling, together with an exercise program and dedicated symptom control, would improve QoL and functioning in advanced cancer patients. It was intended for early palliative care, for those with a possibly fatal cancer (Gagnon et al., 2013). The program was placed in the Division of Palliative Care and the Department of Oncology (McGill University and the Sir Mortimer B. Davis-JGH), and the Department of Medicine at the McGill University Health Centre (MUHC). Initially, the Cancer Nutrition-Rehabilitation Service began operations in the Pulmonary Division of the Sir Mortimer B. Davis-JGH. The clinic operated 2 days/week with more focus on personalized nutritional counseling and the administration of nutritional supplements to combat the loss of appetite and weight. After some development, it expanded and moved to the MUHC-MGH in December of 2003. Subsequently, the MUHC-MGH clinic relocated to the RVH, and in January 2006 launched the new Cancer Nutrition-Rehabilitation Program (part of the Department of Oncology at the MUHC) (Jagoe & Chasen, 2007).

The next 6 years (2006-2012): The new clinic operated 1.5 days/week with a multidisciplinary team consisting of an oncologist/palliative care physician, a psychologist, a nurse, physiotherapist, occupational therapist, dietician and social services worker. The treatment plans from this program emphasized individualized physical rehabilitation to counter fatigue and loss of function, and psychological programs, in addition to nutrition. At this point in time, patients were not separated into distinct rehabilitation streams based upon predicted survival, rather the program accepted mostly advanced cancer patients including those with cachexia. Unfortunately, the program had relatively low patient enrolments and, in the opinion of the Oncology Mission, had minimal reported costs/benefits (Jagoe & Chasen, 2007).

The last 4 years (2012-the present): The program relocated back to the MGH in late 2012 and at the present time, it is included within the Supportive and Palliative Care Service of the MUHC at the MNUPAL location. This last relocation came with a new name (CARE Program) and the opportunity to revise, change and make the program more efficient with the hope of recruiting and benefiting more patients. The CARE currently operates 2 days/week and the team consists of a physician specialized in palliative care, a head registered pivot nurse, a physiotherapist, an occupational therapist, and a dietician. Each of the professionals meets each patient on an individual basis through a series of thirty-minute appointments (please refer

to Appendix A to visualize the CARE program schedule), which has been a core feature since the inception of the original program in 2002. No definitive rehabilitation pathways have been established yet for cancer patients. A novel and unique feature of the CARE program is the fact that all the referred patients are categorized into one of the following three specific program paths/ rehabilitation pathways to meet the various specialized and personalized needs of cancer patients and survivors: 1) Restorative, 2) Supportive, and 3) Cachexia. The cancer patient's disease status, prognosis and needs determine their pathway assignment. The patient population with no signs of active disease and in need to return to their usual activities will be assigned to the Restorative group; those with active disease, undergoing oncological treatments and in need of nutritional and functional reconditioning with a prognosis of 6 months or greater will be assigned to the Supportive group; and those with non-curative intent, more advanced disease and suffering from weight loss, anorexia and fatigue with a prognosis of greater than 3 months will be assigned to the Cachexia group. Cancer cachexia is a multi-factorial wasting syndrome, which deals with a significant reduction in skeletal muscle mass, with or without the loss of adipose tissue, and is often associated with loss of appetite or anorexia (Evans et al., 2008).

In addition to the initial and final program visits, another key and essential feature of this program are the planned FU visits that each professional will have with each patient. This important addition serves to more closely monitor, to provide timely feedback, and to better treat the patients. The subjective measures chosen by the CARE team to evaluate the HRQoL of the patients enrolled in the program include the following subjective outcomes: the abridged Patient-Generated Subjective Global Assessment (aPG-SGA), Edmonton Symptom Assessment System (ESAS), Fatigue Symptom Inventory (FSI), Distress Screening Tool (DST) and the Modified Community Healthy Activities Model Program for Seniors (m-CHAMPS). Each of those measures were chosen by the CARE team members as a result of both literature recommendations and their experience to be the most appropriate assessing malnutrition, frequently experienced symptoms, fatigue, distress and physical activity levels.

A post-program evaluation is an essential step that unfortunately is often done poorly, or not done at all. As of January 2014 the CARE program is officially ongoing, however, outstandingly enough there are no measures of effectiveness with respect to subjective tests and measures performed on each patient. Therefore, this study will retrospectively evaluate whether the goals of the interdisciplinary CARE program at the MUHC were achieved by assessing the subjective outcome measures of this program along, with other demographic and

clinical characteristics. This will provide clues on which patients may have benefited the most from participating in the program and determine whether the patient made HRQoL progress on the account of the program. If there is a significant improvement in the subjective tests, it comes with the understanding that these changes may be varied even within each stream. This is customary in clinical programs of this nature in part due to the complexity of the disease state. Another important part of this study will identify if the classification of cancer patients within the three rehabilitation pathways is clinically meaningful. Ultimately, it is important to note that this is a preliminary study, to publish certain observed trends.

The primary objective of this study is to evaluate the impact of the interdisciplinary CARE program on the cancer patients' HRQoL, by monitoring their self-reported questionnaire scores. Another important objective of this study is to determine if patients referred to the three pathways were in fact different from a nutritional, functional and symptom profile perspective. Secondary objectives involve keeping track of the patient's demographic and anthropometric information and blood biochemical profile.

4.0 Research questions and hypotheses

The research questions and hypotheses have been organized in such a way as to compare the dependent (e.g., aPG-SGA, ESAS, FSI, DST and m-CHAMPS) variable responses within (intra-group) and between (inter-group) each independent variable (e.g., Restorative, Supportive and Cachexia). The intra-group comparisons will determine if there are differences in each dependent variable within each stream over time. The inter-group comparisons will determine if there are pre-post differences in each dependent variable among the three rehabilitation pathways. The following describes in detail each of the research questions with their respective hypotheses. Based upon their current tumor types and staging, patients in the Restorative group are hypothesized to demonstrate significant improvements compared to the patients in the Supportive group. Following the same rationale, patients in the Supportive group are hypothesized to demonstrate significant improvements compared to the patients in the Cachexia group.

4.1 Intra-group comparisons

Research Question 1: Will patients within the Restorative, Supportive and Cachexia groups show significant improvements over time with respect to individual scores in the aPG-SGA and ESAS, and pre-post with respect to individual scores in the FSI, DST and m-CHAMPS?

Hypothesis 1.1: Patients in the Restorative and Supportive group will demonstrate significant improvements in individual scores on the aPG-SGA (decrease) and ESAS (decrease)

over time, and on the FSI (decrease), DST (decrease & fewer checked boxes) and m-CHAMPS (decrease in sedentary activity & increase in light, moderate and heavy physical activity) pre-post.

Hypothesis 1.2: Patients in the Cachexia group will demonstrate maintained individual scores on the aPG-SGA and ESAS over time, and on the FSI (decrease), DST (decrease & fewer checked boxes) and m-CHAMPS (decrease in sedentary activity & increase in light, moderate and heavy physical activity) pre-post.

4.2 Inter-group comparisons

Research Question 2: At baseline, when comparing the aPG-SGA, ESAS, FSI, DST and m-CHAMPS questionnaire scores between each pairing of the rehabilitation programs (restorative vs. supportive, restorative vs. cachexia and supportive vs. cachexia), will the findings in the restorative group be greater than those of the supportive group, and will the supportive group have better results than the cachexia group?

Hypothesis 2.1: At baseline, the patients in the Restorative group will show a statistically higher HRQoL score compared to the Supportive group with regards to the scores of the aPG-SGA (a lower score), ESAS (a lower score), FSI (a lower score), DST (a lower score & fewer checked boxes) and m-CHAMPS (a lower score in sedentary activity & higher score in light, moderate and heavy physical activity).

Hypothesis 2.2: At baseline, the patients in the Supportive group will show a statistically higher HRQoL score compared to the Cachexia group with regards to the scores of the aPG-SGA (a lower score), ESAS (a lower score), FSI (a lower score), DST (a lower score & fewer checked boxes) and m-CHAMPS (a lower score in sedentary activity & higher score in light, moderate and heavy physical activity).

Research Question 3: When comparing the aPG-SGA and ESAS questionnaire scores over time; and the FSI, DST and m-CHAMPS pre-post, between each pairing of the rehabilitation programs (restorative vs. supportive, restorative vs. cachexia and supportive vs. cachexia), will the findings in the restorative group be greater than those of the supportive group, and will the supportive group have better results than the cachexia group?

Hypothesis 3.1: Patients in the Restorative group will show a statistically significant improvement compared to the Supportive group with regards to the scores of the aPG-SGA (a higher decrease) and ESAS (a higher decrease) over time; and of the FSI (a higher decrease), DST (a higher decrease & fewer checked boxes) and m-CHAMPS (a higher decrease in sedentary activity & increase in light, moderate and heavy physical activity) pre-post.

Hypothesis 3.2: Patients in the Supportive group will show a statistically significant improvement compared to the Cachexia group with regards to the scores of the aPG-SGA (a higher decrease) and ESAS (a higher decrease) over time; and for the FSI (a higher decrease), DST (a higher decrease & fewer checked boxes) and m-CHAMPS (a higher decrease in sedentary activity & increase in light, moderate and heavy physical activity) pre-post.

5.0 Methods

5.1 Study Design

This study had an observational retrospective design with repeated measures of the health outcomes in each patient both within and between the three rehabilitation pathways. This particular design was used to evaluate each patient's progress within their pathway and if the patient's outcomes differ between pathways. Although this research design does not randomize patients into certain groups and does not have a control group, it was effective at illustrating whether the subjective health-related outcomes in patients receiving various cancer treatments have maintained, improved or worsened. Patient outcomes were compared to their own baseline, and other health related outcomes were analyzed across the three different program streams. Please refer to Appendix B to understand how the cancer patients were separated into three distinct pathways.

5.2 Study Setting and Sample

Patients were primarily referred to this program by other professionals within the Supportive and Palliative Care Unit, that includes members of the Cancer Pain, Palliative Care, Cancer Rehabilitation and Cachexia, and Lymphedema Clinics. Any cancer specialists at the MUHC that know of the program, whether it be nurses, oncologists, surgeons, or anesthesiologists, must fill out the Cancer Care Mission's Supportive Care Program Referral Form (please refer to Appendix C the view the referral form) that identifies potential patients to the program, and then fax it to the secretary. This program referral form serves as a basis for the telephone triages to be made by the pivot nurse. The combined information gained from the referral form and telephone triage is an initial attempt to better understand the general status of the patient before the secretary books an appointment. The referral form does have a specific indicator/pre-screen item for cachectic patients by identifying weight loss. If there is no significant weight loss for the patient to be classified as cachectic, then they are classified into either the restorative or supportive cancer rehabilitation stream. Restorative patients were at one time diagnosed with cancer, but have undergone curative therapy/surgical removal of the

tumor mass or are presently in remission. If the patient is not classified as Restorative, then they will likely be entered into the Supportive stream.

Consecutive outpatients referred to the CARE program of the Supportive Care Program of the Cancer Mission at the MUHC will be considered for enrolment. The assessments will be obtained at both the MGH Supportive and Palliative Care Unit and MNUPAL. For the purposes of this study, data will be collected and analyzed from only new patients included in the CARE program between January 1st, 2014 and December 31st, 2014.

5.3 Participants Inclusion and Exclusion Criteria

The restorative and supportive rehabilitation programs address patient concerns secondary to cancer and/or its treatment such as deconditioning, fatigue, weakness, nutritional and digestive problems or cognitive loss requiring an interdisciplinary approach. The restorative patients have been seen for post treatment evaluation by oncology and are at least one month off treatment; whereas, the supportive patients have signs of active disease, with or without undergoing treatment. The cachexia patient population includes patients with inoperable, incurable, metastatic cancer presenting with weight loss, anorexia and indicators of abnormal metabolism (anemia, high CRP, hypoalbuminemia, increased tumor markers).

This study will include as subjects all patients admitted to the CARE program. The program has different inclusion and exclusion criteria for each rehabilitation pathway. Eligibility will be ascertained according to the following criteria:

General Inclusion Criteria *(common to all three)*:

1) All new patients will undergo at least one initial assessment

2) Patients with at least one of the following three core assessments by the professional team: ESAS, aPG-SGA or hand grip strength.

Specific Inclusion Criteria:

Restorative pathway:

1. Age ≥ 18 years;

2. Had histologically confirmed diagnosis of cancer but no longer exhibits any clinical signs of active disease;

3. At least one month off treatment

Supportive pathway:

1. Age ≥ 18 years;

2. Histologically confirmed diagnosis of advanced cancer (stage III/IV or stage II undergoing chemotherapy);

3. Life expectancy ≥ 6 months according to the estimation made by the physician;

4. Evidence of active disease and may or may not be undergoing treatment

Cachexia pathway:

1. Age ≥ 18 years;

2. Histologically confirmed diagnosis of advanced cancer (stage III/IV);

3. Inoperable and incurable metastatic cancer

4. Life expectancy ≥ 3 months according to the estimation made by the physician; no curative intent

5. Evidence of active advanced disease and may or may not be undergoing treatment

6. ECOG 1 or 2

Exclusion criteria *(common to all three)*:

1. Impossibility for patients to fill in the questionnaires in English or French;

2. Life expectancy < 3 months according to the estimation made by the physician

5.4 Description of the Program

5.4.1 Role of the Professionals

The CARE program operates both at the MGH site, on the 8th floor of its Livingston Hall, and at the Vendome site, within the MNUPAL (http://mnupal.mcgill.ca). Its team consists of a physician specialized in palliative care, a head registered pivot nurse, a physiotherapist, an occupational therapist, and a dietitian. Each professional provided personalized recommendations for each patient. For example, the attending physician addressed issues that impacted upon optimal symptom control, the improvement of the nutritional and metabolic state, the review of medication intake, and the assessment of the efficacy of medication. In addition to the coordination and support role of the nurse, other responsibilities included clarifying the patient's understanding of the disease and treatment; review strategies for symptom management and discussing psychological distress and sexuality issues. The physical therapist dealt with creating home strengthening programs to optimize and/or regain muscle mass and strength; cardio and balance training; addressed musculoskeletal issues, scar mobility, posture/pain-relieving positions and fall-prevention techniques. The occupational therapist addressed management of cancer-related fatigue, self-care, safety and activities of daily living. The main concerns of the dietitian included: the possible factors promoting weight loss/gain/maintenance; oral care (e.g., mucositis); sensory changes related to nutrition (e. g., taste changes); centrally-mediated changes (e.g., dysphagia, loss of appetite); using the dietary management of diabetes, GI tract implications (e.g., nausea and vomiting, diarrhea, and

constipation); and complimentary therapy/alternative medicine (e.g., homeopathy remedies). Please refer to Appendix D for the complete list of planned interventions.

5.4.2 Program Goals

The intervention goals for patients in the Restorative and Supportive groups included: optimizing physical, nutritional and functional status, minimizing impact of cognitive dysfunction in daily living, and educating and empowering patients to make healthy life choices. The intervention goals for patients in the Cachexia group included: optimizing nutritional and functional status, identifying and minimizing metabolic abnormalities associated with cachexia, and informing and empowering the patient to act on their nutritional status.

5.4.3 Program Schedule

The program was scheduled at the Vendome site every Wednesday and at the MGH every Friday from 08:15 to 15:45. The secretary retrieved the medical charts of every patient with a scheduled appointment for that day. From 08:15 to 09:00, the team of professionals and MNUPAL research assistants gathered for the case presentations of each patient. The patients were expected to arrive at the clinic for 08:30, at which time, height and weight measurements were taken by the secretary. Subsequently, the patient was led into their respective rooms, where they were instructed to fill out the following series of questionnaires: aPG-SGA, ESAS, FSI, DST and m-CHAMPS. Thereafter, one of the professionals met up with the patients. Each of the five professionals individually met with each scheduled patient through a series of thirty-minute intervals that ran from 09:00 to 11:30. From 11:30 to 13:15 (and after 15:45), the five professionals met altogether to review and to discuss the personalized recommendations that were meant to provide the patient with the greatest amount of benefit. The same rotation is then applied to the patients scheduled in the afternoon. From 13:15 to 15:45, each professional saw each scheduled patient through the series of thirty-minute intervals and rotated from patient to patient. Ideally, five patients were seen by each of the five professionals in a two and a half-hour period.

The return visits from patients in the restorative and supportive cancer groups were meant to take place over a 2-4 month period, where the subjective HRQoL measures were repeatedly taken. The return visits from patients in the cachexia group also repeatedly assessed the subjective HRQoL measures, although not necessarily throughout a period of 2-4 months.

Patients in the Cachexia group undergoing the interdisciplinary CARE model were given the opportunity to receive additional assessments at MNUPAL. Upon arrival at the laboratory, patients had their height and weight measurements taken. Oxidative stress was then measured

by performing the FORT and FORD test (using the Form Plus Callegari CR3000 blood analyzer), which determined the oxidative status of the patient, and the ability of the patient's plasma antioxidants to reduce a preformed radical cation (Pavlatou et al., 2009), respectively. Afterwards, the patient's resting metabolic rate was measured using COSMED k4b^2 portable metabolic analyzer. Subsequently, bone mineral content and body composition were assessed by DXA (GE Lunar Prodigy Advance DXA). The patient's quadriceps muscle performance (e.g., peak torque, work and power) was then measured through isokinetic testing using the BIODEX (Medic Atlas system 3). Additional functional measurements were obtained including Jamar hand grip strength and the gait speed.

5.4.4 Data storage and retrieval

The data collected from the medical chart includes several questionnaires completed by the patients before each visit and the various functional tests performed during their visit. The clinical measurements will be studied through an evaluation of the patients' electronic record, available on OACIS. OACIS gathers different types of patient data into a single source where clinicians may access, document and analyze a patient's profile to readily recognize and deal with urgent needs (Telus Health, 2014). Detailed demographic information, booking appointments and other such descriptive information will be studied through an evaluation of the patients' electronic record, available on MédiVisit. MédiVisit is an application that the MUHC uses for the management of appointments in the clinic (MédiSolution Ltée, 2014). All data collected from the medical charts, OACIS and MédiVisit will subsequently be entered into a database application entitled FileMaker Go through the use of iPads.

6.0 Ethical Considerations

The proposal was submitted to the MUHC Research and Ethics Committee for approval by the Director of Professional Services. Once approval was granted, a retrospective chart review was completed for each patient from January 1st to December 31st 2014. All data that was collected and used in analyzing the impact of this program was not linked to the individual results of patients included in the study. Any patient who did not conform to the inclusion criteria was not involved in the analysis. The treatment plan was not biased by the patient's inability to conform to the inclusion criteria.

7.0 Study measurements

Patient demographics: Demographic and anthropometric information were collected on all patients recruited including age, sex, cancer diagnosis, stage and evidence of metastasis, number of visits per professional, number of visits per clinic, pathway patient was assigned

following the first visit, length of the program per patient and the number of patients that died while enrolled in the program.

Biochemical profile: A blood biochemical profile was obtained following selected clinical measurements: CRP, albumin, hemoglobin, white blood cell count, neutrophil, lymphocyte and testosterone.

This study utilized selected subjective measurements, such as the aPG-SGA, ESAS, FSI, DST and m-CHAMPS at the patients' initial and final clinic visit. At every FU appointment, the patients were only required to complete the aPG-SGA and ESAS questionnaires. Please refer to Appendix E for samples of each questionnaire.

7.1 Questionnaires

Abridged Patient-Generated Subjective Global Assessment (aPG-SGA): This questionnaire is a practical modification of the original PG-SGA. Despite the fact that there is no gold standard to characterize malnutrition, clinicians have been using other tools such as the PG-SGA, which has been validated to determine the nutritional status of cancer patients (Tan et al., 2015). The PG-SGA has proven to effectively detect malnutrition and was developed for use in the cancer patient population (Ottery, 2000 & Bauer et al., 2002 & Velasco et al., 2011). It consists of a self-reported questionnaire, in addition to a physical examination and metabolic abnormalities scoring completed by the physician (Vigano et al., 2014). The scored PG-SGA is a nutrition assessment tool that has been shown to identify malnutrition in inpatient (Bauer et al., 2002) and outpatient oncology patients and may anticipate QoL changes (Isenring et al., 2003). The abridged version of the PG-SGA consists solely of the self-reported questionnaire, which evaluates weight history, food intake, appetite, and performance status (Vigano et al., 2014). This questionnaire has been validated as a reliable nutritional screening tool to identify malnutrition for cancer patients in an outpatient (Gabrielson et al., 2013 and Stoyanoff et al., 2009) setting and there is a solid correlation between the PG-SGA and aPG-SGA (r^2=0.97) (Stoyanoff et al., 2009). Box 1 (sub-scale 1) of the questionnaire concerns weight and weight changes with a maximum score of 5; box 2 (sub-scale 2) focuses on food intake with a maximum score of 4; box 3 (sub-scale 3) scores symptom profiling with a maximum score of 24; and, box 4 (sub-scale 4) reports functional status with a maximum score of 3 (Vigano et al., 2014). The scores from each of those boxes/sub-scales are added up to give a total score ranging from 0 (no malnutrition problems) to 36 (worst possible malnutrition problems) (Vigano et al., 2014). Patients with an overall score ranging from: 0 to 1 are recognized to have no particular nutritional problems and in no need of intervention; (Vigano et al., 2014) 2 to 8, are

deemed as having increasing nutritional problems and may benefit from, but are not in critical need of, dietitian driven (or other clinical) interventions; (Vigano et al., 2014) and 9 to 36, have a critical need for improved symptom management and/or nutrition-intervention options (Vigano et al., 2014). The aPG-SGA was able to discriminate malnourished from well-nourished patients with a sensitivity of 93.8% and a specificity of 77.6%, which is very similar to the PG-SGA (97% sensitivity, 86 % specificity) (Stoyanoff et al., 2009 and Gabrielson et al., 2013).

