

## Development a Program for Fitness Recovery for Cancer Survivors

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### 【Goals】

The project goal is to develop an exercise program for assisting cancer survivors or people who have or are going through cancer treatment. The program aim is to efficiently and effectively diminish their discomforting symptoms such as fatigue and depressive mood caused by the illness or as a treatment side effect, so that they can return to their previous normal life and be themselves again while protecting and promoting their own health.

### 【Plan and Implementation Process】

- Step 1: Analysis of factors affecting patients' subjective views of their physical strength after hematopoietic cell transplant; longitudinal research was carried out to determine the changes in muscular strength of lower limbs of patients who receive hematopoietic cell transplant, a highly invasive therapy for cancer, and the influences of cancer treatment on patients' physical functions and their subjective views of their physical conditions, to make a basis for the development of a physical fitness recovery program.
- Step 2: Review of literature on exercise programs for cancer survivors.
- Step 3: In collaboration with a research team headed by Professor Victoria Mock at Johns Hopkins University School of Nursing that has already been running an exercise program for cancer survivors in the United States, discussion aiming to develop a Japanese-version program was made (a conference in the US and a workshop at St. Luke's College of Nursing).
- Step 4: Introducing the developed exercise program on the Internet.

### 【Goal Attainment】

#### 1. Research activities

- 1) Results of analysis of factors affecting patients' subjective views of their physical strength after hematopoietic cell transplant

In patients who undergo hematopoietic cell transplant that requires inpatient treatment in a laminar-air flow room for about a month, living in a small space for an extended period of time resulted in lower number of steps, making the post-transplant muscular strength of lower limbs significantly weaker than that before the transplant. Weakened muscular strength of lower limbs leads to impaired ability to walk (and hence slower pace and shortened strides when walking), and was considered to be one of the factors contributing to patients' delayed return to social life once discharged from hospital. Among the measured muscular strength of lower limbs, weakened muscles around the ankle joints was marked, while the delayed recovery of food intake was found to be significantly correlated to heightened sense of fatigue and anxiety following discharge. It was assumed that weakened muscles around the ankle joints lead to reduced physical balance, decreased pace and strides of walking, which in return makes patients feel more vulnerable in walking, delays recovery of physical activity, and increases the sense of fatigue and anxiety. Analysis of individual cases showed that a smooth increase in physical activity could be expected after discharge in patients with an average at least 2,000 steps per day.

As a result, insights for developing a physical fitness recovery program for cancer survivors are that the primary goal should focus on the recovery of muscle strength to enable activities of daily living such as walking, standing up, and crouching down, and that increased strength of muscles around ankle and hip joints as well as well-maintained flexibility, instead of a focus on a substantial increase in muscle strength in major muscle groups. The focus on ankle and hip joints, should help smoothen such activities; ultimately leading to a reduced sense of vulnerability when walking.

2) Results of literature reviews on exercise programs for cancer survivors

On MEDLINE/PubMed as the database, the final search was carried out in May 2006 with a query of “[cancer] AND [exercise] AND [physical] AND [rehabilitation]”, limited to English articles on experimental research. The resulting articles were added with useful articles chosen from among their references, to comprise a total of 46 articles for analysis of “purposes, subjects, methods, therapy evaluation criteria and results, and measures of maintaining adherence” of the exercise programs for cancer survivors. The results of analysis showed that continued exercise by cancer survivors improved cardio-respiratory functions, muscular endurance, and immune function; and improved sleep and emotional stability, which led to effective use of physical energy and better subjective views of their own health and quality of life (QOL). It was also suggested that in order for subjects with a sense of fatigue or depressive mood to safely carry out exercise and continue to do so, appropriate advice and feedback by experts should be provided in terms of how much daily exercise, what kind, and how; and most importantly, it should be provided directly and individually on a regular basis.

3) Organizing a public hearing in the United States and a workshop at St. Luke's College of Nursing

In August 2006, we visited Professor Victoria Mock and her research team at the Johns Hopkins University School of Nursing, where we held a conference regarding the implementation of exercise programs for cancer survivors that are already in place in the United States. The results suggested importance in “securing program safety” by making motor function evaluation for individual subjects prior to the start of an exercise program to provide orientation regarding the ways to exercise based on the results, and having collaboration between the medical (oncology) team for the subject and the researchers. With respect to “ways to maintain subject adherence”, it was suggested that to be effective, research nurses should provide routine follow-ups through visits or over the telephone, and take measures to ensure that patients feel a sense of accomplishment in what they have done through keeping a self management diary.

In June 2007, a workshop was held at St. Luke's College of Nursing, with Professor Victoria Mock and Dr. Keita Kamijo, a Post-Doctoral Research Scientist at the Institute for Human Science and Biomedical Engineering, the National Institute of Advanced Industrial Science and Technology, in Japan to report the progress of the current project development and discuss the development and evaluation indicators of a Japanese-version exercise program for cancer survivors. At the workshop, it was reported that the effects of continued mild exercise include sharper concentration and shorter response time in cognitive functions, in addition to alleviation of a sense of fatigue and depressive mood that had already been reported, providing insights into the future purposes of program and the types and methods

of exercise as well as evaluation indicators for them.

#### 4) Introducing the developed exercise program for cancer survivors on the Internet

In March 2007, we introduced the “Program for Recovering Fitness for Cancer Survivors” on the Kango Net, a St. Luke's College of Nursing 21st Century COE Program website. The program consisted of two modes of exercise: “Walking” to build a basic physical strength to mitigate fatigue in keeping constant movements in daily life, and “Tube (rubber band) training” to develop muscles required for walking and maintaining posture using a rubber band that can be adjusted for site and strength. There also were detailed references as to conditions in which any exercise should be avoided and issues to be kept in mind while exercising in order to safely carry out the exercise, as well as indicators to determine the intensity of exercise, grouped into four levels, to ensure adequate exercise intensity.

While the website currently has a rather modest number of visits at around 200 to 500 per month, it has slowly but steadily gained recognition among cancer survivors, as it has been mentioned on survivors' blogs with reports of exercise implementation.

#### 2. Education of novice researchers

Prior to the workshop, held by Professor Victoria Mock in June 2007 at St. Luke's College of Nursing, a lecture entitled “The process of research collaboration in clinical settings” was given by Professor Victoria Mock. The lecture was concerned with the purpose and activities of The Center for Collaborative Intervention Research (CCIR) at Johns Hopkins University, and the collaboration process of research projects conducted in clinical settings. The lecture was organized by graduate students in Adult Nursing (cancer and palliative care, acute and chronic care), and was attended by graduate students (internal and external), research students, postdoctoral students and faculty members.

#### 3. International collaborative research

Collaboration was promoted between the research team headed by Professor Victoria Mock at Johns Hopkins University School of Nursing.

#### 4. Future directions

At present, this program is a one-way communication of contents. In the future, it will be necessary to develop it into an interactive system in which the progress of users' implementation of the program can be monitored and advice or answers to questions may be given as to the appropriateness of the types or intensity of exercise. Furthermore, indicators for evaluating the program's effects will be determined so that they will be measured in a randomized control study.

Adherence to exercise is strengthened through “experiencing the fun of exercising” and “constantly and individually receiving appropriate advice from an expert” and thus, exercising is incorporated into daily life, leading to subjects' development of better health. Taking this into consideration, a series of “exercising sessions for cancer survivors” in collaboration with exercise planners and other professionals, where strong partnership will be needed with the subjects' oncologist, in order to develop a system to ensure safety in implementing an exercise program.