Edmonton Symptom Assessment System (ESAS): This questionnaire is a commonly used tool to evaluate the severity of the nine most frequently experienced symptoms in cancer patients, using a scale ranging from 0 (absence of symptoms) to 10 (worst possible symptoms) (Aktas et al., 2015; Moro et al., 2006; Dudgeon et al., 1999). The symptoms examined in this reliable tool include: pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, well-being, and shortness of breath, with a possible tenth symptom chosen by the patient (Bruera et al., 1991; Chang et al., 2000; Philip et al., 1998). The ESAS was deemed a valid tool, by a longitudinal cancer patient cohort study, by comparing it to the MSAS, FACT and KPS status. The ESAS had a test-retest validity better at 2 days versus 1 week; the distress ESAS score had a greater correlation to the physical symptom/well-being subscales of the FACT, MSAS and with KPS; individual items and summary scores revealed good internal consistency and were associated with their corresponding FACT and MSAS measures; and, lastly, the individual items between the three tools were well correlated (Chang et al., 2000).

Fatigue Symptom Inventory (FSI): This tool has 14 items and assesses several facets of fatigue, such as perceived severity, frequency, and interference with daily functioning. This questionnaire uses an 11-point scale, for each item, with the lower points signifying less acute fatigue problems. Items 1-13 will be added up to calculate a globe score, whereas, question 14 only gives qualitative data (Shahid et al., 2012). Initially, the FSI was validated in the female breast cancer population (Hann et al., 1998 and Jacobsen et al., 1999) and then it was further validated in a mixed sex patient population with different types of cancers (Hann et al., 2000). The 1998 Hann study showed: convergent/divergent validity by comparing the FSI to the fatigue scale of the POMS-F and the SF-36 vitality subscale; construct validity by comparing between and within the three groups of women (e.g., those undergoing treatment for breast cancer; those who had completed treatment; and, lastly those with no history of cancer), along with measures of anxiety and depression. The seven items dealing with the interference of fatigue in daily living had a good internal consistency (α-coefficients=0.94 for the women undergoing treatment; 0.95 for those who had completed treatment; and, 0.93 for those with no history of cancer). Test-

retest reliability for the entire FSI among patients undergoing treatment varied from 0.35 to 0.75, and was tested at three different times (Hann et al., 1998). The 2000 Hann study further validated that the FSI was a reliable measure of fatigue in cancer patients, by showing: that the seven-item interference scale had good internal consistency (α-coefficients > 0.90); convergent validity by comparing it to an existing measure of fatigue; and, construct validity by comparing it to measures of life satisfaction and depression (Hann et al., 2000).

Distress Screening Tool (DST): includes the distress thermometer which is a popular, acceptable and rapid screening tool used to evaluate the psychological distress of cancer patients (Stewart-Knight et al., 2012). This tool comprises of three different parts. In the first part, the patients are instructed to circle the number on the thermometer that "best describes how much distress they have been experiencing in the past week including today" (NCCN Guidelines 2013). The second part is a list of problems divided into the five following sections: practical, family, emotional, spiritual and physical, and the patients are asked to "tick each item that has been a cause of distress for them during the last week including today" (NCCN Guidelines 2013). In the last part, the patients are asked to "select out of the items that they have ticked, the 3 items that cause them the most concern" (NCCN Guidelines 2013). The validity and reliability of the DST recommended by the NCCN was evaluated in Chinese cancer patients. In this study, the DT and problem checklist (Holland et al., 2000) was compared to the HADS and SCL-90. The DT cutoff score of 4 resulted in: an accuracy (or AUC) of 0.80 with good sensitivity and specificity (0.80 and 0.70, respectively) when compared to HADS; and, an accuracy of 0.83 with a greater sensitivity and specificity (0.87 and 0.72, respectively) relative to SCL-90. Patients were then asked to fill out the DST at baseline and after 7-10 days, and the results showed an acceptable test-retest reliability (r=0.800, *P*=0.000). Overall, this study indicates that DST has a reasonable accuracy and reliability to screen the severity of distress, as well as, problems causing distress in the tested population (Tang et al., 2011). In 2014, Chambers et al. tested the accuracy of DT by comparing it to the following three standardized scales: IES-R, HADS and BSI-18. When compared to the IES-R, the DT demonstrated high sensitivity (>85%) and good accuracy (AUC varying from 0.84 to 0.88), at all time points. At baseline, the DT showed good accuracy compared to both the anxiety and depression subscales for HADS (AUC=0.84 and 0.82, respectively), however, sensitivity was greatly reduced after 12 months. The DT displayed a high validity for the anxiety (AUC=0.90, sensitivity=90%) and depression (AUC=0.85, sensitivity=74%) subscales of the BSI-18. This study concluded that the DT is a reliable tool to recognize distress, anxiety and depression in

the prostate cancer population (Chambers et al., 2014).

Modified Community Healthy Activities Model Program for Seniors (m-CHAMPS): The CHAMPS is a valid and reliable self-reported physical activity questionnaire used to assess the physical activity of seniors. This questionnaire evaluates the occurrence and duration of physical activities commonly performed by older adults per week (Stewart et al., 2001). The modified CHAMPS is a useful and valid tool to measure change in levels of physical activity in a cancer population (Resnicow et al., 2003). Harada et al. assessed the measurement properties of CHAMPS in 2001. The CHAMPS was compared to the SF-36 measures of physical functioning, general health, mental health, and pain; BMI; performance-based tests of lower body functioning and endurance; and, Mini-Logger activity monitor data from ankle and waist sensors. Data showed a fair validity (r^2=0.48) and a good 2-week test-retest reliability (0.76) of the CHAMPS moderate activity (Harada et al., 2001). Stewart et al. also evaluated the reliability of the CHAMPS in 2001 and found that it had a good 6-month stability (ranging from r^2= 0.58 to 0.67) and modest construct validity correlations (ranging from r^2=0.22 to 0.30) for the moderate-intensity or greater activities, when compared to other physical function tests and self-reported QoL measures. This study concluded that the CHAMPS might be suitable to assess the physical activity levels of older adults undergoing interventions to increase physical activity (Stewart et al., 2001). In 2006, Cyarto et al. evaluated the CHAMPS in older Australian adults by comparing it to tests of physical ability and the SF-12 measures of physical and mental health. Results showed excellent 1-week test-retest reliability (ranging from 0.81 to 0.88) for moderate-intensity activity; and, significant validity correlations when compared to four physical performance tests (ranging from r^2=0.19 to 0.32) (Cyarto et al., 2006). In 2009, Giles and Marshall, also studied the validity of the CHAMPS in older Australian adults. Although, this study compared a mail-administered version of the CHAMPS questionnaire to an objective measure of step counts (using a pedometer). The results showed good to excellent 1 to 2-week test-retest reliability for all the physical activity constructs (r^2=0.70 to 0.89 sessions/week and r^2=0.65 to 0.75 for min/week); as well as, good correlation coefficients between the weekly step counts and reported walking frequency and activity duration (r^2= 0.57 and r^2= 0.40, respectively). Good correlation coefficients were also noted between step counts and total reported physical activity frequency (r^2= 0.52), however, when compared to total activity duration, the correlation was low (r^2= 0.21). Overall, the data demonstrated that, for the tested population, the mailed self-completed CHAMPS gave reliable and valid estimates of physical activity (Giles and Marshall, 2009).

7.2 Blood Biochemistry

C-reactive Protein: CRP is a widely used systemic biomarker for diagnosing acute and chronic inflammation, promoted by the presence of a tumor (Gagnon et al., 2013). Elevated serum CRP levels predict lower survival rates in patients with cancer (Srimuninnimit et al., 2012).

Albumin: It is the most abundant protein in human blood plasma, provides an estimation of visceral protein function and has a strong prognostic role in predicting cancer survival (Gupta & Lis, 2010).

Hemoglobin: It is the protein in red blood cells that carry oxygen, and low levels have shown to negatively affect certain cancer treatment outcomes, such as survival (Littlewood, 2001).

Neutrophils: are the most abundant white blood cell type, and they indicate systemic inflammation. Significantly high neutrophil levels are associated with a poor prognosis (Tazzyman et al., 2009).

Lymphocyte: is another type of white blood cell, which confers immune response specificity. Low levels of lymphocytes may suggest a poor prognosis for different stages and types of tumors (Schueneman et al., 2013).

Testosterone: monitoring bioavailable and total testosterone levels in our patients will track muscle mass changes. Bioavailable testosterone has been shown to have a stronger association to muscle strength compared to total testosterone (Roy et al., 2002). Low testosterone levels are correlated with an increased symptom burden, a lower QoL and a poor prognosis (Dev et al., 2014).

8.0 Statistical analyses

Baseline differences by pathway were determined by a series of general linear models (proc glm). Mixed-model approach (PROC MIXED [repeated autoregressive]) was used for the analysis of repeated measurements. Fixed effects included in the model were: rehabilitation pathway (restorative, supportive or cachexia), time and the product term of time and pathway. Covariates included in the model were: sex, age, whether the patients were currently on oncological treatment, days in program and number of FU visits. All covariates were determined a priori based on established associations with the dependent variables. All baseline results dealing with the aPG-SGA, ESAS, FSI, DST and m-CHAMPS questionnaires were adjusted for the following covariates: age, sex and whether or not the patients were currently on oncological treatment. Results concerning the pre and post FSI, DST and m-CHAMPS questionnaire scores

were adjusted for age, sex, on/off treatment and number of FU visits attended. All over time/program duration results coming from the aPG-SGA and ESAS questionnaires were adjusted for age, sex and on/off treatment. Mixed models were used to examine time differences from pre-rehabilitation to post-rehabilitation in all rehabilitation pathways (cachexia, restorative and supportive), as well as a function of pathway over multiple FU assessments (2 week blocks). All analyses were completed using SAS 9.3 (Cary, NC, USA), with significance set at $p < 0.050$. Occasional missing data are reflected in the degrees of freedom. The sample size of subjects was 115.

8.1 Data manipulation and handling:

Data truncation: In order to calculate changes over the duration of the FUs, data was truncated into 2 week windows of assessment. To achieve this, the amount of days in the cancer rehabilitation program were calculated into weeks from entry into the program (baseline visit), and then categorized into 2 week blocks. Week 0 to week 2 was referred to as week block 1, week 2 to week 4 was referred to as week block 2, week 4 to week 6 was referred to as week block 3 and so on. Due to a lack of participants who completed FUs beyond 24 weeks in the program (week block 12), truncation of the data beyond this point was computed, with the final FU beyond week 24 taken for any individual who had FUs after this time point.

9.0 Results

9.1 Patient demographics and clinical characteristics

A total of 115 MUHC outpatients with cancer (mean age 62.9 ± 13.4 y; 59% male) participated in this study (Table 3a); where 24%, 34% and 42% of patients were referred to the restorative (n=28), supportive (n=39) and cachexia (n=48) rehabilitation pathway streams, respectively. The most common primary cancer diagnoses were lung (30.4%), lower GI (12.2%) and breast (9.6%). All restorative patients by definition are disease free and/or have a curative disease status. The patients in the other two streams had a history of advanced cancer as evidenced by the presence of either locally advanced (28% of supportive patients and 25% of cachectic patients) or metastatic (69% of supportive patients and 75% of cachectic patients) disease. Patients previously received either single treatment of radiotherapy (11%), single treatment of chemotherapy (36%) or their combination (37%) and are currently receiving either single treatment of radiotherapy (2%), single treatment of chemotherapy (47%) or their combination (2%). The percentage of cancer patients not previously or currently receiving any oncological treatment is 16% and 49%, respectively. Throughout the 2014 time period, 12 patients passed away while in the CARE program. Overall, the average period of time that all

patients spent in the CARE is 75.8 (± 64.6) days, which included a baseline visit and an average of 2.6 (± 2.1) FU appointments. Referring to Table 3b, the age of patients in both the supportive (65.1 yrs ± 11.4) and cachexia (67.8 yrs ± 11.4) groups proved to be significantly different (p=0.050) from the restorative (51.7 yrs ± 13.0) group. The restorative patients attended significantly more FU visits (3.4 visits ± 2.0) compared to those in the supportive (2.1 visits ± 2.0) group. As hypothesized, and due to their advanced disease status and increased debilitation, the cachectic patients had a statistically lower BMI (22.4 kg/m2 ± 5.1) compared to the two other groups. Another interesting finding concerns the white blood cell count, those of the cachectic patients were significantly higher (8.9*10^9/L ± 5.0) than that of the restorative patients (5.9*10^9/L ± 1.8).

Table 3a. Baseline demographics and patient characteristics

Variables		Mean ± SD	N
Age (years)		62.9 ± 13.4	115
BMI (kg/m^2)		25.4 ± 6.4	114
Albumin (g/L)		35.8 ± 5.7	76
CRP (mg/L)		31.3 ± 45.9	31
Hemoglobin (g/L)		113.5 ± 20.0	87
WBC (10^9/L)		7.8 ± 4.2	87
		%	n
Sex	Male	54.8	63
	Female	45.2	52
Cancer Diagnosis	Lung	30.4	35
	Lower GI	12.2	14
	Breast	9.6	11
	Hematology	7.8	9
	Liver Bioduct & Pancreas	7.8	9
	Gynecological	7.0	8
	Upper GI	7.0	8
	Urology	7.0	8
	Head and Neck	5.2	6
	Musculo-Skeletal System	1.7	2
	Neurology	1.7	2
	Skin	1.7	2
	Endocrinology	0.9	1
Previous Oncological Treatment			
	Chemotherapy & Radiotherapy	36.5	42
	Chemotherapy	35.7	41
	Radiotherapy	11.3	13
Concurrent Oncological Treatment			
	Chemotherapy	47.0	54
	Chemotherapy & Radiotherapy	2.6	3
	Radiotherapy	1.7	2

Table 3b. Baseline demographic and clinical patient characteristics divided by stream

		Restorative		Supportive		Cachexia	
Variables		**Mean ± SE**	**N**	**Mean ± SE**	**N**	**Mean ± SE**	**N**
Age (years)		51.7 ± 13.0	28	65.1 ± 11.4 [a]	39	67.8 ± 11.4 [a]	48
Days in the program		97.8 ± 63.5	28	60.9 ± 55.5	39	75.1 ± 69.5	48
Number of follow-up visits (excluding baseline)		3.4 ± 2.0	28	2.1 ± 2.0 [a]	39	2.5 ± 2.1	48
Weight at baseline visit (kg)		75.6 ± 18.5	28	75.3 ± 21.0	39	66.3 ± 14.0	47
BMI (kg/m^2)		27.1 ± 7.5	28	27.2 ± 7.1	39	22.4 ± 5.1 [a,b]	48
Albumin (g/L)		39.3 ± 3.9	10	35.9 ± 5.4	30	34.8 ± 6.1	36
CRP (mg/L)		38.8 ± 69.1	5	31.2 ± 45.2	8	29.2 ± 41.7	18
Hemoglobin (g/L)		111.3 ± 36.1	13	112.8 ± 14.5	30	114.6 ± 17.2	44
WBC (10^9/L)		5.9 ± 1.8	13	7.0 ± 3.1	30	8.9 ± 5.0 [a]	44
		%	n	%	n	%	n
Rehabilitation Pathway		24	28	34	39	42	48
Sex	Male	39.3	11	41	16	75	36
	Female	60.7	17	59	23	25	12
Disease Status							
	Curative	100.0	28	0.0	0	0.0	0
	Locally advanced	0.0	0	28.2	11	25.0	12
	Metastatic	0.0	0	69.2	27	75.0	36
Previous Oncological Treatment							
Chemotherapy		39.3	11	43.6	17	27.1	13
Radiotherapy		10.7	3	5.1	2	16.7	8
Chemotherapy & Radiotherapy		50.0	14	33.3	13	31.1	12
Concurrent Oncological Treatment							
Chemotherapy		3.6	1	76.9	30	50.0	24
Radiotherapy		0.0	0	2.6	1	2.1	1
Chemotherapy & Radiotherapy		3.6	1	2.6	1	2.1	1

[a] Significantly different ($p \leq 0.050$) from Restorative; [b] Significantly different ($p \leq 0.050$) from Supportive.

9.2 Differences between groups for initial aPG-SGA questionnaire scores

The details of the significant main effects of rehabilitation pathway for four aPG-SGA questionnaire dependent variables, at baseline, will follow. Firstly, there was a main effect of pathway for current weight ($F [2, 113] = 4.38$; $p = 0.015$), however the posthoc tests did not reveal specific group differences*. Secondly, there was a main effect of pathway for weight loss history, which takes into account the weight loss from one month ago if available, and if not, then weight loss from six months ago is used, and that of the past two weeks ($F [2, 113] = 7.39$; $p = 0.001$). Post-hoc analyses (Tables 3c, 3n) disclosed significant differences ($p \leq 0.050$) between both the restorative and cachexia, and supportive and cachexia groups. Thirdly, the performance status variable, which considers the activities and function performed over the past month, also had a main effect of pathway ($F [2, 113] = 7.47$; $p = 0.001$), with posthoc tests (Tables 3c, 3n) demonstrating significant differences ($p \leq 0.050$) between the restorative and cachexia groups. Lastly, there was an effect of pathway for the total score variable ($F [2, 113] = 4.68$; $p=0.011$), with the posthoc tests (Tables 3c, 3n) showing significant differences ($p \leq 0.050$) between the restorative and cachexia groups. Referring to Tables 3c and 3n, the cachexia (1.7 ± 1.6) group reported a worse weight loss score compared to the restorative (0.6 ± 0.9) and supportive (0.6 ± 1.1) groups; the restorative (1.2 ± 0.8) patients reported a higher level of physical activity and function compared to the cachexia (1.8 ± 1.0) patients; and lastly, the cachectic (10.6 ± 5.6) patients reported greater overall malnutrition/total score compared to the restorative (6.2 ± 5.2) patients. There was no significant main effect of pathway for the other aPG-SGA variables (p's > 0.050). These analyses were adjusted for covariates.

9.3 Differences between groups for initial ESAS questionnaire scores

There was a significant main effect of pathway for the following two ESAS questionnaire dependent variables, at baseline: appetite ($F [2, 113] = 7.74$; $p=0.001$), where the posthoc tests (Tables 3c, 3o) showed significant differences ($p \leq 0.050$) between the restorative and cachexia groups; and fatigue ($F [2, 113] = 3.16$; $p=0.047$), here the posthoc tests (Table 3o) did not reveal specific group differences*. The cachectic (4.9 ± 3.1) patients reported a worse appetite score compared to the restorative (2.5 ± 2.4) patients at their initial clinic visit (Tables 3c, 3o). At baseline, there were no significant main effects of pathway for the other ESAS variables (p's > 0.050). These analyses were adjusted for covariates.

9.4 Differences between groups for initial FSI questionnaire scores

At baseline, there were no significant main effects of pathway for all fourteen variables linked to the FSI questionnaire. These analyses were adjusted for covariates.

9.5 Differences between groups for initial DST questionnaire score

There is a significant main effect of pathway for sleep ($F [2, 113] = 3.60$; $p=0.031$) and weight ($F [2, 113] = 4.12$; $p=0.019$) at baseline, where posthoc analyses (Tables 3c, 3p) exposed differences ($p \leq 0.050$) between the restorative and cachexia groups. Also, there was an effect of pathway for worrying about friends/family ($F [2, 113] = 4.34$; $p = 0.015$) where the posthocs (Tables 3c, 3p) displayed differences ($p \leq 0.050$) between the supportive and cachexia groups. Tables 3c and 3p show that there appear to be more restorative patients (67.9% ± 47.6) reporting feeling distressed with their quality and/or quantity of sleep compared to the cachectic patients (38.3% ± 49.1); more cachectic patients (63.8% ± 48.6) had a feeling of distress with their body weight compared to the restorative patients (35.7% ± 48.8); and lastly, more supportive patients (53.8% ± 50.5) reported feeling distressed for worrying about their family and/or friends compared to the cachectic patients (27.7% ± 45.2). There were no significant main effects of pathway for the other twenty-three variables linked to the DST. These analyses were adjusted for covariates.

9.6 Differences between groups for initial m-CHAMPS questionnaire scores

At baseline, there were no significant main effects of pathway for the following four variables linked to the m-CHAMPS: hours engaged in sedentary, light, moderate and heavy physical activity. These analyses were adjusted for covariates.

Table 3c. aPG-SGA baseline differences between groups

	Restorative	Supportive	Cachexia		
Variables				**Difference Between Means**	**Simultaneous 95% Confidence Limits**
Weight Loss History	0.6 ± 0.9	0.6 ± 1.1	1.7 ± 1.6 [a,b]	1.2 1.1	0.4 – 1.9 0.4 – 1.8
Food Intake	0.8 ± 1.0	0.7 ± 0.8	1.1 ± 1.0		
Nutritional Impact Factor Status	3.6 ± 4.0	5.5 ± 5.0	5.9 ± 3.7		
Performance Status	1.2 ± 0.8	1.4 ±1.0	1.8 ± 1.0 [a]	0.7	0.1 – 1.2
Total Score	6.2 ± 5.2	8.3 ± 6.5	10.6 ± 5.6 [a]	4.4	1.1 – 7.8

aPG-SGA scores range from:
0 (no weight loss) to 5 (worse weight loss) for Weight Loss History

0 (no decrease in food intake) to 4 (worse decrease in food intake) for Food Intake

0 (no problems eating) to 24 (worse appetite) for Nutritional Impact Factors

0 (normal with no limitations) to 3 (worse performance) for Performance Status

0 (no malnutrition) to 36 (worst overall malnutrition status) for Total Score

Values are Adjusted Means ± SD; n= 28 (Restorative); n=39 (Supportive); n= 47 (Cachexia)
[a] *Significantly different ($p \leq 0.050$) from the Restorative group;* [b] *Significantly different ($p \leq 0.050$) from the Supportive group.*

Table 3d. Baseline ESAS values for each variable among groups

Variables	Restorative	Supportive	Cachexia	Difference Between Means	Simultaneous 95% Confidence Limits
Anxiety	2.8 ± 2.8	2.6 ± 2.7	2.7 ± 2.6		
Appetite	2.5 ± 2.4	4.0 ± 3.0	4.9 ± 3.1 [a]	2.4	0.8 – 4.1
Depression	2.5 ± 2.9	1.5 ± 2.1	2.0 ± 2.3		
Drowsiness	2.0 ± 2.5	3.5 ± 2.9	3.4 ± 3.1		
Fatigue	4.3 ± 2.4	5.5 ± 2.8	5.1 ± 2.5		
Nausea	1.2 ± 2.2	2.5 ± 3.4	1.1 ± 1.9		
Pain	3.2 ± 2.5	3.8 ± 2.7	3.3 ± 2.7		
Shortness of Breath	2.7 ± 2.7	3.4 ± 3.0	3.6 ± 3.2		
Well-Being	4.4 ± 2.5	4.2 ± 2.6	5.1 ± 2.4		

ESAS scores range from 0 (best) to 10 (worst).

Values are Adjusted Means ± SD; n= 28 (Restorative); n=39 (Supportive); n= 47 (Cachexia)
[a] *Significantly different ($p \leq 0.050$) from the Restorative group*

Table 3e. DST score differences at baseline visit between groups

Variables	Restorative	Supportive	Cachexia	Difference Between Means (%)	Simultaneous 95% Confidence Limits (%)	N
Sleep	67.9 ± 47.6	56.4 ± 50.2	38.3 ± 49.1 [a]	29.6	2.0 – 57.2	114
Weight	35.7 ± 48.8	46.2 ± 50.5	63.8 ± 48.6 [a]	28.1	0.1 – 56.1	114
Worry about family/ friends	35.7 ± 48.8	53.8 ± 50.5	27.7 ± 45.2 [b]	26.2	1.8 – 5.1	114

DST values are Adjusted Means (%) ± SD; where the percentage of subjects that are feeling distressed about the variable in question ranges from 0% to 100%

[a] Significantly different (p ≤ 0.050) from the Restorative group; [b] Significantly different (p ≤ 0.050) from the Supportive group.

9.7 PRE/POST differences in FSI, DST and m-CHAMPS

There were no significant (p ≤ 0.050) interactions between pathway and time (pre/post program) for any of the fourteen previously named variables linked to the FSI (Tables 3d-3g, 3q-3nn). However, two FSI variables showed significant time effects, namely, least fatigue (F [2, 1] = 11.86; p=0.006) and current fatigue (F [2, 1] = 11.30; p=0.006). The restorative patients experienced a trend decrease (p=0.055) in the level of fatigue on the day where they felt the least fatigued during the past week, it reduced from 2.8 ± 0.5 to 0.9 ± 0.7 post-program (Tables 3d, 3e). The restorative patients also reported a significant decrease (p=0.050) in the level of fatigue experienced while filling out the questionnaire post-program, it declined from 3.4 ± 0.6 to 2.0 ± 0.7 (Tables 3f, 3g). The only patients with DST significant changes from pre to post program belonged to the cachexia group, with a difference in feeling distressed for practically getting to and from appointments (p=0.040) and a significant interaction between pathway and time of F [2, 1] = 9.38; p=0.008 (Tables 3h, 3i). Before the cachexia group started the program, 17.5% ± 6.8 of the patients felt distressed going to or from appointments, and following the program, 113.0% ± 25.2 of them were distressed (Table 3i). There were no significant (p ≤ 0.050) interactions between pathway and time for any of the other of the twenty-five variables linked to the DST (Tables 3oo-3hhhh). There were no significant (p ≤ 0.050) interactions between pathway and time for any of the four perceived activity levels of intensity linked to the m-CHAMPS (Tables 3iiii-3pppp). All these analyses were adjusted for covariates.

Table 3f. Fixed Effects Table of FSI Variable **Least Fatigued** PRE/POST Program

Type 3 Tests of Fixed Effects Least Fatigued				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	0.67	0.516
Time	1	11	11.86	0.006
Pathway * Time	2	11	0.04	0.965
Age	1	97	0.36	0.549
Sex	1	97	0.20	0.659
On Treatment	1	97	3.01	0.086
Number of FUs	1	97	0.47	0.494

Table 3g. FSI Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean ± SE (Scores range from 0 = not at all fatigued ; 10 = as fatigued as I can be) Least Fatigued	Number of patients completing a PRE & POST Program FSI questionnaire
Restorative	0	2.8 ± 0.5	23
Restorative	1	0.9 ± 0.7	9
Supportive	0	3.6 ± 0.4	35
Supportive	1	1.8 ± 0.9	4
Cachexia	0	3.6 ± 0.3	44
Cachexia	1	2.0 ± 1.2	2

Table 3h. Fixed Effects Table of FSI Variable **Current fatigue** PRE/POST Program

Type 3 Tests of Fixed Effects Current fatigue				
Effect	Num DF	Den DF	F Value	Pr > F
Pathway	2	97	0.99	0.376
Time	1	11	11.30	0.006
Pathway * Time	2	11	0.09	0.917
Age	1	97	1.08	0.302
Sex	1	97	1.46	0.231
On Treatment	1	97	1.12	0.294
Number of FUs	1	97	0.12	0.735

Table 3i. FSI Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean ± SE (Scores range from 0 = not at all fatigued ; 10 = as fatigued as I can be) Current fatigue	Number of patients completing a PRE & POST Program FSI questionnaire
Restorative	0	3.4 ± 0.6	23
Restorative	1	2.0 ± 0.7	9
Supportive	0	4.5 ± 0.5	36
Supportive	1	3.3 ± 0.7	4
Cachexia	0	4.4 ± 0.4	44
Cachexia	1	3.3 ± 0.9	2

Table 3j. Fixed Effects Table of DST Variable **Getting to and from appointments** PRE/POST Program

Type 3 Tests of Fixed Effects Getting to and from appointments				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	3.57	0.032
Time	1	8	1.69	0.230
Pathway * Time	2	8	9.38	0.008
Age	1	102	0.00	0.965
Sex	1	102	0.14	0.709
On Treatment	1	102	0.01	0.927
Number of FUs	1	102	0.41	0.524

Table 3k. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Getting to and from appointments	Number of patients completing a PRE & POST Program DST questionnaire
Restorative	0	28.9 ± 10.8	25
Restorative	1	15.3 ± 16.8	6
Supportive	0	40.4 ± 7.9	38
Supportive	1	5.0 ± 20.7	3
Cachexia	0	17.5 ± 6.8	46
Cachexia	1	113.0 ± 25.2	2

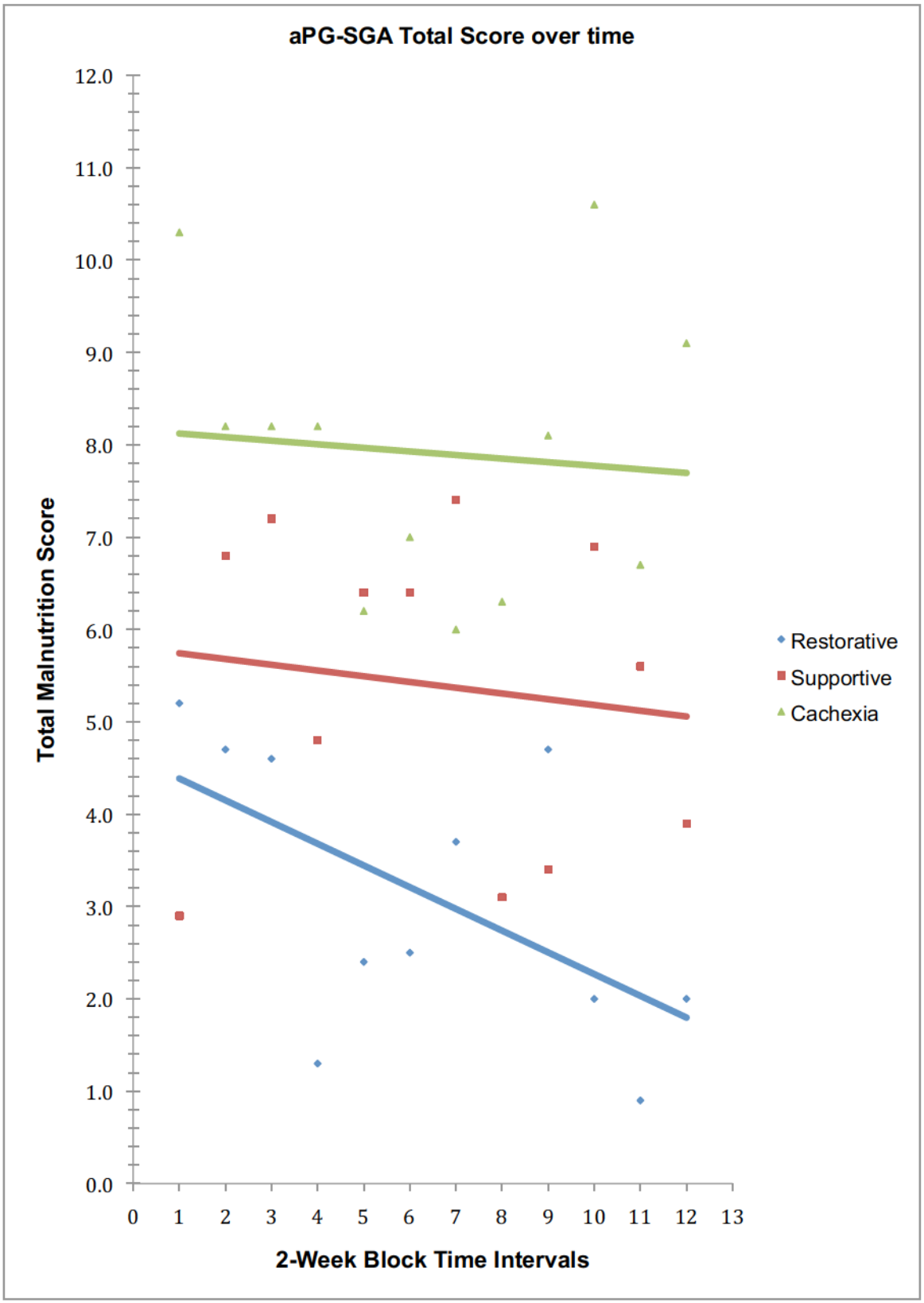
9.8 aPG-SGA over time

There were no significant differences/interactions for the total aPG-SGA malnutrition score among and within groups (rehabilitation pathways) over the 12 x 2-week block intervals of time (Tables 3j, 3k). However, there was a trend main effect of pathway (F [2, 1] = 2.99; p=0.053) and a significant main time effect (F [2, 1] = 7.10; p=0.009) of the total score (Table 3j) for all patients. These analyses were adjusted for covariates.

Table 3l. Fixed Effects Table of aPG-SGA variable Total Score over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Total Score				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	180	2.99	0.053
2 Week Block Time Intervals	1	93	7.10	0.009
Pathway * 2 Week Block Time Intervals	2	180	0.17	0.841
Age	1	180	1.51	0.221
Sex	1	180	1.59	0.209
On/Off Oncological Treatment	1	180	0.28	0.598

Figure 2. Plot of aPG-SGA total malnutrition score over time



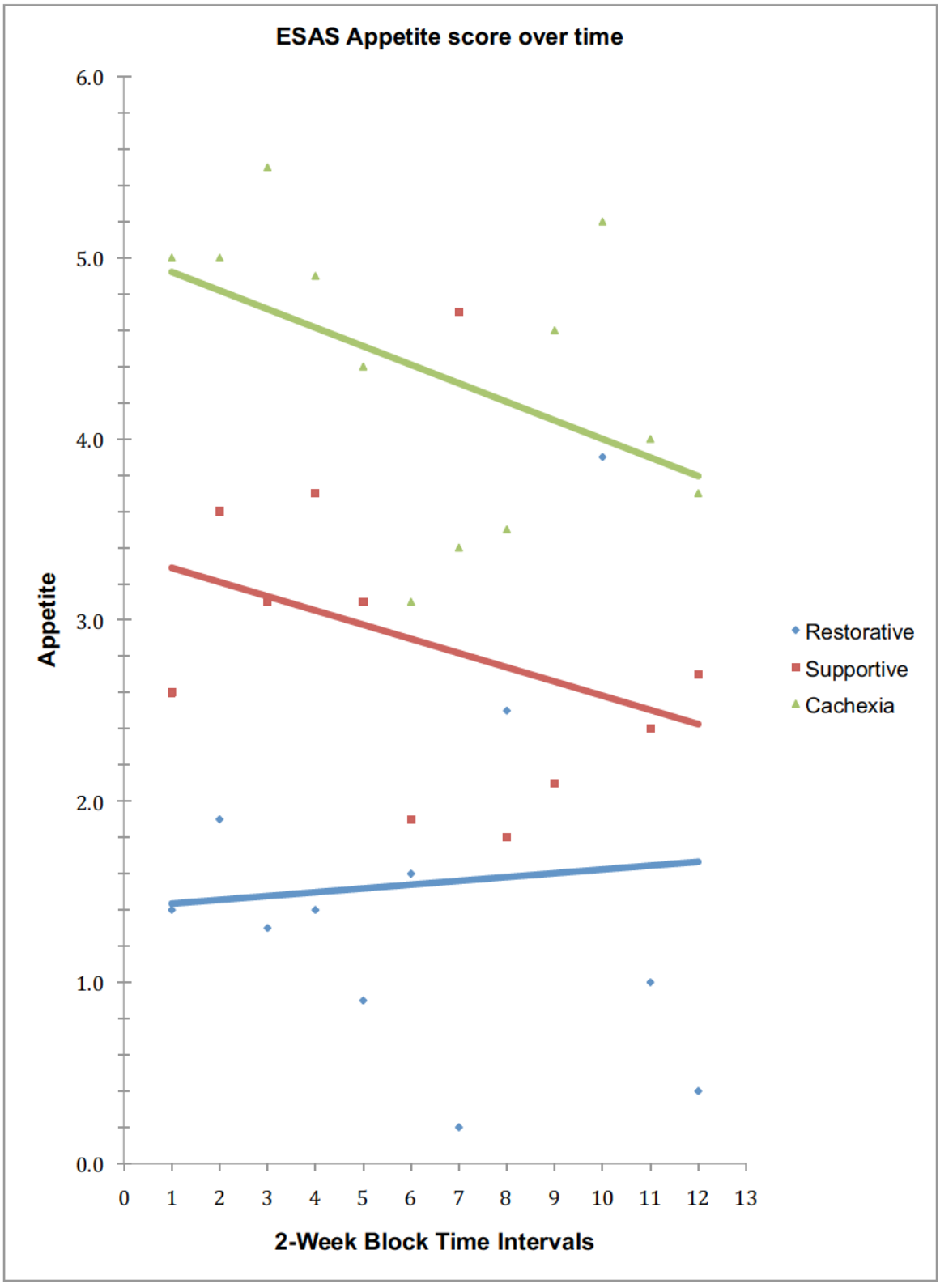
9.9 ESAS over time

None of the ESAS variables had a statistically significant interaction among and within groups over the 12 x 2-week block intervals of time (Tables 3l, 3m, 3qqqq-3fffff). However, the appetite score did have a significant main effect of pathway (F [2, 1] = 10.43; p<0.0001) and a trend main effect of time (F [2, 1] = 3.46; p=0.067) for all patients (Table 3l).

Table 3m. Fixed Effects Table of ESAS variable Appetite over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Appetite				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	10.43	<0.0001
2 Week Block Time Intervals	1	93	3.46	0.067
Pathway * 2 Week Block Time Intervals	2	179	0.47	0.629
Age	1	179	1.04	0.310
Sex	1	179	0.01	0.943
On/Off Oncological Treatment	1	179	0.68	0.411

Figure 3. Plot of ESAS appetite score over time



Besides the previously mentioned linear trend in time for the ESAS appetite score, there weren't any other significant and/or consistent statistical trend of change among and within the three groups over the 12 x 2-week block intervals for the other ESAS variables. These changes are varied even within each stream, which is customary in clinical programs of this nature in part due to the complexity of the disease state. Another point to consider is the fact that each block interval of time includes a different subset of patients, therefore, any observed change doesn't necessarily represent patient improvement.

Please refer to Appendix F for all other tables and figures (plots) that weren't put in the main text of the results section.

10.0 Discussion

The great majority of patients affected by cancer and its treatments are in desperate need of improving their physical, functional and QoL status. To address these needs, cancer rehabilitation programs have been developed to help deal with the patients' symptom burden, functional loss, and physical and psychological status. From the literature, a great deal of rehabilitation program assessments use a combination of self-reported questionnaires and functional tests to assess the overall wellbeing of the patient. Generally speaking, previous programs have reported marginal to moderate levels of success in terms of the overall improvements in a mixed patient population. Recognized strengths from these programs include a fixed program duration (e.g., 10-12 weeks), and a pre-defined start and end visit date, which tends to encourage greater program completion. A major weakness of current programs is the lack of FU visits between program initiation and completion. Therefore, an important addition to programs would be to have patients come in for FU appointments to more closely monitor and better treat them. However, what appears to be missing in the literature is a more personalized approach to patient assessment along with a systematic categorical intake system that places patients into assessment pathways based upon disease severity, which is exactly what the MUHC's CARE program does. All patients referred to the CARE program are categorized into one of the following three specific program rehabilitation pathways to meet the various specialized and personalized needs of cancer patients and survivors: 1) Restorative, no signs of active disease and in need to return to their usual (work) activities; 2) Supportive, have active disease and are undergoing oncological treatments who are in need of nutritional and functional reconditioning; and 3) Cachexia, those with non-curative intent, more advanced disease and suffering from weight loss, anorexia and fatigue.

10.1 Baseline Comparisons

The differences of self-reported questionnaire scores between groups revealed some significant and relevant variation between groups, further demonstrating that dividing the cancer patients in different rehabilitation pathways might be clinically meaningful, at baseline. The restorative and cachexia patients had significantly different BMI, WBC, weight loss histories, performance statuses, total malnutrition scores, appetite, and feelings of distress concerning sleep and weight. Whereas, the supportive and cachexia patients portrayed differences in BMI, weight loss history, and feelings of distress towards worrying about their friends/family. On the other hand, none of the variables were significantly different between the restorative and supportive pathways. The most baseline differences in self-reported questionnaires and other variables were observed between the restorative and cachexia pathways because, clinically, those two types of patients are the most different. At baseline, the characterization of the three rehabilitation pathways seems to make sense. Clinically, the patients seem different at baseline, which favors the argument that patients are in need of different types of rehabilitation interventions.

10.2 Pre-post Program Comparisons

This preliminary data did not capture much relevant and significant changes pre-post program, mainly due to the small number of patients completing the post-program FSI, DST and m-CHAMPS questionnaires and a lack of power. However, from the post-program FSI questionnaires that were filled out, the restorative patients reported a trend of lower levels of fatigue, both, at the time the questionnaire was being completed (3.4 ± 0.6 to 2.0 ± 0.7) and the day, during the past week, where the patient felt the least fatigued (from 2.8 ± 0.5 to 0.9 ± 0.7). Although, being based upon nine patients, this is not clinically relevant. The DST saw a rise in the number of cachectic patients, from 17.5% ± 6.8 to 113.0% ± 25.2, feeling distressed getting to and from appointments, however, being based upon only two patients, it isn't a meaningful difference. The self-reported hours of physical activity (the occurrence and duration of physical activities commonly performed per week) did not significantly increase or decrease post-program for any of the patients. Also, perhaps the patients are more similar than we hypothesized, the groups filling out the questionnaires might not be as different as we taught.

10.3 Program Duration Comparisons

The study did report a couple of progress trends for the patients, as measured by the aPG-SGA and ESAS questionnaires, on the account of the program. The fixed effects of the random trend model did not show any significant interaction of pathway over time, however,

there was a significant main effect of time for the aPG-SGA total malnutrition score and a trend main effect of time for the ESAS appetite score. Meaning that, collectively, patients in the program did report a difference over time with respective to the two previously mentioned variables. The linear random trend effects in Figures 2 and 3 reflect the development of each group across time. These differences are trends of progress, where Figure 2 displays a trend of lower total malnutrition score for all patients over time; and, Figure 3 shows a trend of appetite status improvement for all patients over time. Perhaps the patients started to take the advice from the dietitan to modify their behavior for a healthier eating lifestyle, which may explain why progress trends were solely observed for the malnutrition and appetite status scores.

There weren't any other significant and clinically relevant changes or program effect when looking at the different questionnaire scores for the patients in the restorative, supportive and cachexia rehabilitation pathways over the 12 x 2-week block intervals of time. Rather, the observed trend for all the other variables was stable HRQoL questionnaire scores across all three types of patients throughout the duration of the program, which is a positive finding for the cachexia patients, whose health is rapidly debilitating due to rapid decreases in muscle mass and fat, poor functional outcomes and becoming weaker, as time progresses. The cachexia group experienced a stable HRQoL, according to the scores collected, as opposed to the two other groups. This may be more of a comment on the study's experimental approach rather than the actual health of the patients. In general, the cachexia patients tend to be followed up with more closely by the team compared to the restorative and supportive groups, due to their debilitating prognosis. More data points and less missing data (because more attention was put on these patients) may have resulted in establishing a better relationship between the variables inquestion.

Stable self-reported HRQoL scores mean that the patients perceived that they did not get worse while going through the CARE program. While the patients seem to not have made much progress while they were seeing the interdisciplinary team, they didn't get worse either (e.g. a decline in HRQoL). Both the restorative and supportive patients definitely need help from rehabilitative services to get them back on their feet. Perhaps, a more prominent physical therapy and structured exercise component would better reinforce an increase in strength and HRQoL. Inconsistent and incomplete collection of questionnaire scores, and the lack of structured and timely FU appointments (if any were scheduled at all, some patients were lost to FU) might have affected the analysis of results and might also explain why not much improvement was seen for the restorative and supportive patients.

The only hypotheses that proved to be true were: 1) At baseline, the patients in the Restorative group showed a statistically significant improvement compared to the Cachexia group with regards to some of the individual scores of the aPG-SGA, ESAS and DST; 2) At baseline, the patients in the Supportive group showed a statistically significant improvement compared to the Cachexia group with regards to one of the individual scores of the aPG-SGA and DST; and 3) Over follow-up visits, there was a trend of progress/improvement for the aPG-SGA total malnutrition score and for the ESAS appetite status for all patients.

In theory, improvement in the HRQoL measures might have relieved symptom burden and ameliorated psychological status, more so, giving restorative patients the confidence and support to return to work or their usual activities and possibly allowing the supportive patients more comfortable daily living, although, this was not reflective in our results.

At baseline, the patients are classified into different categories with quite rigid clinical criteria, which make sense, in the point of view of patient health status and prognosis, however, statistically (from the results we gathered over time) it doesn't make sense. As time progresses, there was no HRQoL score variation between the groups. The supportive patients seem to be more homogenous in their responses, therefore, they seem to share the same outcomes. The homogeneity of supportive patients means losing their clinical identity. As time progresses, the disease status of the supportive (as well as the patients from the other two groups) patients may evolve over time. Even though, they were classified, at baseline, as supportive, it does not necessarily mean that their clinical prognosis stayed, by definition, "supportive" throughout their involvement with the CARE program. With the supportive group, there might a mix of patients with symptoms similar to those in the restorative and cachexia groups. Therefore, they did not show any differences perhaps because their self-reported HRQoL outcomes measures are a mix of restorative and cachectic patient symptoms. Also, the fact that some supportive patients were receiving systemic treatment and/or radiotherapy while participating in the CARE program might have affected the self-reported outcome measures. Certain HRQoL measures may have improved or worsened at any given visit, not necessarily due to their involvement in the CARE program, but rather due to benefits or side effects from their cancer treatment.

Overall, the patients enrolled in the CARE program have not demonstrated significant improvements in subjective HRQoL outcomes, besides total malnutrition and appetite status, quite possibly due to lack of FUs and/or capturing FU data, and, possibly, the homogeneity of patients between groups. If data collection followed its proper course, and every patient completed the required questionnaires during every visit with the CARE program, the analyzed

data would have been more representative. Another issue concerns the irregular and sometimes long gaps of time between FU appointments, which realistically can be tough to work around simply because of the number of waitlisted patients. Statistically speaking, it isn't easy to analyze clinical and personalized interventions. A more structured program where every patient has a fixed number of appointments might also be beneficial for program and data completion.

The general goal of this program was to have patients take better control of their lives by improving their functional status and QoL, through the help of an interdisciplinary team. Using a personalized approach of information delivery, patients were educated regarding symptom control, prescription of exercises, suggestions for behavioral modification, and psychological support by specifically trained health care professionals. Solely, looking at the scores from those five selected subjective questionnaires, in addition to malnutrition and appetite status, the patients did not show any other meaningful trends of improvement in HRQoL. There is a great need for personalized and more targeted interventions to achieve or maintain optimal performance and QoL in cancer survivors with different disease and treatment characteristics.

10.4 Limitations of the Study

There are many possible limitations that this research project may have faced. Those limitations that had the greatest potential impact on the quality of the findings and the ability to effectively answer the research questions and/or hypotheses are self-reported outcome measures, limited external validity, lack of control group and retrospective design.

The HRQoL data was evaluated using subjective and patient-reported assessments, which may have problems with honesty, accuracy of assessing ourselves, understanding, rating scales, response bias, recall bias, social desirability bias and over-estimating HRQoL (NICE Clinical Guidelines, 2009).

The study subjects received personalized interventions specific to their individual needs and goals, and therefore, interventions were not uniform. Individualized programs are the norm in clinical practice, and such programs are likely to be patient-centered rather than uniform, which is exactly what we want in a cancer rehabilitation program. However, statistically speaking, when interventions are not uniform, the results are particularly susceptible to bias, even though, clinically it is a strength.

Our findings are based on a relatively small patient sample in a specific hospital setting, one centre only, therefore the generalizability to a larger population is limited. The conclusions from this study cannot be generalized to all cancer patients. The patient subject sample was not representative of all cancer patients, it only reflected the patients referred to the CARE program

from the MUHC's Department of Oncology, therefore limiting the external validity of this study's conclusions to reflect the cancer rehabilitation and its patients in everyday practice (Steckler and McLeroy, 2008).

There is a limited availability of potential methodological designs for the three particular patient groups. A lack of control group for comparison makes it difficult to infer effect. Therefore, the next step would be to create control or contrast groups, although some patients only have a few months to live and withholding treatments would not be ethical. An option could be to use the wait-listed patients as controls in a randomized controlled trial (Zernicke et al., 2014), to determine the unique effect of the CARE program.

This study has a retrospective design, with the main disadvantage of limited control over data collection. The existing data was, in certain instances, incomplete or inconsistently measured between patients. The impact of missing data in quantitative studies has serious implications of biased estimates of parameters, loss of information, decreased statistical power, increased standard errors, and weakened generalizability of findings (Dong and Peng, 2013). The scientific community is working on minimizing missing data by modifying study/trial design and how the trials are conducted. To illustrate, just simplifying trial participation for patients, their caregivers, and those conducting the trials might increase program completion and data collection. Despite the fact that there are many statistical analyses that accommodate missing data, (e.g., nonresponse by multiple imputation) it would be beneficial to identify possible patterns for missing data when planning a clinical trial/study. Simple modifications to the trial design may definitely minimize missing data (Kurland et al., 2012).

The time period, in days, between the FU appointments of the patients participating in the CARE program was also not consistent, therefore making it difficult to compare data and draw out conclusions with great statistical power. To overcome this issue and calculate changes over the duration of the FUs, data was truncated into 2-week windows of assessment. However, data truncation raises its own set of limitations, though it has little effects on statistical power, it can affect linear relations between time and HRQoL outcome measures (Ulrich et al., 1994).

The collected outcome data in those patients completing the program was assessed to get an idea on the impact of this type of intervention. Any sort of FU outcome data in those patients not completing the program might have been equally helpful in understanding how these patients differed, in terms of disease deterioration, from those completing the program.

Lastly, *possible reasons for having a significant main effect of pathway but no specific group differences after performing the posthoc tests: 1) a borderline main effect (e.g.,

p=0.04999999 or p=0.050); 2) not enough people in the population sample to detect a posthoc difference (especially if this finding is in some of the FU data where there was a significant drop off); 3) the possibility of having a lot of variability around the mean for each group (which if you don't have a lot of people in your group, this could be happening); 4) a main effect which is due to error, given the amount of analyses performed this could be a remote possibility. Theoretically, 5 out of 100 completed analyses should be significant by chance so it could be a function of multiple tests. However, we did adjust for multiple comparisons in the analyses so that seems highly unlikely.

10.5 Conclusion

The interventions of the CARE program, where the multidisciplinary team of health care professionals assessed, evaluated and provided personalized advice to the patients, did show some significant and meaningful trends of progress in self-reported, HRQoL outcome measures of overall malnutrition and appetite status for the cancer patients from all three pathways, within a one year time period. The data collected throughout 2014 confirm that the HRQoL and symptom profile can vary significantly across cancer patients at different stages of their disease trajectories. Our results reinforce the need for well-controlled and randomized clinical trials to confirm any benefits of interdisciplinary cancer rehabilitation programs for patients and their families. Rehabilitation programs need to be organized around those characteristics in order to personalize possible future interventions and significantly impact on the performance and QoL of cancer patients.

10.6 Future Directions

Certain ways to improve the data collection of questionnaires from visit to visit and prepare a more efficient cancer rehabilitation program with more focused and specialized interventions will follow. A main finding from this retrospective chart review was that there weren’t many collected and complete sets of initial and end program questionnaires. The majority of patients completed an initial set of questionnaires, as they should, however, very few completed an initial and end set of questionnaires. Reasons for the latter include a variety of situations, either: the questionnaires weren’t handed to the patient on the day of their end evaluation, the patients never came to the clinic for their end visit, patients passed away before having their end evaluation or patients were not well suited for the CARE program and were referred elsewhere. Moving forward, patients, regardless of stream, should come in for an initial visit, followed by two to three FU visits, and lastly an end visit. Once the patient is done with this “new” program and still needs to be seen, they can either: be referred to another clinic better

suited to meet their needs (e.g., psycho-social oncology, palliative day hospital, lymphedema program, survivorship program, etc..); schedule another appointment with a specific member of the CARE program for targeted interventions (e.g., if the patient only needs help with physical rehabilitation, then they schedule to meet the physiotherapist alone versus an appointment with the entire team); or re-enroll in the 4-5 visit cancer rehab program (e.g., if they need more help from the entire team). This way all patients have a pre-determined start and end visit date and all the required HRQoL outcome measures get collected, to adequately assess the impact of the CARE program on QoL status of its patients.

Another important addition to the CARE program, would be to assess patient satisfaction using the validated FACIT-TS-PS questionnaire (Peipert et al., 2014) pre- and post-program. It would be a great way to retrieve information on how the CARE program is received from the perspective of the patients. The FACIT-TS-PS is a relatively new developed treatment satisfaction tool that measure the health care experience during therapy, or in this case rehabilitation interventions, for chronic illness. The questionnaire is composed of the following subscales: explanations, interpersonal, comprehensive care, technical quality, decision-making, nurses, trust, and overall satisfaction, where items are scored using a 5-point system (0, not at all; 1, a little; 2, somewhat; 3, quite a bit; 4, very much) (Peipert et al., 2014).

From my personal experience with the CARE program, there seems to be a gap between great verbal patient feedback (concerning their involvement with the program and interaction with the interdisciplinary team) and minimal changes in their QoL status scores. Thus, it would be very interesting and informative to perform a more comprehensive investigation on the benefits and/or advantages of patient participation. Perhaps, brief patient interviews can be conducted at various points throughout the program, to determine possible reasons for patient attendance, despite their own acknowledgment of physical and psychological deterioration.

A great clinical service such as the CARE program must adapt, be responsive and personalize to the patients' needs, but perhaps there should be more of an emphasis on program completion or non-completion that is worth considering. For instance, in a clinical trial setting, completion is considered essential for outcome data and is a fundamental indicator of success. For patients with advanced cancer, CRP level and perceived strength are shown to be useful prognostic indicators for the ability to complete an interdisciplinary rehabilitation program (Chasen et al., 2013). These indicators can be used to assist in patient selection for rehabilitation and in directing patients to appropriate resources. Common to several successful

cancer rehabilitation program completion, is a fixed program duration (whether it be a 6-week or 3-month long program) and rigid, scheduled FU visits. Earlier re-evaluation of sick patients and less waiting between FUs visits could potentially lead to less dropouts and a higher number of subjects completing the program. Perhaps, asking the patients to fill out five HRQoL questionnaires, before being seen by the CARE team, during their initial and end visit is too physically and mentally demanding on the patients. Another suggestion: implementing a patient-oriented goal setting, in addition to the goals that the rest of the health care team is setting for the patient, what do the patients what to improve on.

Are the patients actually taking the advice given by the team? Should the CARE team find more objective ways or measures of compliance from exercise programs and dietary advice? A novel and futuristic approach to track if patients are actually following the given advice, on a daily basis, is for the CARE program to develop an app (free download on smart phones, which the majority of patients have). This could be an app where each health care professional creates a check list of advice they are giving to the patient at each visit. Afterwards, all the patient has to do at home is check off which items on the list they are actually completing, on their phones, on a daily basis.

Interesting future projects or additions to this project include: discovering reasons for program dropouts by making FU phone calls to those who dropped out; determining if the patients who completed the CARE program resulted in less than average palliative care or emergency hospitalization compared to cancer patients who did not undergo a rehabilitation program; determine if the government will save more money by investing in cancer rehabilitation programs now, which may later prevent, delay or minimize in-patient hospitalization. Is the CARE team being effective in terms of changing the behavior of their patients? Will effectively modifying the behavior of the patients, allow them to adopt healthier lifestyle changes and ultimately improve their own QoL?

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12.0 Appendices

12.1 Appendix A: Cancer Rehabilitation Program Schedule

CANCER REHAB CLINIC/CACHEXIA					
Date:	Friday th, 2014				
8:15-9:00	Meeting -case presentation(NP + F/U)				
	MD	NR	NUT	OT	PT
9:00-9:30					
9:30-10:00					
10:00-10:30					
10:30-11:00					
11:00-11:30					
11:30-12:15		meeting			
12:15-13:15		Lunch			
13:15-13:45					
13:45-14:15					
14:15-14:45					
14:45-15:15					
15:15-15:45					

	ROOM	PATIENT	MGH #	Type
AM	1			
	2			
	3			
	4			
	5			
	6			

	ROOM	PATIENT	MGH #	Type
PM	1			
	2			
	3			
	4			

12.2 Appendix B: Description of the Three Rehabilitation Pathways

RESTORATIVE REHABILITATION		
Prognosis	No signs of active disease	
Patient Population	- Patient is experiencing problems secondary to cancer and/or its treatments such as deconditioning, fatigue, weakness, nutritional and digestive problems or cognitive loss requiring an interdisciplinary approach (Physician-MD, Nurse-RN, Occupational Therapist-OT, Physical Therapist-PT, Dietitian-NUT) - Patient has been seen for post treatment evaluation by oncology and is at least 1 month after treatment is completed	
Goals	- Optimize physical, nutritional and functional status - Return to usual activity - Minimize impact of cognitive dysfunction in daily living - Educate and empower patients to make healthy life choices	
Assessment Tools	**First visit (all patients):** - ESAS - DST - a-PG-SGA - 6 min walk - Sit to stand - SLS (Single Leg Stand) - Modified CHAMPS - Blood work (SMA-10, CRP, albumin, CBC, Testosterone) - **Hand grip – 1 year pilot** - **Mini-Cog – 1 year pilot** - **FSI - 1 year pilot** **As needed:** - MOCA, Bells-test, Trail-making - Blood work - Pittsburgh Sleep Quality Index - Semmes Weinstein monofilament test **Every visit:** ESAS (RN) & a-PG-SGA (NUT) & Hand grip - 1 year pilot (NUT) **End-evaluation:** - ESAS - DST - a-PG-SGA - 6 min walk - Sit to stand - SLS - Modified CHAMPS - MOCA if previously completed, - Pittsburgh Sleep Quality Index if previously completed, for comparison - **Hand grip – 1 year pilot** - **FSI - 1 year pilot** - Blood work (SMA-10, CRP, albumin, CBC, Testosterone)	 RN MD RN MD NUT PT PT PT OT MD NUT MD OT OT MD RN,OT OT RN MD RN MD NUT PT PT PT OT OT RN,OT NUT OT MD
Timeline	2 – 4 Months	

SUPPORTIVE REHABILITATION		
Prognosis	6 months or greater, patients with active disease	
Patient Population	- Patient is experiencing problems secondary to cancer and/or its treatments such as deconditioning, fatigue, weakness, nutritional and digestive problems or cognitive loss requiring an interdisciplinary approach (Physician, Nurse, Occupational Therapist, Physical Therapist, Dietitian) - Patients with active disease undergoing treatment or not	
Goals	- Optimize physical, nutritional and functional status - Minimize impact of cognitive dysfunction in daily living - Educate and empower patients to make healthy life choices	
Tools	**First visit (all patients):**	
	- ESAS	RN MD
	- DST	RN MD
	- a-PG-SGA	NUT
	- 6 min walk	PT
	- Sit to stand	PT
	- SLS (Single Leg Stand)	PT
	- Blood work (SMA-10, CARE, albumin, CBC,)	MD
	- **Hand grip – 1 year pilot**	NUT
	- **Mini-Cog – 1 year pilot**	MD
	- **FSI** - 1 year pilot	OT
	As needed:	
	- MOCA, Bells-test, Trail-making	OT
	- Blood work (testosterone, etc…)	MD
	- Pittsburgh Sleep Quality Index	RN,OT
	- Semmes Weinstein monofilament test	OT
	Every visit:	
	- ESAS	RN
	- a-PG-SGA	NUT
	- Hand grip – 1 year pilot	NUT
	End-evaluation:	
	- ESAS	RN MD
	- DST	RN MD
	- a-PG-SGA	NUT
	- 6 min walk	PT
	- Sit to stand	PT
	- SLS	PT
	- Modified CHAMPS	OT
	- MOCA if previously completed, for comparison	OT
	- Pittsburgh Sleep Quality Index, if previously completed, for comparison	RN,OT
	- **Hand grip – 1 year pilot**	NUT
	- **FSI - 1 year pilot**	OT
	- Blood work (SMA-10, CARE, albumin, CBC, Testosterone)	MD
Timeline	2 – 4 months	

CACHEXIA		
Prognosis	Non-curative intent / Greater than 3 months	
Patient Population	- Patients with inoperable/incurable/metastatic cancer presenting with weight loss, anorexia and indicators of abnormal metabolism (anemia, CARE, hypoalbuminemia, increased tumor markers, etc…) - ECOG 1 or 2 - Pain control is not primary concern	
Goals	- To optimize nutritional and functional status - Identify and minimize metabolic abnormalities associated with cachexia - Inform and empower the patient to act on their nutritional status.	
Tools	First visit (all patients): - ESAS - DST - a-PG-SGA - Blood work (SMA-10, CARE, albumin, CBC, TSH, LFTs) - Vital signs - Hand grip – 1 year pilot - Mini-Cog – 1 year pilot - FSI if fatigue is $\geq$ 4 on ESAS – 1 year pilot As needed/feasible - Additional blood work (bioavailable testosterone) - OT/PT referral - Referral to MNUPAL (McGill Nutrition and Performance Laboratory) Every visit: - ESAS - a-PG-SGA - Hand grip - Blood work (to be done on a monthly basis prior to clinic appointment) - Vital signs End-evaluation: - FSI if was done at the first visit – 1 year pilot - When appropriate, transition to Cancer Rehab or Day Hospital	 MD,RN MD,RN NUT MD RN NUT MD OT MD MD MD MD,RN NUT NUT MD RN OT
Timeline	- Until return to normal nutritional status or referral to the day hospital.	

12.3 Appendix C: Cancer Care Mission's Supportive Care Program Referral Form

Centre universitaire de santé McGill
McGill University Health Centre

☐ HME MCH ☒ HGM MGH ☒ HRV RVH
☒ HNM MNH ☒ ITM MCI ☐ CL LC

* F M U - 1 0 4 0 *

Mission des soins de cancer
Cancer Care Mission

Référence au programme de soutien en oncologie
Douleur cancéreuse, soins palliatifs, réadaptation, cachexie, lymphoedème

Supportive Care Program Referral
Cancer Pain, Palliative Care, Cancer Rehabilitation, Cachexia, Lymphedema

Numéro de dossier / Unit Number / Nom du patient / Patient's Name

Téléphone / *Telephone* :514-934-1934 ext 48412 **Télécopieur** / *Fax* :514-934-8415

Date (AAAY/MM/JJ) :

Nom du référant / *Referral from:*

Diagnostic / *Diagnosis :*

Maladie métastatique / *Metastatic Diseases :* ☐ Non/No ☐ Oui/Yes

Traitements / *Treatments*

☐ Chirurgie / *Surgery* — Radiothérapie/ *Radiotherapy* ☐ En cours /*Ongoing* ☐ Terminée /*Completed*

Chimiothérapie / *Chemotherapy* ☐ En cours/*Ongoing* ☐ Terminée/*Completed*

Plan de soins / *Goals of care:* ☐ Curatif / *Cure* ☐ Palliatif / *Palliative* ☐ Incertain / *Uncertain*

Imagerie récente (Veuillez indiquer la totalité ou l'imagerie pertinente terminée) / *Recent Imaging (Please indicate all or pertinent imaging completed):*
☐ **Autres (spécifiez)** / *Others (specify)* :

☐	Radiographie *X-ray*	☐	IRM *MRI*	☐	Échographie *Ultrasound*	☐	Aucune imagerie *No imaging done*
☐	TDM *CT Scan*	☐	TEP *PET*	☐	Scintigraphie osseuse *Bone Scan*	☐ Oui/Yes ☐ Non/No	Les images sont-elles dans Oacis? *Are imaging in Oacis?*

Si l'imagerie a été effectuée à l'extérieur du CUSM, assurez-vous que le rapport soit envoyé par télécopieur au numéro suivant 514-934-8415 ou apporté par le patient lui-même / *If imaging done outside of MUHC ensure the report is faxed 514-934-8415 or brought with the patient*

Urgence de la référence / *Referral Urgency*

☐ **HAUTE PRIORITÉ** / *HIGH PRIORITY*
Rendez-vous le plutôt possible 24-48 heures
Appointment as soon as possible 24-48 hours

☐ **MODÉRÉE** / *MODERATE*
Rendez-vous dans une semaine
Appointment within 1 week

☐ **FAIBLE** / *LOW*
Rendez-vous dans les 2 semaines
Appointment within 2 weeks

Raison de la demande / *Reason for the Referral*

☐ **Douleur reliée au cancer** / *Pain related to cancer*
☐ **Gestion de symptômes autre que la douleur** / *Symptom management other than pain (précisez / specify)* _____
☐ **Soins palliatifs** / *Palliative cares*
☐ **Réadaptation** / *Rehabilitation (précisez / specify)* _____
☐ **Perte de poids** / *Weight loss*
☐ **Lymphoedème** / *Lymphedema*
☐ **Autre**/ *Other* _____

Nom du médecin en lettres moulées / *Print name of referring physician*

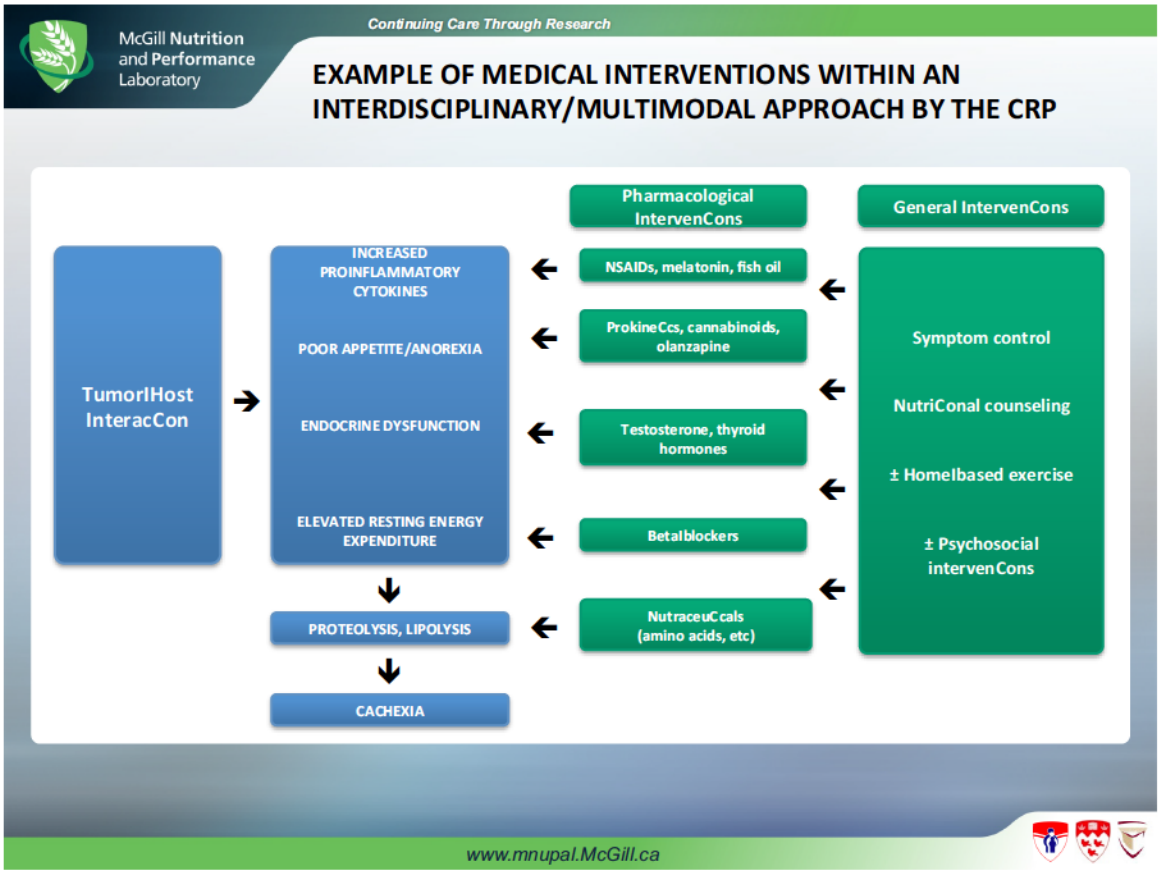
Signature du médecin / *Referring physician's signature*

Original- Dossier médical/ Medical record **Copie jaune-Département**/ Yellow copy-Department

DM-2331 (REV 2011/05/18) projet pilot CUSM Repro MUHC

12.4 Appendix D: Planned Interventions

Medical Interventions:



Slide Retrieved from Powerpoint Presentation:
Vigano, AAL. (2013). The MUHC Cachexia Clinic: From Staging to Managing Nutritional and Functional Problems in Advanced Cancer Patients. *MUHC Medical Grand Rounds*, March 12, 2013.

Nursing Interventions:

Restorative	Supportive	Cachexia
Bio-psycho-social evaluation		
Clarify understanding of disease, and goals of FU Reinforce importance of recommended oncology FU	Clarify understanding of disease, goals of treatment and care. Encourage setting realistic goals.	
Vital signs Review current medication list, current usage and organization		
Symptom assessment: Re pain, fatigue, GI and other symptoms: -Assess localization, intensity, qualily, frequency & duration, relieving and aggravating factors, associated symptoms -Effect on functional capacity and quality of life -Effectiveness of treatment -Side effects or complications of treatment -Contact number in order to report escalation of symptoms, inefficacity of treatment or side effects of treatment Re sleep disturbances : PQSI Re psycho-social distress: Assess for anxiety, depression, coping in patient and caregiver Re sexuality issues: Assess for difficulties in resuming usual sexual activity and/or adapting to change in body image		
Teaching/Education Identify information needs Reinforce understanding the cause of symptoms, rationale for intervention, use of medication, and side effects of medication Reinforce when to contact re. symptoms, provide contact number to call if needed Re pain: Encourage use of pain journal Re fatigue: Reinforce rest/activity balance, setting priorities, realistic expectations. Reinforce directives given by ot and pt Re sleep: Review sleep hygiene		
Support -Active listening, validate feelings, normalize experience, commend efforts and strengths, prompt to identify strengths. Re sexuality issues: Validate their concerns, permission to discuss Re isolation or care giver burden: Refer to social services, CLSC and other community agencies.		
Coordination - Contact number for patients re symptoms, prescriptions, appointments, other concerns. -Triage of new referrals, booking appointments, clinic schedule, -Contact number for rehab/cachexia team. -In collaboration with MD and team, organize referrals to CLSC, PSO, SW, Pastoral care etc -Assist patient to navigate system, communication with other professionals		

Physiotherapy interventions:

<table>
<tr><th>Restorative</th><th>Supportive</th><th>Cachexia</th></tr>
<tr><td>Home strengthening program
to regain muscle mass and strength</td><td colspan="2">to optimize or regain muscle mass and strength</td></tr>
<tr><td colspan="2">Cardio training:
progressive walking program, biking, and/or return to pt's usual cardio training program</td><td>Light training: using slowly progressive walking +/- stationary bike program</td></tr>
<tr><td colspan="3">Balance training</td></tr>
<tr><td colspan="3">Address musculoskeletal issues using manual therapy, ROM ex's, specific strengthening ex's, and proprioceptive ex's</td></tr>
<tr><td colspan="3">Scar mobility</td></tr>
<tr><td>Facilitate progressive return to physical activities such as heavy house work and pt's usual phys. activities incl. sports, dance, yoga…</td><td>Facilitate progressive and safe return to physical activities</td><td>Facilitate safe participation in physical activities</td></tr>
<tr><td></td><td colspan="2">Educate pt on posture and/or pain-relieving positions/movements</td></tr>
<tr><td></td><td colspan="2">Fall-prevention techniques incl. prescription of walking aids, AFO's, and education about neuropathies</td></tr>
<tr><td></td><td colspan="2">Empower pt. to be able to judge if phys. activities are appropriate for him/her</td></tr>
<tr><td>Empower pt. to make life-long healthy lifestyle choices and to make a commitment to physical activity</td><td colspan="2"></td></tr>
</table>

Occupational Therapist Interventions:

Restorative	Supportive	Cachexia
Neuropathies: Help with management of neuropathies to optimize function, safety and comfort		
Pain Management: Teach functional pain management strategies		
Self-care and daily Living : Provide adaptive aids to enable self-care and instrumental activities of daily living		
Safety: Assess fall risk and teach fall prevention techniques		
	Safety: Assess need for home equipment and services Monitor patient's functional status, and if need be, assist to transition the patient to appropriate living environment	
Experience of cancer: Discuss treatment experience, provide active listening and support	**Experience of cancer:** Discuss cancer experience and help patient adapt to permanent life changes, provide active listening and support	**Experience of cancer:** Discuss cancer experience and help patient adapt to permanent life changes, provide active listening and support

Functional goal: Assist with setting specific functional goals	**Functional goal:** Assist with setting **realistic** functional goals	
Level of activity: **- Improve** activity levels - Simplify work or school related tasks - Enable meaningful activities - Teach energy **restoration** techniques	**Level of activity:** **- Maintain/Improve** activity levels - Help patient work through activity or role losses - Enable meaningful activities - Teach strategies to compensate for decreased cognition	**Level of activity:** **- Slow down** functional decline - Simplify self-care and leisure tasks and help patient work through activity or role losses - Enable meaningful light activities - Teach energy conservation techniques

Nutrition Interventions

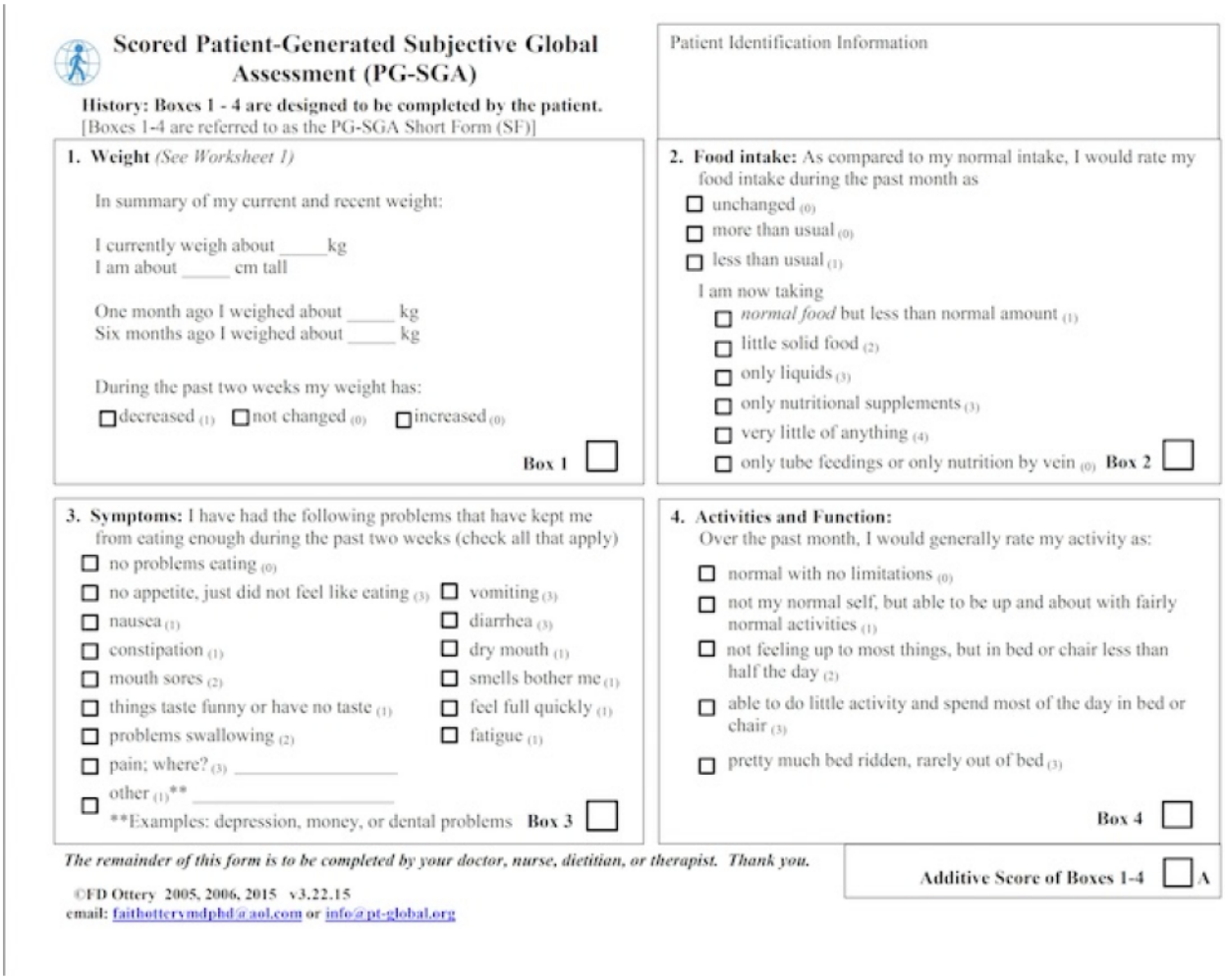
- For all interventions goals are created with the patient and family in order to meet their needs
- Patients and families are empowered to make their own decisions. Individual food preferences are respected whether they be cultural, religious, personal or otherwise. However, in instances where current intake is inadequate or suboptimal the patient will be informed and goals changed accordingly.
- A summary of discussion with clear and specific goals are given to patient at the end of the session.
- All patients are provided contact information and are encouraged to call with questions and concerns.

Restorative	Supportive	Cachexia
Promote weight gain/maintenance: Using high energy, high protein diet, supplements and modification of usual eating patterns and habits.		
Diabetes (including hypoglycemia): Using, "Just the Basics" for Diabetes, menu modification adapted for patients' treatment phase and needs, dietary management of hypoglycemia, review of proper medication usage and discussion of discrepancies with MD, supplement use if applicable.		
Nausea and vomiting: Using "dietary management of nausea", recommendations on remaining hydrated, homemade oral rehydration solution, modification of usual eating patterns and habits and revision of anti-emetic and prokinetic agent usage.		
Diarrhea: Using "dietary management of diarrhea", low fiber diet, recommendations on remaining hydrated, homemade oral rehydration solution.		
Constipation: Using "dietary management of constipation with guide to high fiber foods", fluid recommendations and revision of laxative use.		
Food security: Limited referral to community food access programs, discussion with team and referral to social worker as needed.		
Complimentary therapy/alternative medicine: Revision of natural health product usage for safety and efficacy along with traditional medicine using existing standards and references as well as alerting team to any potential problems. Respecting patients' wishes to engage in safe use of these therapies and to empower their choices. Demystify their usage.		
Promote weight loss/maintenance: Using Canada's Food Guide to Healthy Eating, "Eating Well After Cancer Treatment", modification of usual eating patterns and habits and a		

supplement review.		
	Mucositis: Using, “tips to manage dry mouth or thick saliva”, “tips to manage sore mouth or throat”, revision of oral hygiene and soft solid diet.	
	Taste changes: Using, “tips to manage taste or smell changes”, revision of oral hygiene, homemade mouth rinse recipe and menu modification.	
	Food safety: Using, “food safety during cancer” and alerting patient as to the safe usage of probiotics. However, patients typically receive food safety treatment prior to coming to cancer rehabilitation.	
	Dysphagia: Diet adapted based on type of dysphagia, instruction on modifying texture and consistency of solids and liquids, provide contact information for dysphagia product suppliers, enteral nutrition, discussion and FU with team OT with possible referral to dysphagia clinic.	

12.5 Appendix E: Sample Questionnaires

abridged Patient-Generated Subjective Global Assessment (aPG-SGA) Questionnaire:



Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History: Boxes 1 - 4 are designed to be completed by the patient.
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

Patient Identification Information

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about _____kg
I am about _____ cm tall

One month ago I weighed about _____ kg
Six months ago I weighed about _____ kg

During the past two weeks my weight has:
☐ decreased (1) ☐ not changed (0) ☐ increased (0)

Box 1 ☐

2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as
☐ unchanged (0)
☐ more than usual (0)
☐ less than usual (1)

I am now taking
☐ *normal food* but less than normal amount (1)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritional supplements (3)
☐ very little of anything (4)
☐ only tube feedings or only nutrition by vein (0) **Box 2** ☐

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)
☐ no problems eating (0)
☐ no appetite, just did not feel like eating (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
☐ fatigue (1)
☐ pain; where? (3) _____
☐ other (1)** _____
Examples: depression, money, or dental problems **Box 3 ☐

4. Activities and Function:
Over the past month, I would generally rate my activity as:
☐ normal with no limitations (0)
☐ not my normal self, but able to be up and about with fairly normal activities (1)
☐ not feeling up to most things, but in bed or chair less than half the day (2)
☐ able to do little activity and spend most of the day in bed or chair (3)
☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.

Additive Score of Boxes 1-4 ☐ A

email: faithotterymdphd@aol.com or info@pt-global.org

Image retrieved from:
http://pt-global.org/?page_id=13
Faith D. Ottery, MD, PhD

Edmonton Symptom Assessment System (ESAS):

Centre universitaire de santé McGill
McGill University Health Centre

☐ HME MCH ☒ HGM MGH ☐ HRV RVH
☐ HNM MNH ☒ ITM MCI ☐ CL LC

* F M U – 6 7 9 9 *

Échelle d'évaluation des symptômes d'Edmonton (EESE)

Edmonton Symptom Assessment System (ESAS)

Numéro de dossier / Unit Number / Nom du patient / Patient's Name

Veuillez écrire lisiblement en lettres moulées / *Please type or print legibly*

Nom *Name*	**Date** *Date* A A Y Y	M M	J D

Pour chaque item suivant, encerclez le chiffre qui décrit le mieux votre état de santé au cours des **DERNIÈRES 24 HEURES.**
For each of the following items, please circle the number that best describes your health ***DURING THE LAST 24 HOURS.***

Aucune douleur *No pain*	0	1	2	3	4	5	6	7	8	9	10	**Pire douleur possible** *Worst possible pain*
Aucune fatigue *Not tired*	0	1	2	3	4	5	6	7	8	9	10	**Pire fatigue possible** *Worst possible tiredness*
Aucune nausée *Not nauseated*	0	1	2	3	4	5	6	7	8	9	10	**Pires nausées possible** *Worst possible nausea*
Aucune dépression *Not depressed*	0	1	2	3	4	5	6	7	8	9	10	**Pire dépression possible** *Worst possible depression*
Aucune anxiété *Not anxious*	0	1	2	3	4	5	6	7	8	9	10	**Pire anxiété possible** *Worst possible anxiety*
Aucune somnolence *Not drowsy*	0	1	2	3	4	5	6	7	8	9	10	**Pire somnolence possible** *Worst possible drowsiness*
Très bon appétit *Best appetite*	0	1	2	3	4	5	6	7	8	9	10	**Pire appétit possible** *Worst possible appetite*
Meilleure sensation de bien-être *Best feeling of well-being*	0	1	2	3	4	5	6	7	8	9	10	**Pire sensation de bien-être possible** *Worst possible feeling of well-being*
Aucun essoufflement *No shortness of breath*	0	1	2	3	4	5	6	7	8	9	10	**Pire essoufflement possible** *Worst possible shortness of breath*
Autre problème *Other problem*	0	1	2	3	4	5	6	7	8	9	10	

Souhaitez-vous avoir de l'aide pour l'un des problèmes nommés ci-haut ?
Would you like to receive some help for one or the other problem you may have mentioned above?
☐ **Oui** / *Yes* ☐ **Non** / *No*

Signature du patient *Patient's Signature*

Original- Dossier médical/ Medical Record **Copie jaune-Département**/ Yellow copy-Department

DM-2310 (REV 2011/05/03) *CUSM Repro MUHC*

Fatigue Symptom Inventory (FSI):

FSI

For each of the following, circle the <u>one number</u> that best indicates how that item applies to you.

1. Rate your level of fatigue on the day you felt **most** fatigued during the past week:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all fatigued										**As fatigued as I could be**

2. Rate your level of fatigue on the day you felt **least** fatigued during the past week:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all fatigued										**As fatigued as I could be**

3. Rate your level of fatigue on the **average** during the past week:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all fatigued										**As fatigued as I could be**

4. Rate your level of fatigue **right now**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all fatigued										**As fatigued as I could be**

5. Rate how much, in the past week, fatigue interfered with your **general level of activity**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

6. Rate how much, in the past week, fatigue interfered with your **ability to bathe and dress yourself**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

7. Rate how much, in the past week, fatigue interfered with your **normal work activity (includes both work outside the home and housework)**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

For each of the following, circle the one number that best indicates how that item applies to you.

8. Rate how much, in the past week, fatigue interfered with your **ability to concentrate**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

9. Rate how much, in the past week, fatigue interfered with your **relations with other people**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

10. Rate how much, in the past week, fatigue interfered with your **enjoyment of life**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

11. Rate how much, in the past week, fatigue interfered with your **mood**:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
No interference										**Extreme interference**

12. Indicate **how many days**, in the past week, you felt fatigued for any part of the day:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Days							**Days**

13. Rate **how much of the day**, on average, you felt fatigued in the past week:

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
None of the day										**The entire day**

14. Indicate which of the following best describes the **daily pattern** of your fatigue in the past week:

0	*1*	*2*	*3*	4
Not at all fatigued	**Worse in the morning**	**Worse in the afternoon**	**Worse in the evening**	**No consistent daily pattern of fatigue**

Distress Screening Tool (DST):

Centre universitaire de santé McGill
McGill University Health Centre

☐ HME MCH ☒ HGM MGH ☐ HRV RVH
☐ HNM MNH ☒ ITM MCI ☐ CL LC

* F M U – 6 0 1 3 *

Outil de dépistage de la détresse
Distress Screening Tool

Numéro de dossier / Unit Number / Nom du patient / Patient's Name

Veuillez écrire lisiblement en lettres moulées / *Please type or print legibly*

Nom *Name*	Date *Date* A A Y Y	M M	J D

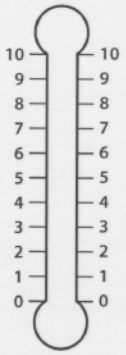
LA DÉTRESSE est une émotion désagréable qui diminue la qualité de vie et peut nuire au fonctionnement de la personne.
DISTRESS is an unpleasant emotional experience that reduces quality of life and can affect daily functioning.

1. COTE AU THERMOMÈTRE *SCORE ON THE DISTRESS THERMOMETER*

Comment évaluez-vous votre détresse **durant la dernière semaine, incluant aujourd'hui ?** SVP encerclez un chiffre (0-10) sur le thermomètre.

Please circle the number (0-10) that best describes how much distress you have been experiencing ***in the past week including today.***

Détresse extrême
Extreme Distress



Aucune détresse
No Distress

2. LISTE DE PROBLÈMES CANADIEN *CANADIAN PROBLEM CHECKLIST*

☑ SVP cochez tous les éléments qui ont été une source de préoccupation ou un problème pour vous **durant la dernière semaine, incluant aujourd'hui.**
Please check all of the following items that have been a concern or problem for you ***in the past week including today.***

Pratiques *Practical*

- ☐ Travail / études — *Work / School*
- ☐ Finances — *Finances*
- ☐ Se rendre aux rendez-vous — *Getting to and from appointments*
- ☐ Logement — *Accommodation*

Social / familial *Social / Family*

- ☐ Me sentir comme un fardeau — *Feeling a burden to others*
- ☐ Préoccupations envers la famille / les amis — *Worry about family / friends*
- ☐ Me sentir seul(e) — *Feeling alone*

Émotionnel *Emotional*

- ☐ Peurs / inquiétudes — *Fears / worries*
- ☐ Tristesse — *Sadness*
- ☐ Colère / frustration — *Frustration / anger*
- ☐ Changement d'apparence — *Changes in appearance*
- ☐ Intimité / sexualité — *Intimacy / sexuality*
- ☐ Perte d'intérêt face aux activités habituelles — *Loss of interest in usual activities*
- ☐ M'adapter à la maladie — *Coping*

Spirituel *Spiritual*

- ☐ Me questionner sur le sens ou le but de ma vie — *Meaning / purpose of life*
- ☐ Me sentir ébranlé(e) dans mes croyances — *Faith*
- ☐ Me questionner dans ma relation avec Dieu — *Questioning relationship to God*

Information *Informational*

- ☐ Comprendre la maladie et les traitements — *Understanding my illness and/or treatment*
- ☐ Communiquer avec l'équipe soignante — *Talking with the health care team*
- ☐ Prendre une décision face aux traitements — *Making treatment decisions*
- ☐ Connaître les ressources disponibles — *Knowing about available resources*

Physique *Physical*

- ☐ Concentration / mémoire — *Concentration / memory*
- ☐ Sommeil — *Sleep*
- ☐ Poids — *Weight*
- ☐ Constipation ou diarrhée — *Constipation or diarrhea*

Le thermomètre de détresse est un outil adapté et reproduit avec la permission du NCCN (Janvier 2007) «*Distress Management Clinical Practice Guidelines in Oncology*». Pour une version plus récente et complète des indications du NCCN, visitez le http://www.nccn.org.

The Distress Thermometer is a tool adapted and reproduced with permission from the NCCN (Jan. 2007) "Distress Management Clinical Practice Guidelines in Oncology". To view most recent and complete version of the Guidelines, go online to http://www.nccn.org.

Adaptation par l'équipe d'oncologie psychosociale et spirituelle du CHUQ; Mai 2009. Les outils sont basés sur les recommandations du Partenariat canadien contre le cancer sur le fichier minimum de données.
Adapted from the psychosocial and spiritual oncology group of the CHUQ; May 2009. The measures are based on the Canadian Partnership Against Cancer (CPAC) minimum data set recommendations.

Signature du patient *Patient's Signature*

Original- Dossier médical/ Medical Record — **Copie jaune-Département**/ Yellow copy-Department

DM-2202 (REV 2011/05/03) *CUSM Repro MUHC*

m-CHAMPS Questionnaire used in the CARE program:

MODIFIED CHAMPS – ACTIVITY QUESTIONNAIRE

Think of a typical week. In the last week how many hours total do you:

	SEDENTARY ACTIVITIES	HOURS
1	Using a computer	
2	Reading	
3	Writing or drawing	
4	Arts and crafts	
5	Playing cards bingo or board games	
6	Doing crosswords, soduku or puzzles	
7	Watching television	
	TOTAL HOURS	

	LIGHT ACTIVITIES	HOURS
8	Visiting with friends or family	
9	Doing volunteer work	
10	Attending church, a club or a group meeting	
11	Attending the hospital	
12	Doping needlework or knitting	
13	Doing stretching or flexibility exercises	
14	General conditioning	
15	Attending a concert, movie, lecture or sport event	
16	Walking leisurely	
17	Doing chores outside the home (banking, running errands)	
18	Playing musical instrument	
19	Shooting pool or billiards	
20	Driving	
	TOTAL HOURS	

	MODERATE ACTIVITY	HOURS
21	Doing light work around the house (sweeping, laundry)	
22	Doing light gardening (pulling weeds)	
23	Doing woodwork	
24	Working on your car, lawn mower	
25	Jogging	
26	Walking fast	
27	Doing yoga or tai-chi	
28	Dancing	
29	Light strength training	
30	Taking public transport	
	TOTAL HOURS	

	HEAVY ACTIVITIES	HOURS
31	Playing gold	
32	Playing tennis	
33	Bowling	
34	Skating	
35	Heavy work around the house (washing windows, shovelling)	
36	Heavy gardening (spading, raking)	
37	Aerobic exercise (bicycling, rowing machine)	
38	Swimming or doing water exercises	
39	Heavy strength training	
40	Playing basketball, soccer, racquetball	
41	Playing hockey	
42	Skiing	
43	Playing curling	
	TOTAL HOURS	

	OTHER ACTIVITIES	HOURS
44		
45		
46		
	TOTAL HOURS	

12.6 Appendix F: Result Tables 3n-3fffff

Table 3n. Fixed Effects Table of FSI Variable **Normal work activity interference** PRE/POST Program

Type 3 Tests of Fixed Effects Normal work activity interference				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	0.31	0.734
Time	1	10	9.18	0.013
Pathway * Time	2	10	2.47	0.134
Age	1	97	1.91	0.170
Sex	1	97	1.15	0.287
On Treatment	1	97	0.04	0.844
Number of FUs	1	97	0.00	0.985

Table 3o. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference)** **Normal work activity interference**
Restorative	0	4.5 ± 0.8
Restorative	1	2.3 ± 0.9
Supportive	0	4.1 ± 0.6
Supportive	1	4.1 ± 1.3
Cachexia	0	5.2 ± 0.5
Cachexia	1	1.3 ± 1.5

Table 3p. Fixed Effects Table of FSI Variable **Relations with other people interference** PRE/POST Program

Type 3 Tests of Fixed Effects Relations with other people interference				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	95	0.48	0.620
Time	1	10	6.68	0.027
Pathway * Time	2	10	0.41	0.673
Age	1	95	0.92	0.340
Sex	1	95	0.03	0.863
On Treatment	1	95	0.04	0.840
Number of FUs	1	95	0.06	0.807

Table 3q. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference)** **Normal work activity interference**
Restorative	0	2.3 ± 0.7
Restorative	1	1.4 ± 0.8
Supportive	0	3.7 ± 0.5
Supportive	1	2.0 ± 1.1
Cachexia	0	3.7 ± 0.4
Cachexia	1	1.4 ± 1.4

Table 3r. Fixed Effects Table of FSI Variable **Enjoyment of life interference** PRE/POST Program

Type 3 Tests of Fixed Effects Enjoyment of life				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	95	0.85	0.429
Time	1	10	10.11	0.010
Pathway * Time	2	10	0.27	0.768
Age	1	95	0.09	0.761
Sex	1	95	1.71	0.194
On Treatment	1	95	0.33	0.566
Number of FUs	1	95	0.24	0.628

Table 3s. FSI Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference) Enjoyment of life
Restorative	0	3.1 ± 0.8
Restorative	1	1.7 ± 0.9
Supportive	0	4.9 ± 0.6
Supportive	1	2.8 ± 1.2
Cachexia	0	4.7 ± 0.5
Cachexia	1	2.3 ± 1.4

Table 3t. Fixed Effects Table of FSI Variable **Mood interference** PRE/POST Program

Type 3 Tests of Fixed Effects Mood interference				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	0.62	0.540
Time	1	11	3.67	0.084
Pathway * Time	2	11	0.45	0.653
Age	1	97	2.32	0.131
Sex	1	97	1.72	0.193
On Treatment	1	97	0.01	0.925
Number of FUs	1	97	0.06	0.805

Table 3u. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference)** Mood interference
Restorative	0	3.0 ± 0.7
Restorative	1	2.2 ± 0.9
Supportive	0	4.2 ± 0.5
Supportive	1	3.5 ± 1.2
Cachexia	0	4.5 ± 0.5
Cachexia	1	2.3 ± 1.4

Table 3v. Fixed Effects Table of FSI Variable **Activity interference** PRE/POST Program

Type 3 Tests of Fixed Effects Activity interference				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	96	1.21	0.302
Time	1	11	6.41	0.028
Pathway * Time	2	11	0.34	0.719
Age	1	96	0.14	0.710
Sex	1	96	1.20	0.276
On Treatment	1	96	0.78	0.381
Number of FUs	1	96	0.05	0.817

Table 3w. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference)** Activity interference
Restorative	0	3.7 ± 0.7
Restorative	1	2.5 ± 0.9
Supportive	0	5.2 ± 0.5
Supportive	1	4.1 ± 1.0
Cachexia	0	5.5 ± 0.4
Cachexia	1	3.2 ± 1.4

Table 3x. Fixed Effects Table of FSI Variable **Concentration interference** PRE/POST Program

Type 3 Tests of Fixed Effects Concentration interference				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	95	1.04	0.356
Time	1	10	9,68	0.011
Pathway * Time	2	10	2.53	0.129
Age	1	95	1.06	0.307
Sex	1	95	0.58	0.449
On Treatment	1	95	0.02	0.891
Number of FUs	1	95	1.08	0.301

Table 3y. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference) Concentration interference**
Restorative	0	2.9 ± 0.7
Restorative	1	2.2 ± 0.9
Supportive	0	4.0 ± 0.5
Supportive	1	2.9 ± 1.2
Cachexia	0	4.0 ± 0.5
Cachexia	1	-0.3 ± 1.5

Table 3z. Fixed Effects Table of FSI Variable **Interference with the ability to self-bathe and dress** PRE/POST Program

Type 3 Tests of Fixed Effects Ability to self-bathe and dress				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	0.40	0.671
Time	1	11	4.45	0.059
Pathway * Time	2	11	0.28	0.762
Age	1	97	0.01	0.943
Sex	1	97	0.26	0.614
On Treatment	1	97	0.07	0.792
Number of FUs	1	97	0.24	0.624

Table 3aa. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = no interference ; 10 = extreme interference)** **Interference with the ability to self-bathe and dress**
Restorative	0	1.9 ± 0.7
Restorative	1	1.4 ± 0.8
Supportive	0	2.1 ± 0.5
Supportive	1	1.2 ± 0.8
Cachexia	0	2.8 ± 0.5
Cachexia	1	1.8 ± 0.9

Table 3bb. Fixed Effects Table of FSI Variable **Most Fatigued** PRE/POST Program

Type 3 Tests of Fixed Effects Most Fatigued				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	1.35	0.263
Time	1	11	4.78	0.051
Pathway * Time	2	11	0.14	0.873
Age	1	97	2.25	0.137
Sex	1	97	0.38	0.540
On Treatment	1	97	0.05	0.825
Number of FUs	1	97	0.54	0.464

Table 3cc. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = not at all fatigued ; 10 = as fatigued as I can be) Most Fatigued**
Restorative	0	5.6 ± 0.6
Restorative	1	3.5 ± 0.8
Supportive	0	6.7 ± 0.4
Supportive	1	5.3 ± 1.1
Cachexia	0	6.5 ± 0.4
Cachexia	1	5.2 ± 1.6

Table 3dd. Fixed Effects Table of FSI Variable **Average fatigue** PRE/POST Program

Type 3 Tests of Fixed Effects Average fatigue				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	97	2.46	0.091
Time	1	11	3.96	0.072
Pathway * Time	2	11	0.54	0.596
Age	1	97	0.14	0.709
Sex	1	97	0.98	0.324
On Treatment	1	97	0.45	0.503
Number of FUs	1	97	0.74	0.393

Table 3ee. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = not at all fatigued ; 10 = as fatigued as I can be) Average fatigue**
Restorative	0	3.9 ± 0.5
Restorative	1	2.1 ± 0.7
Supportive	0	5.0 ± 0.4
Supportive	1	3.8 ± 0.9
Cachexia	0	5.0 ± 0.3
Cachexia	1	4.6 ± 1.3

Table 3ff. Fixed Effects Table of FSI Variable **Daily fatigue** PRE/POST Program

Type 3 Tests of Fixed Effects Daily fatigue				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	95	1.30	0.277
Time	1	9	13.36	0.005
Pathway * Time	2	9	0.15	0.860
Age	1	95	2.08	0.152
Sex	1	95	1.13	0.291
On Treatment	1	95	1.56	0.215
Number of FUs	1	95	0.01	0.936

Table 3gg. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = none of the day ; 10 = the entire day)** **Daily fatigue**
Restorative	0	3.6 ± 0.7
Restorative	1	1.5 ± 0.9
Supportive	0	5.6 ± 0.5
Supportive	1	3.0 ± 1.2
Cachexia	0	5.2 ± 0.4
Cachexia	1	2.2 ± 1.5

Table 3hh. Fixed Effects Table of FSI Variable **Numbers of days fatigued in the past week** PRE/POST Program

Type 3 Tests of Fixed Effects Numbers of days fatigued in the past week				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	94	0.34	0.715
Time	1	10	10.18	0.010
Pathway * Time	2	10	0.48	0.632
Age	1	94	1.43	0.235
Sex	1	94	0.96	0.330
On Treatment	1	94	1.12	0.292
Number of FUs	1	94	0.06	0.804

Table 3ii. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores range from 0 = 0 days ; 7 = 7 days) Numbers of days fatigued in the past week**
Restorative	0	4.3 ± 0.6
Restorative	1	3.4 ± 0.7
Supportive	0	5.3 ± 0.4
Supportive	1	3.6 ± 0.9
Cachexia	0	5.4 ± 0.4
Cachexia	1	3.7 ± 1.0

Table 3jj. Fixed Effects Table of FSI Variable **Daily pattern of fatigue** PRE/POST Program

Type 3 Tests of Fixed Effects Daily pattern of fatigue				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	95	0.17	0.846
Time	1	10	0.22	0.650
Pathway * Time	2	10	0.07	0.931
Age	1	95	0.15	0.701
Sex	1	95	0.06	0.804
On Treatment	1	95	0.40	0.530
Number of FUs	1	95	1.17	0.283

Table 3kk. FSI Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Scores 0 = not at all fatigued; 1= worse in the morning; 2= worse in the afternoon; 3=worse in the evening; 4= no consistent daily pattern of fatigue)** Daily pattern of fatigue
Restorative	0	3.6 ± 0.3
Restorative	1	3.4 ± 0.4
Supportive	0	3.6 ± 0.2
Supportive	1	3.3 ± 0.6
Cachexia	0	3.7 ± 0.2
Cachexia	1	3.8 ± 0.7

Table 3ll. Fixed Effects Table of DST Variable **Distress thermometer** PRE/POST Program

Type 3 Tests of Fixed Effects Distress thermometer				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	4.52	0.013
Time	1	8	1.99	0.196
Pathway * Time	2	8	2.00	0.198
Age	1	102	4.18	0.044
Sex	1	102	0.44	0.509
On Treatment	1	102	1.24	0.268
Number of FUs	1	102	0.08	0.782

Table 3mm. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean ± SE (Distress thermometer score) (0 = no distress ; 10 = extreme distress)**
Restorative	0	2.3 ± 0.7
Restorative	1	-0.006 ± 0.9
Supportive	0	4.0 ± 0.5
Supportive	1	4.0 ± 1.1
Cachexia	0	4.1 ± 0.4
Cachexia	1	3.8 ± 1.3

Table 3nn. Fixed Effects Table of DST Variable **Worrying about friends/family** PRE/POST Program

Type 3 Tests of Fixed Effects Worrying about friends/family				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.76	0.177
Time	1	8	0.05	0.821
Pathway * Time	2	8	4.91	0.041
Age	1	102	1.74	0.190
Sex	1	102	0.27	0.603
On Treatment	1	102	2.38	0.126
Number of FUs	1	102	2.06	0.154

Table 3oo. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Worrying about friends/family**
Restorative	0	40.6 ± 11.3
Restorative	1	0.5 ± 18.6
Supportive	0	51.4 ± 8.3
Supportive	1	21.0 ± 23.2
Cachexia	0	28.2 ± 7.1
Cachexia	1	89.1 ± 28.6

Table 3pp. Fixed Effects Table of DST Variable **Work/School** PRE/POST Program

Type 3 Tests of Fixed Effects Work/School				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.34	0.268
Time	1	8	0.02	0.898
Pathway * Time	2	8	0.44	0.658
Age	1	102	3.06	0.083
Sex	1	102	1.76	0.187
On Treatment	1	102	0.20	0.653
Number of FUs	1	102	0.61	0.438

Table 3qq. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Work/School**
Restorative	0	28.3 ± 8.8
Restorative	1	27.8 ± 15.9
Supportive	0	15.6 ± 6.5
Supportive	1	28.6 ± 20.3
Cachexia	0	10.1 ± 5.5
Cachexia	1	-7.4 ± 25.5

Table 3rr. Fixed Effects Table of DST Variable **Weight** PRE/POST Program

Type 3 Tests of Fixed Effects Weight				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.13	0.879
Time	1	8	0.98	0.352
Pathway * Time	2	8	1.21	0.347
Age	1	102	0.05	0.819
Sex	1	102	0.88	0.349
On Treatment	1	102	0.48	0.492
Number of FUs	1	102	0.09	0.770

Table 3ss. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** Weight
Restorative	0	41.8 ± 12.1
Restorative	1	51.3 ± 22.3
Supportive	0	40.7 ± 8.9
Supportive	1	33.8 ± 28.2
Cachexia	0	64.7 ± 7.6
Cachexia	1	8.6 ± 35.8

Table 3tt. Fixed Effects Table of DST Variable **Understanding my illness and/or treatment** PRE/POST Program

Type 3 Tests of Fixed Effects Understanding my illness and/or treatment				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.28	0.281
Time	1	8	2.51	0.152
Pathway * Time	2	8	1.82	0.223
Age	1	102	5.04	0.027
Sex	1	102	0.72	0.400
On Treatment	1	102	10.41	0.002
Number of FUs	1	102	0.41	0.524

Table 3uu. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Understanding my illness and/or treatment**
Restorative	0	30.7 ± 10.2
Restorative	1	30.1 ± 13.6
Supportive	0	23.3 ± 7.5
Supportive	1	-10.0 ± 15.4
Cachexia	0	26.3 ± 6.4
Cachexia	1	20.9 ± 18.2

Table 3vv. Fixed Effects Table of DST Variable **Talking with the health care team** PRE/POST Program

Type 3 Tests of Fixed Effects Talking with the health care team				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.12	0.889
Time	1	8	1.19	0.307
Pathway * Time	2	8	0.08	0.924
Age	1	102	0.92	0.340
Sex	1	102	0.81	0.370
On Treatment	1	102	0.40	0.529
Number of FUs	1	102	0.14	0.705

Table 3ww. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Talking with the health care team
Restorative	0	8.4 ± 8.1
Restorative	1	1.2 ± 14.8
Supportive	0	18.1 ± 6.0
Supportive	1	3.6 ± 18.8
Cachexia	0	12.7 ± 5.1
Cachexia	1	-4.1 ± 23.7

Table 3xx. Fixed Effects Table of DST Variable **Sleep** PRE/POST Program

Type 3 Tests of Fixed Effects Sleep				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.59	0.554
Time	1	8	7.59	0.025
Pathway * Time	2	8	0.37	0.705
Age	1	102	0.74	0.392
Sex	1	102	4.96	0.028
On Treatment	1	102	0.08	0.781
Number of FUs	1	102	0.23	0.630

Table 3yy. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** Sleep
Restorative	0	72.6 ± 11.5
Restorative	1	20.4 ± 19.7
Supportive	0	57.3 ± 8.5
Supportive	1	8.6 ± 24.9
Cachexia	0	34.7 ± 7.2
Cachexia	1	12.5 ± 30.9

Table 3zz. Fixed Effects Table of DST Variable **Sadness** PRE/POST Program

Type 3 Tests of Fixed Effects Sadness				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.14	0.867
Time	1	8	2.79	0.134
Pathway * Time	2	8	0.56	0.594
Age	1	102	1.58	0.212
Sex	1	102	1.12	0.293
On Treatment	1	102	0.34	0.559
Number of FUs	1	102	0.49	0.484

Table 3aaa. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Sadness
Restorative	0	43.0 ± 12.4
Restorative	1	24.9 ± 17.4
Supportive	0	43.7 ± 9.1
Supportive	1	40.5 ± 20.4
Cachexia	0	50.6 ± 7.8
Cachexia	1	15.5 ± 24.4

Table 3bbb. Fixed Effects Table of DST Variable **Meaning/purpose of life** PRE/POST Program

Type 3 Tests of Fixed Effects Meaning/purpose of life				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.54	0.587
Time	1	8	1.80	0.217
Pathway * Time	2	8	0.29	0.758
Age	1	102	0.02	0.882
Sex	1	102	1.61	0.207
On Treatment	1	102	1.41	0.237
Number of FUs	1	102	0.73	0.394

Table 3ccc. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Meaning/purpose of life**
Restorative	0	22.2 ± 9.1
Restorative	1	12.7 ± 16.3
Supportive	0	17.6 ± 6.7
Supportive	1	-12.3 ± 19.7
Cachexia	0	14.9 ± 5.7
Cachexia	1	-1.2 ± 25.8

Table 3ddd. Fixed Effects Table of DST Variable **Making treatment decisions** PRE/POST Program

Type 3 Tests of Fixed Effects Making treatment decisions				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.68	0.192
Time	1	8	0.38	0.552
Pathway * Time	2	8	0.31	0.742
Age	1	102	0.45	0.502
Sex	1	102	0.63	0.429
On Treatment	1	102	2.88	0.093
Number of FUs	1	102	0.62	0.432

Table 3eee. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Making treatment decisions**
Restorative	0	29.2 ± 9.7
Restorative	1	13.2 ± 17.0
Supportive	0	11.0 ± 7.2
Supportive	1	-6.9 ± 20.0
Cachexia	0	27.2 ± 6.2
Cachexia	1	33.7 ± 26.7

Table 3fff. Fixed Effects Table of DST Variable **Loss of interest in usual activities** PRE/POST Program

Type 3 Tests of Fixed Effects Loss of interest in usual activities				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.33	0.717
Time	1	8	7.39	0.026
Pathway * Time	2	8	0.58	0.582
Age	1	102	0.75	0.388
Sex	1	102	1.03	0.313
On Treatment	1	102	1.13	0.290
Number of FUs	1	102	0.72	0.399

Table 3ggg. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Loss of interest in usual activities**
Restorative	0	22.0 ± 10.9
Restorative	1	-18.7 ± 19.2
Supportive	0	44.0 ± 8.1
Supportive	1	-22.1 ± 22.8
Cachexia	0	30.1 ± 6.9
Cachexia	1	2.6 ± 30.2

Table 3hhh. Fixed Effects Table of DST Variable **Knowing about available resources** PRE/POST Program

Type 3 Tests of Fixed Effects Knowing about available resources				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.48	0.232
Time	1	8	5.52	0.047
Pathway * Time	2	8	3.53	0.080
Age	1	102	0.09	0.760
Sex	1	102	2.83	0.095
On Treatment	1	102	0.00	0.996
Number of FUs	1	102	1.00	0.320

Table 3iii. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** **Knowing about available resources**
Restorative	0	9.5 ± 10.1
Restorative	1	8.9 ± 12.8
Supportive	0	27.2 ± 7.4
Supportive	1	23.3 ± 13.9
Cachexia	0	25.8 ± 6.4
Cachexia	1	-20.2 ± 16.1

Table 3jjj. Fixed Effects Table of DST Variable **Intimacy/sexuality** PRE/POST Program

Type 3 Tests of Fixed Effects Intimacy/sexuality				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.72	0.491
Time	1	8	0.81	0.393
Pathway * Time	2	8	0.35	0.716
Age	1	102	4.71	0.032
Sex	1	102	2.48	0.119
On Treatment	1	102	0.33	0.569
Number of FUs	1	102	0.11	0.745

Table 3kkk. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Intimacy/sexuality
Restorative	0	24.4 ± 8.6
Restorative	1	13.1 ± 15.0
Supportive	0	15.5 ± 6.4
Supportive	1	-8.5 ± 17.7
Cachexia	0	14.7 ± 5.5
Cachexia	1	15.0 ± 23.5

Table 3lll. Fixed Effects Table of DST Variable **Frustation/anger** PRE/POST Program

Type 3 Tests of Fixed Effects Frustation/anger				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.59	0.210
Time	1	8	0.03	0.866
Pathway * Time	2	8	2.52	0.141
Age	1	102	3.54	0.063
Sex	1	102	0.18	0.671
On Treatment	1	102	0.00	0.997
Number of FUs	1	102	1.54	0.218

Table 3mmm. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Frustation/anger
Restorative	0	29.9 ± 11.3
Restorative	1	-3.0 ± 18.8
Supportive	0	35.0 ± 8.3
Supportive	1	18.3 ± 23.6
Cachexia	0	28.5 ± 7.1
Cachexia	1	70.9 ± 29.1

Table 3nnn. Fixed Effects Table of DST Variable **Finances** PRE/POST Program

Type 3 Tests of Fixed Effects Finances				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.13	0.875
Time	1	8	4.54	0.066
Pathway * Time	2	8	0.33	0.727
Age	1	102	7.93	0.006
Sex	1	102	0.10	0.747
On Treatment	1	102	1.11	0.295
Number of FUs	1	102	1.55	0.217

Table 3ooo. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Finances
Restorative	0	28.7 ± 9.4
Restorative	1	-2.3 ± 15.6
Supportive	0	19.1 ± 6.9
Supportive	1	6.9 ± 19.6
Cachexia	0	20.8 ± 5.9
Cachexia	1	-10.0 ± 24.1

Table 3ppp. Fixed Effects Table of DST Variable **Fears/worries** PRE/POST Program

Type 3 Tests of Fixed Effects Fears/worries				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.25	0.780
Time	1	8	1.42	0.267
Pathway * Time	2	8	0.47	0.644
Age	1	102	2.04	0.156
Sex	1	102	0.15	0.702
On Treatment	1	102	0.58	0.446
Number of FUs	1	102	3.40	0.068

Table 3qqq. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Fears/worries
Restorative	0	31.6 ± 11.7
Restorative	1	16.1 ± 17.1
Supportive	0	41.6 ± 8.6
Supportive	1	13.9 ± 20.4
Cachexia	0	35.9 ± 7.4
Cachexia	1	38.0 ± 24.6

Table 3rrr. Fixed Effects Table of DST Variable **Coping** PRE/POST Program

Type 3 Tests of Fixed Effects Coping				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	2.69	0.072
Time	1	8	0.10	0.756
Pathway * Time	2	8	0.68	0.534
Age	1	102	0.17	0.683
Sex	1	102	1.28	0.261
On Treatment	1	102	0.00	0.985
Number of FUs	1	102	0.08	0.774

Table 3sss. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** Coping
Restorative	0	16.1 ± 11.6
Restorative	1	5.1 ± 17.3
Supportive	0	46.0 ± 8.5
Supportive	1	63.3 ± 20.9
Cachexia	0	36.0 ± 7.3
Cachexia	1	41.1 ± 25.3

Table 3ttt. Fixed Effects Table of DST Variable **Constipation or diarrhea** PRE/POST Program

Type 3 Tests of Fixed Effects Constipation or diarrhea				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.30	0.278
Time	1	8	0.09	0.773
Pathway * Time	2	8	1.93	0.208
Age	1	102	0.05	0.818
Sex	1	102	0.48	0.489
On Treatment	1	102	2.28	0.134
Number of FUs	1	102	0.69	0.409

Table 3uuu. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** **Constipation or diarrhea**
Restorative	0	31.7 ± 11.1
Restorative	1	2.2 ± 19.3
Supportive	0	31.5 ± 8.1
Supportive	1	9.2 ± 24.5
Cachexia	0	28.7 ± 7.0
Cachexia	1	67.3 ± 30.5

Table 3vvv. Fixed Effects Table of DST Variable **Concentration/memory** PRE/POST Program

Type 3 Tests of Fixed Effects Concentration/memory				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.97	0.144
Time	1	8	0.52	0.491
Pathway * Time	2	8	1.28	0.329
Age	1	102	0.14	0.706
Sex	1	102	0.04	0.845
On Treatment	1	102	2.98	0.088
Number of FUs	1	102	5.16	0.025

Table 3www. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Concentration/memory**
Restorative	0	28.0 ± 8.7
Restorative	1	13.3 ± 14.9
Supportive	0	42.1 ± 7.7
Supportive	1	0.0 ± 27.4
Cachexia	0	37.5 ± 7.4
Cachexia	1	49.3 ± 25.4

Table 3xxx. Fixed Effects Table of DST Variable **Changes in appearances** PRE/POST Program

Type 3 Tests of Fixed Effects Changes in appearances				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.68	0.510
Time	1	8	1.73	0.224
Pathway * Time	2	8	0.63	0.559
Age	1	102	0.10	0.750
Sex	1	102	14.9	0.0002
On Treatment	1	102	0.00	0.951
Number of FUs	1	102	0.57	0.453

Table 3yyy. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Changes in appearances**
Restorative	0	22.4 ± 10.1
Restorative	1	21.9 ± 16.3
Supportive	0	19.0 ± 7.5
Supportive	1	-5.4 ± 18.2
Cachexia	0	34.4 ± 6.5
Cachexia	1	1.9 ± 24.9

Table 3zzz. Fixed Effects Table of DST Variable **Feeling a burden to others** PRE/POST Program

Type 3 Tests of Fixed Effects Feeling a burden to others				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.48	0.233
Time	1	8	1.54	0.250
Pathway * Time	2	8	0.71	0.522
Age	1	102	1.04	0.311
Sex	1	102	0.89	0.347
On Treatment	1	102	0.50	0.480
Number of FUs	1	102	1.40	0.240

Table 3aaaa. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** **Feeling a burden to others**
Restorative	0	24.7 ± 11.1
Restorative	1	7.2 ± 16.9
Supportive	0	25.5 ± 8.1
Supportive	1	-6.2 ± 20.5
Cachexia	0	36.6 ± 7.0
Cachexia	1	42.3 ± 24.9

Table 3bbbb. Fixed Effects Table of DST Variable **Feeling alone** PRE/POST Program

Type 3 Tests of Fixed Effects Feeling alone				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	1.99	0.142
Time	1	8	3.37	0.104
Pathway * Time	2	8	0.64	0.550
Age	1	102	0.13	0.724
Sex	1	102	0.12	0.725
On Treatment	1	102	0.00	0.973
Number of FUs	1	102	1.85	0.177

Table 3cccc. DST Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post program=1)	Adjusted Mean (%) ± SE (percentage of patients feeling distressed) Feeling alone
Restorative	0	27.8 ± 9.6
Restorative	1	18.7 ± 15.0
Supportive	0	24.6 ± 7.1
Supportive	1	12.7 ± 18.4
Cachexia	0	11.4 ± 6.0
Cachexia	1	-26.2 ± 22.5

Table 3dddd. Fixed Effects Table of DST Variable **Accommodation** PRE/POST Program

Type 3 Tests of Fixed Effects Accommodation				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	102	0.05	0.952
Time	1	8	0.54	0.482
Pathway * Time	2	8	0.03	0.971
Age	1	102	0.23	0.632
Sex	1	102	0.49	0.487
On Treatment	1	102	0.07	0.791
Number of FUs	1	102	0.10	0.755

Table 3eeee. DST Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post program=1)**	**Adjusted Mean (%) ± SE (percentage of patients feeling distressed)** Accommodation
Restorative	0	3.2 ± 5.0
Restorative	1	-1.6 ± 9.1
Supportive	0	4.9 ± 3.7
Supportive	1	-2.8 ± 11.6
Cachexia	0	5.3 ± 3.1
Cachexia	1	1.8 ± 14.6

Table 3ffff. Fixed Effects Table of m-CHAMPS Variable **Sedentary Activity** PRE/POST Program

Type 3 Tests of Fixed Effects Sedentary Activity				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	54	0.28	0.760
Time	1	6	1.50	0.266
Pathway * Time	2	6	0.33	0.729
Age	1	54	0.01	0.933
Sex	1	54	0.00	0.964
On Treatment	1	54	2.20	0.143
Number of FUs	1	54	0.43	0.513

Table 3gggg. m-CHAMPS Score Differences PRE/POST Program Within Groups

Pathway	Time (Pre-program=0; Post-program=1)	Adjusted Mean (hrs) ± SE Sedentary Activity
Restorative	0	35.2 ± 5.7
Restorative	1	25.7 ± 7.0
Supportive	0	37.3 ± 3.9
Supportive	1	36.0 ± 11.6
Cachexia	0	39.2 ± 1.9
Cachexia	1	21.8 ± 17.9

Table 3hhhh. Fixed Effects Table of m-CHAMPS Variable **Light Activity** PRE/POST Program

Type 3 Tests of Fixed Effects Light Activity				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	54	1.34	0.271
Time	1	6	6.30	0.046
Pathway * Time	2	6	0.33	0.733
Age	1	54	0.74	0.392
Sex	1	54	0.06	0.808
On Treatment	1	54	0.01	0.910
Number of FUs	1	54	0.09	0.770

Table 3iiii. m-CHAMPS Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post-program=1)**	**Adjusted Mean (hrs) ± SE Light Activity**
Restorative	0	22.9 ± 3.9
Restorative	1	33.4 ± 4.5
Supportive	0	15.1 ± 2.7
Supportive	1	22.6 ± 6.5
Cachexia	0	17.4 ± 3.1
Cachexia	1	35.9 ± 12.3

Table 3jjjj. Fixed Effects Table of m-CHAMPS Variable **Moderate Activity** PRE/POST Program

Type 3 Tests of Fixed Effects Moderate Activity				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	54	0.17	0.841
Time	1	6	0.02	0.902
Pathway * Time	2	6	0.50	0.632
Age	1	54	0.03	0.864
Sex	1	54	12.25	0.001
On Treatment	1	54	1.94	0.169
Number of FUs	1	54	0.00	0.963

Table 3kkkk. m-CHAMPS Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post-program=1)**	**Adjusted Mean (hrs) ± SE Moderate Activity**
Restorative	0	6.8 ± 2.4
Restorative	1	10.2 ± 3.1
Supportive	0	10.8 ± 1.7
Supportive	1	9.6 ± 5.4
Cachexia	0	9.4 ± 1.9
Cachexia	1	5.8 ± 7.6

Table 3llll. Fixed Effects Table of m-CHAMPS Variable **Heavy Activity** PRE/POST Program

Type 3 Tests of Fixed Effects Heavy Activity				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	54	0.75	0.479
Time	1	6	0.02	0.884
Pathway * Time	2	6	0.29	0.757
Age	1	54	25.14	<0.0001
Sex	1	54	4.90	0.031
On Treatment	1	54	1.05	0.309
Number of FUs	1	54	0.66	0.419

Table 3mmmm. m-CHAMPS Score Differences PRE/POST Program Within Groups

Pathway	**Time (Pre-program=0; Post-program=1)**	**Adjusted Mean (hrs) ± SE Heavy Activity**
Restorative	0	-0.2 ± 0.4
Restorative	1	0.4 ± 0.4
Supportive	0	0.7 ± 0.3
Supportive	1	0.6 ± 0.7
Cachexia	0	0.6 ± 0.3
Cachexia	1	0.4 ± 1.2

Table 3nnnn. Fixed Effects Table of ESAS variable Anxiety over 12 two-week intervals

Random trend Model Type 3 Tests of Fixed Effects for Anxiety				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	1.78	0.172
2 Week Block Time Intervals	1	93	0.02	0.881
Pathway * 2 Week Block Time Intervals	2	179	0.57	0.567
Age	1	179	0.21	0.648
Sex	1	179	1.47	0.227
On/Off Oncological Treatment	1	179	0.57	0.453

Figure 4. Plot of ESAS anxiety score over time

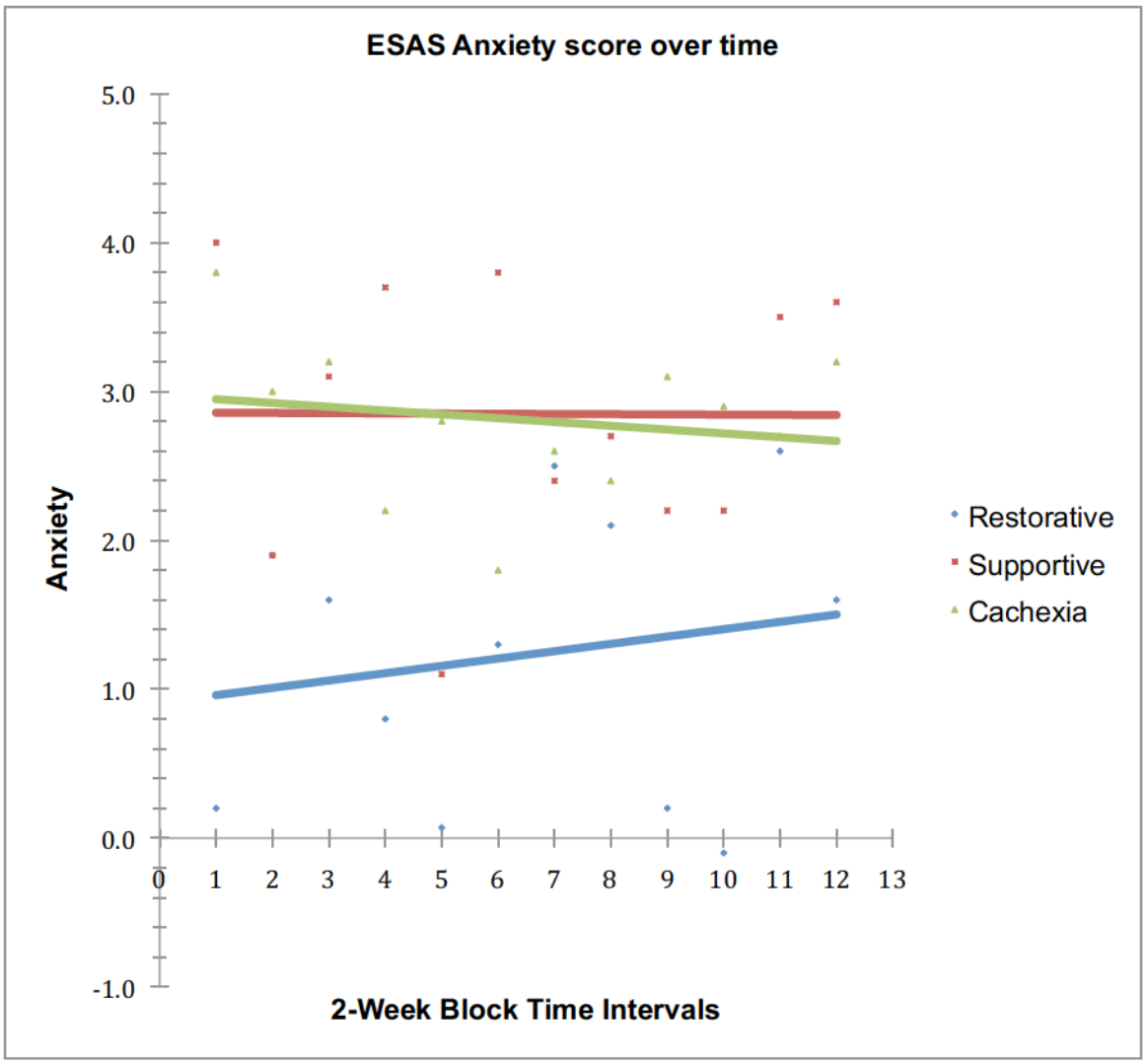


Table 3oooo. Fixed Effects Table of ESAS variable Depression over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Depression				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	0.22	0.801
2 Week Block Time Intervals	1	93	0.00	0.961
Pathway * 2 Week Block Time Intervals	2	179	0.27	0.762
Age	1	179	0.00	0.971
Sex	1	179	0.69	0.406
On/Off Oncological Treatment	1	179	5.02	0.026

Figure 5. Plot of ESAS depression score over time

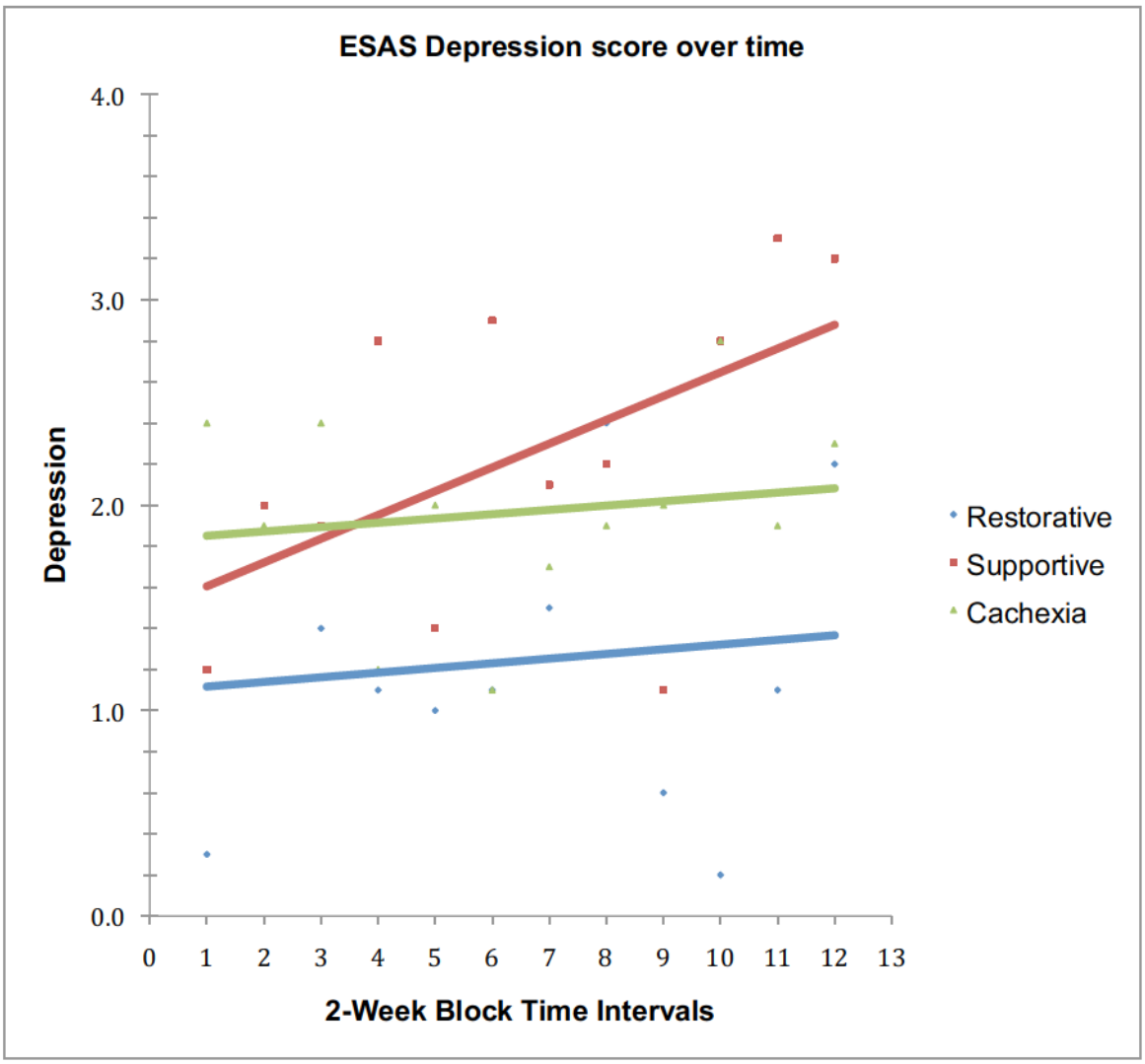


Table 3pppp. Fixed Effects Table of ESAS variable Drowsiness over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Drowsiness				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	2.47	0.087
2 Week Block Time Intervals	1	93	1.45	0.231
Pathway * 2 Week Block Time Intervals	2	179	0.25	0.782
Age	1	179	0.03	0.857
Sex	1	179	0.30	0.586
On/Off Oncological Treatment	1	179	0.18	0.674

Figure 6. Plot of ESAS drowsiness score over time

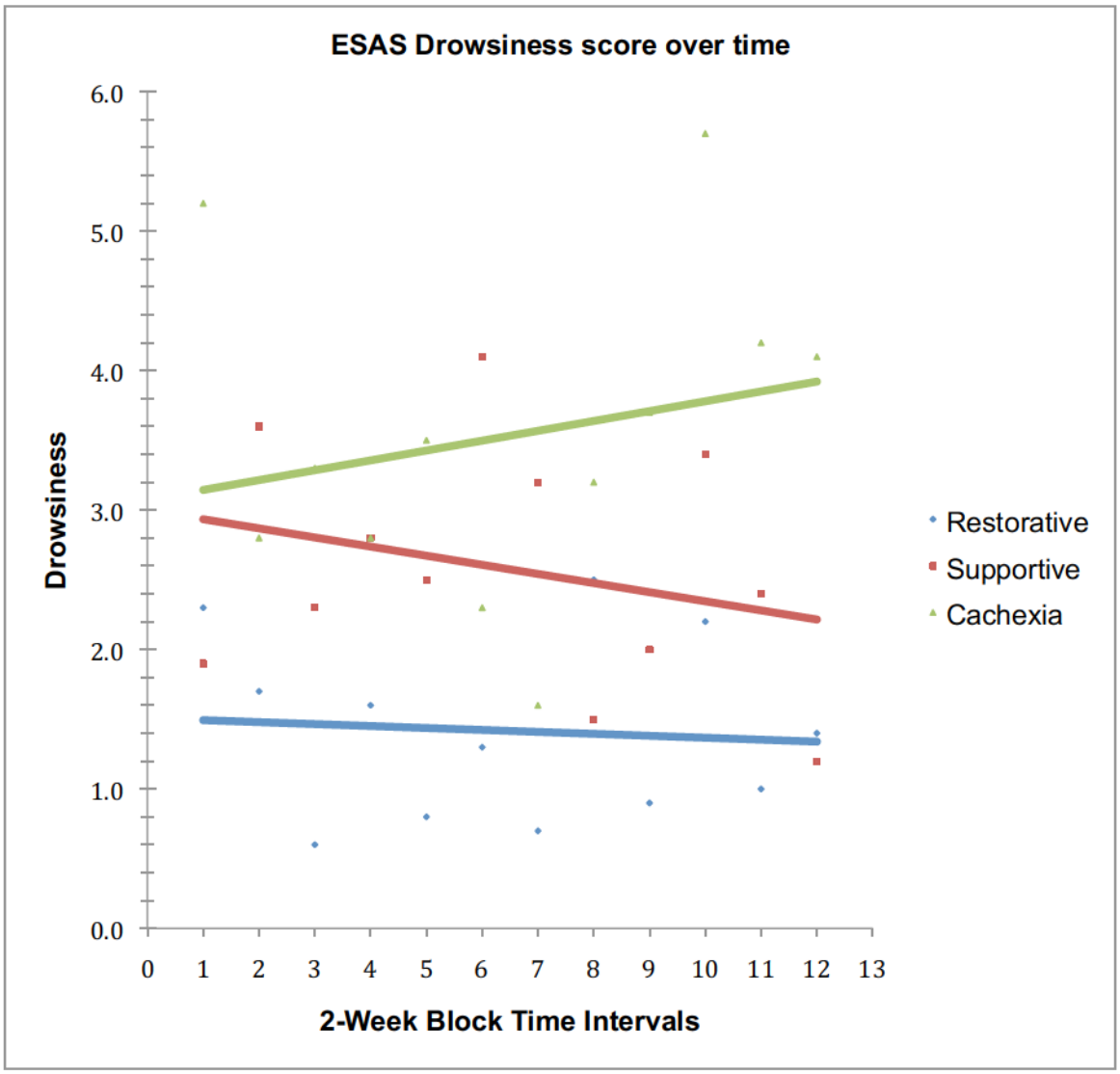


Table 3qqqq. Fixed Effects Table of ESAS variable Fatigue over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Fatigue				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	2.31	0.102
2 Week Block Time Intervals	1	93	1.78	0.185
Pathway * 2 Week Block Time Intervals	2	179	0.64	0.531
Age	1	179	0.60	0.442
Sex	1	179	1.18	0.279
On/Off Oncological Treatment	1	179	1.19	0.278

Figure 7. Plot of ESAS fatigue score over time

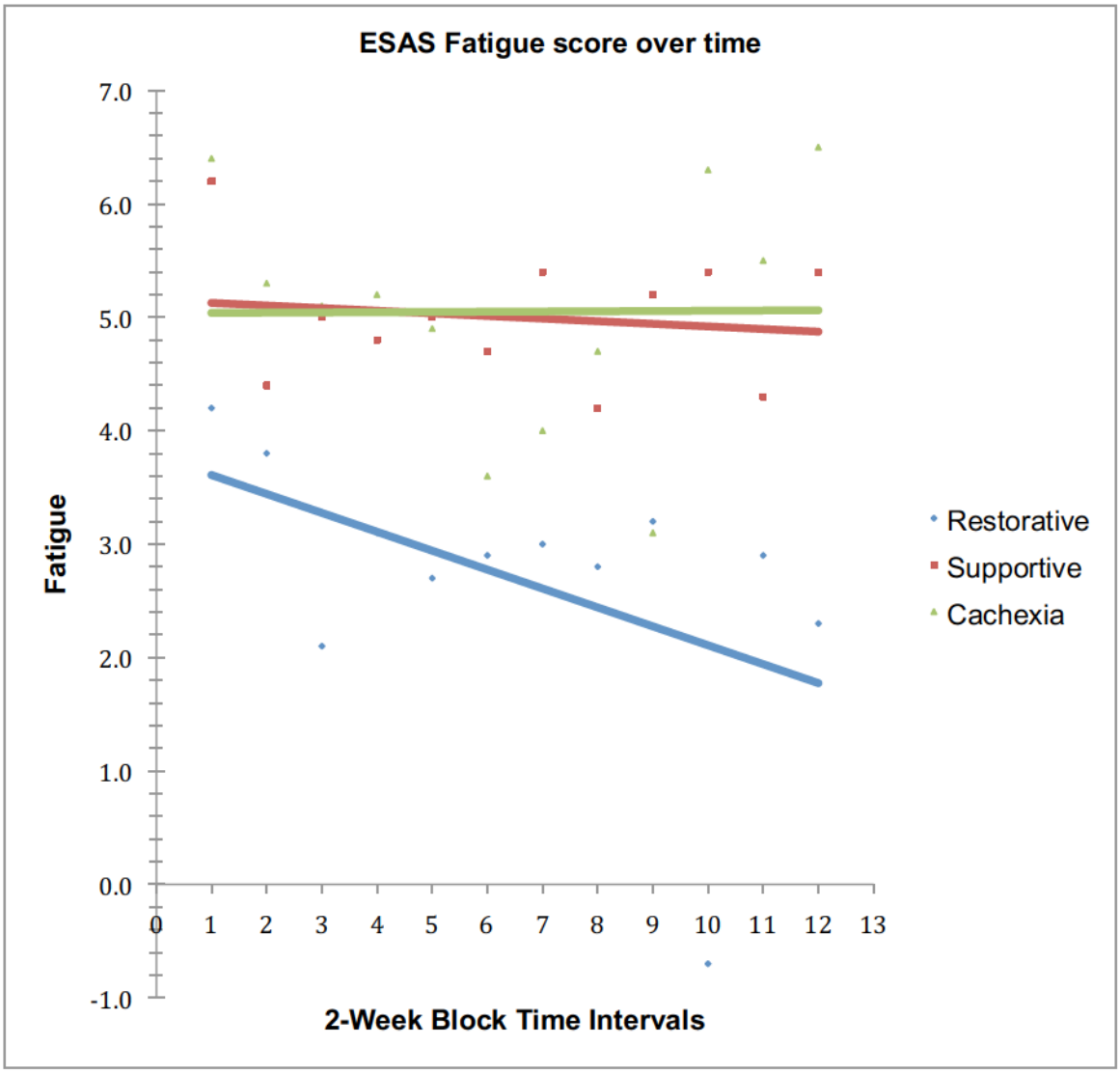


Table 3rrrr. Fixed Effects Table of ESAS variable Nausea over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Nausea				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	4.97	0.008
2 Week Block Time Intervals	1	93	0.45	0.505
Pathway * 2 Week Block Time Intervals	2	179	1.20	0.302
Age	1	179	8.19	0.005
Sex	1	179	6.65	0.011
On/Off Oncological Treatment	1	179	0.02	0.885

Figure 8. Plot of ESAS nausea score over time

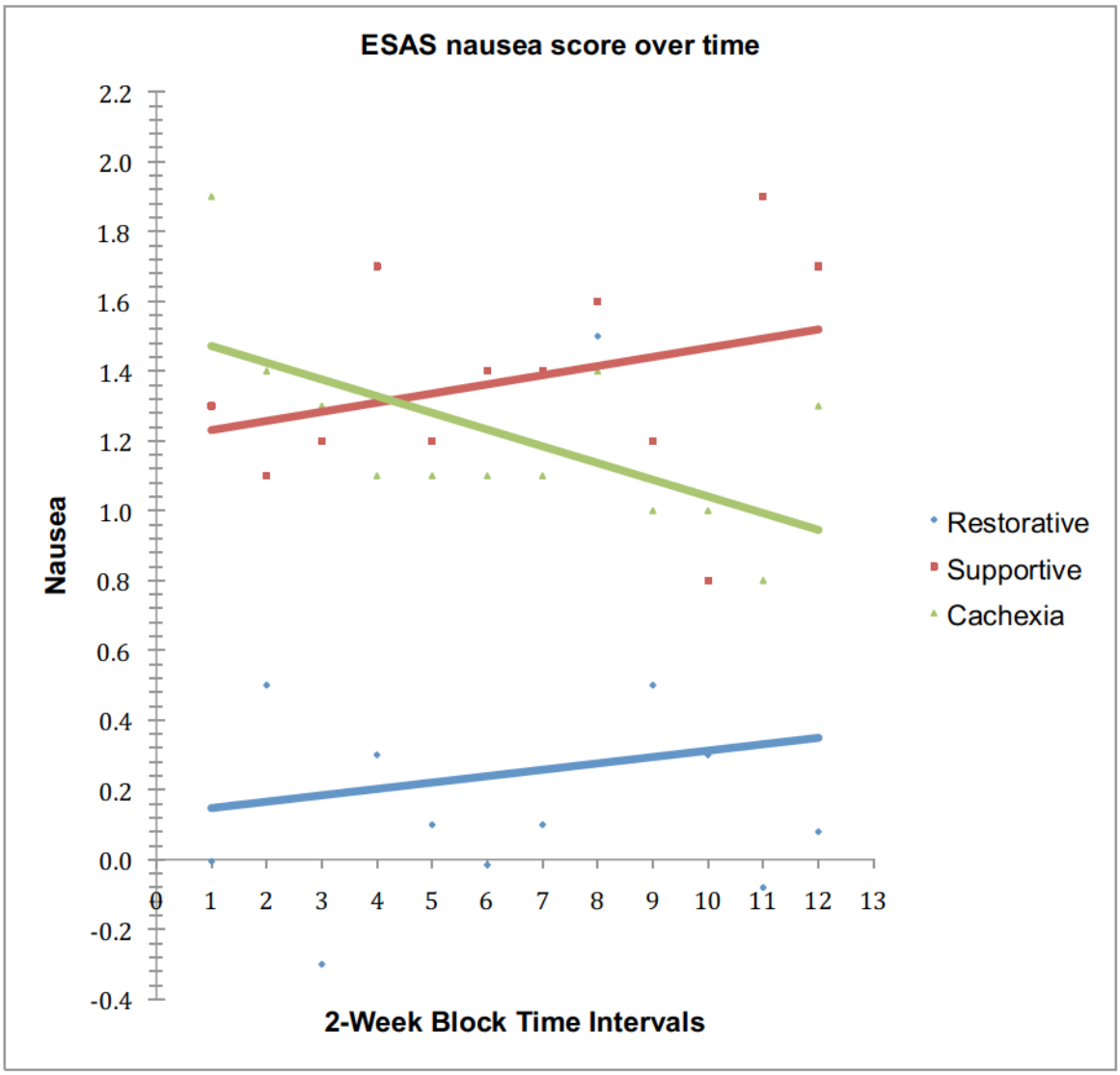


Table 3ssss. Fixed Effects Table of ESAS variable Pain over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Pain				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	2.32	0.101
2 Week Block Time Intervals	1	93	1.10	0.298
Pathway * 2 Week Block Time Intervals	2	179	0.22	0.800
Age	1	179	0.64	0.425
Sex	1	179	3.08	0.081
On/Off Oncological Treatment	1	179	5.70	0.018

Figure 9. Plot of ESAS pain score over time

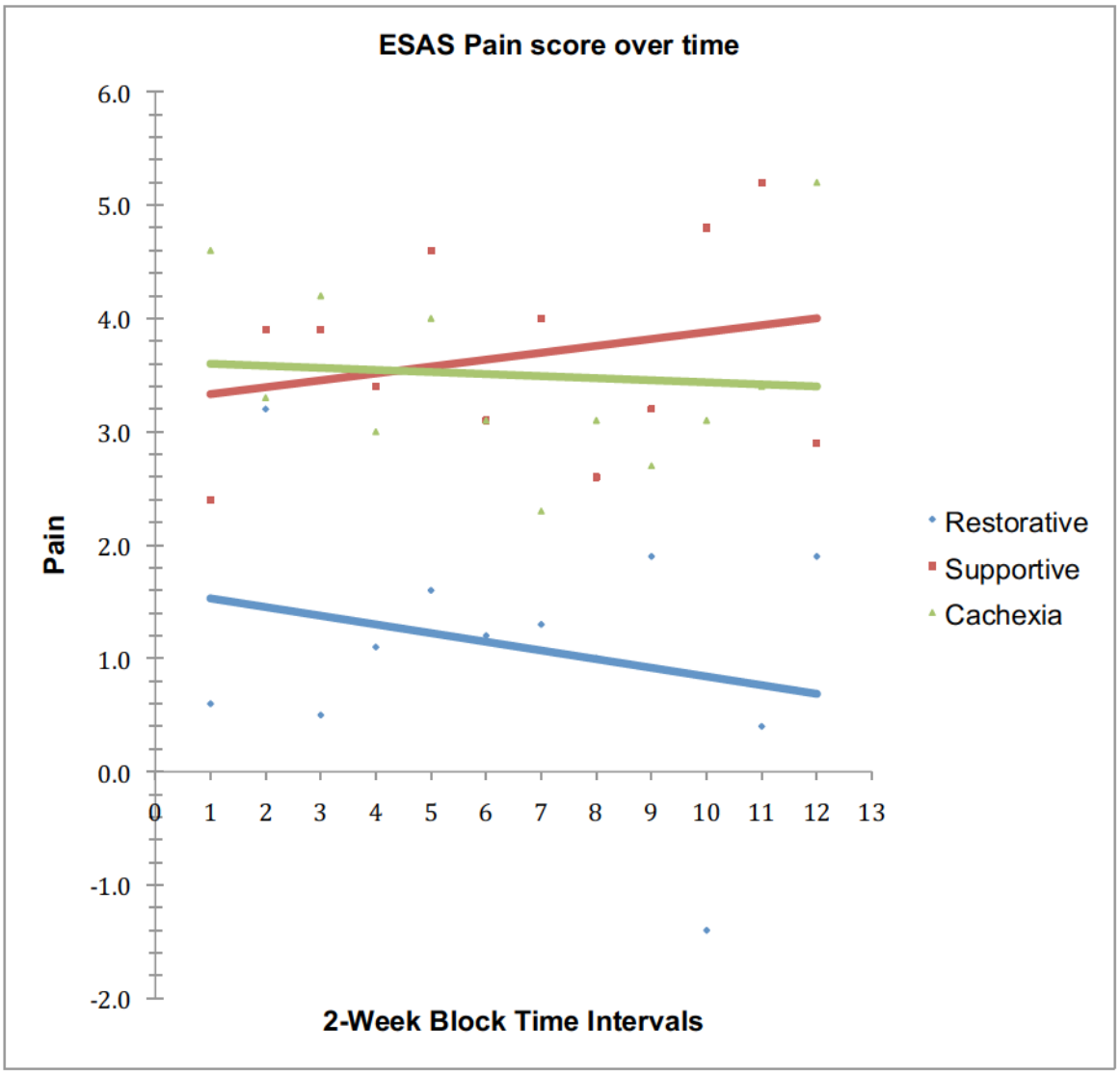


Table 3tttt. Fixed Effects Table of ESAS variable SOB over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for SOB				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	178	4.09	0.018
2 Week Block Time Intervals	1	93	0.47	0.493
Pathway * 2 Week Block Time Intervals	2	178	0.35	0.702
Age	1	178	2.38	0.124
Sex	1	178	2.23	0.137
On/Off Oncological Treatment	1	178	0.83	0.363

Figure 10. Plot of ESAS SOB score over time

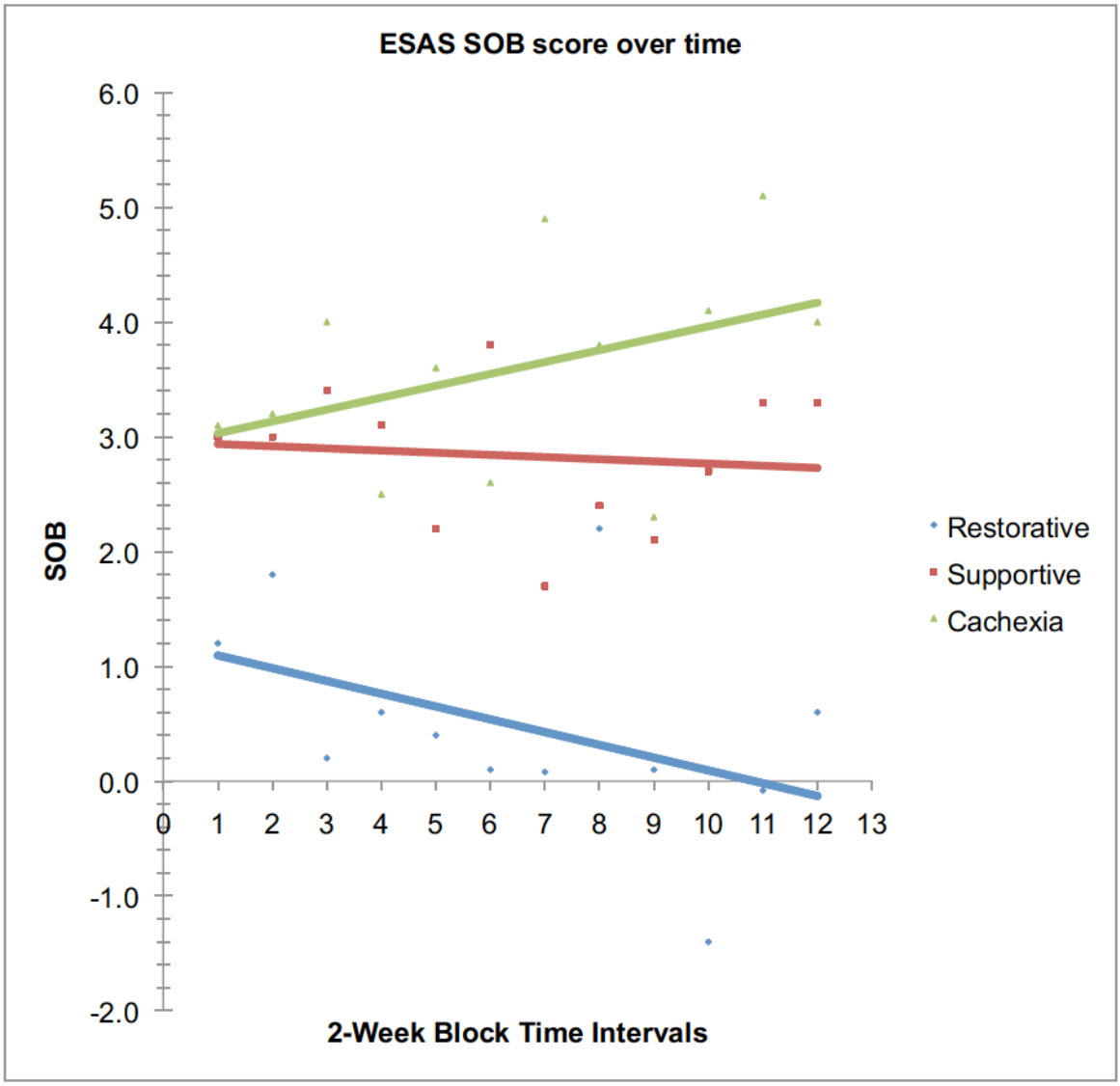


Table 3uuuu. Fixed Effects Table of ESAS variable Well-being over 12 two-week intervals

Random Trend Model Type 3 Tests of Fixed Effects for Well-being				
Effect	**Num DF**	**Den DF**	**F Value**	**Pr > F**
Pathway	2	179	5.48	0.005
2 Week Block Time Intervals	1	93	1.34	0.250
Pathway * 2 Week Block Time Intervals	2	179	0.47	0.624
Age	1	179	1.17	0.282
Sex	1	179	1.27	0.262
On/Off Oncological Treatment	1	179	0.76	0.384

Figure 11. Plot of ESAS well-being score over time