

PROGRAM CE27 • RELEASE DATE: OCTOBER 16, 2011 • EXPIRATION DATE: OCTOBER 15, 2012

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Exercise Across the Cancer Continuum



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STATEMENT OF NEED

Mounting evidence continues to underscore the importance of exercise during and after cancer treatment as a way to promote quality of life, improve function, and potentially reduce comorbidities. In the past 2 decades, it has become increasingly clear that exercise also plays a vital role in cancer prevention and control. Exercise may decrease the risk of many cancers; extend survival for breast and colon cancer survivors; and prevent, attenuate, treat, or rehabilitate many of the psychological and physiological challenges faced by survivors. Because many oncology nurses practice in a location that lacks formal oncology rehabilitation services, they may be the primary providers for exercise prescription. For these situations, nurses can introduce early exercise intervention and help patients' exercise regimens progress as they traverse along the cancer continuum.

TARGET AUDIENCE

Advanced practice nurses, registered nurses, and other interested healthcare professionals, especially those caring for cancer patients

LEARNING OBJECTIVES

After completing this activity, the reader should be able to:

- Discuss the role of exercise throughout the phases along the cancer continuum
- Prepare an exercise prescription that meets individual patient needs and limitations

The new buzzword in cancer survivorship is *exercise*. Cancer is the primary cause of impairment or dysfunction in the United States because of long- and late-term effects of treatment.¹ The primary comorbidities include obesity, diabetes, osteoporosis, integumentary conditions, cardiovascular disease, and psychosocial impairments. Research has suggested that every cancer survivor will have at least one primary comorbidity and this interaction increases with age.² Mounting evidence continues to underscore the importance of exercise during and after cancer treat-

ment as a way to promote quality of life,³ improve function,^{4,5} and potentially reduce comorbidities.^{6,7} In the past 2 decades, it has become increasingly clear that exercise also plays a vital role in cancer prevention and control.⁸ Exercise may decrease the risk of many cancers; extend survival for breast and colon cancer survivors; and prevent, attenuate, treat, or rehabilitate many of the psychological and physiological challenges faced by survivors.⁹

The Call to Action

On national and global levels, clinicians are being challenged to address the long- and late-term effects of cancer diagnosis and treatment in the context of the whole person (Table). Although we understand the importance of exercise in the prevention and management of cancer and its related complications, it has been difficult to merge theory and practice. Many nurses and other healthcare professionals struggle to create a viable structure that integrates the recommended exercise guidelines into their patients' comprehensive oncology survivorship plans of care.

The Cancer Continuum

Traditionally, exercise has been studied either during the "treatment period" or "posttreatment period" (formerly referred to as the "survivorship period"). More recently, the definition of cancer survivorship has broadened to include the individual from the time of diagnosis through the balance of his or her life.¹⁰ Courneya and Friedenreich proposed a framework that outlines 6 phases of the cancer continuum.¹¹ Exercise is appropriate at any of these phases with a thorough evaluation of the patient

and appropriate modifications. This article will limit discussion to the role of exercise throughout the final 4 phases of this framework, using diagnosis as the threshold point in the continuum. The first 2 phases, prescreening and screening, occur before diagnosis. The pre-treatment, treatment, survivorship, and end-of-life phases occur after diagnosis. The *International Classification of Functioning, Disability, and Health* (ICF) provides a framework for healthcare professionals to identify impairments, limitations, and restrictions resulting from cancer, its treatment, and related comorbidities.¹² After identifying these areas, an appropriate exercise plan can be added to the survivorship plan of care.

The World Health Organization endorsed the ICF in 2001. The model addresses the physical, psychologic, and social needs of the cancer patient through an analysis of the body, individual, and societal domains. These domains intermingle in determining one's quality of life and, thereby, offer a working structure to assess and treat the needs of the whole person (Figure). Nurses may use this model as a springboard for collaboration with other healthcare and community professionals to develop meaningful exercise interventions for cancer survivors.

Prescribing Exercise Along the Cancer Continuum

After identifying the impairments, limitations, and restrictions related to the health condition, the healthcare provider can develop an appropriate exercise plan. Therapeutic exercise is prescribed similarly to medication dosing and takes into consideration the status of

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Disclosures are as follows:

- Mary Calys, DPT, PT, MS, BSW, has nothing to disclose.

- Dawn Lagrosa has nothing to disclose.
- Kristen Olafson has nothing to disclose.
- Kristin Siyahian has nothing to disclose.
- Lisa VanHoose, PhD, PT, CLT-LANA, WCC, has nothing to disclose.

The staff of Science Care have nothing to disclose.

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Table Goals for Treating the Whole Cancer Patient

Organization	Goal
American Cancer Society 2015 ^a	Accomplish measurable improvement in quality of life from the time of diagnosis and for the balance of life of all cancer survivors
Healthy People 2020 ^b	Increase the proportion of cancer survivors who report physical health–related quality of life similar to the general population
LIVESTRONG National Action Plan Cancer Survivorship ^c	Minimizing preventable pain, disability, and psychosocial distress for those living with, through, and beyond cancer
World Cancer Declaration ^d	Access to accurate cancer diagnosis, appropriate cancer treatments, supportive care, rehabilitation services, and palliative care will be improved for all patients worldwide

^a2010 Strategic Progress Report. Atlanta, GA: American Cancer Society; 2010.

^bHealthy People 2020 objective topic areas. HealthyPeople.gov.

^cNational Action Plan for Cancer Survivorship: Advancing Public Health Strategies. Lance Armstrong Foundation, US Centers for Disease Control and Prevention; 2004.

^dUnion for International Cancer Control. World Cancer Declaration: targets. 2011. www.uicc.org/declaration/targets/.

the individual, mode of exercise, intensity, frequency, duration, and safe progression. Treatment goals may be preventive, restorative, supportive, or palliative and address complications that may occur along the cancer continuum.¹³

Preventive exercise. Preventive exercise is prescribed before the development, or to lessen or shorten the duration, of disability.¹³ For example, preoperative education and training may prepare a client for postoperative range-of-motion limitations and prevention of lymphedema after breast surgery. Preoperative training is not affected by normal postoperative pain and/or postanesthesia symptoms. Preventive measures also may include approaches to improve a client's physical functioning and general health status, that is, a program to provide clients with knowledge and skills to reduce their risk for developing osteoporosis after cancer treatments.

Restorative exercise. Restorative exercise is indicated when the return to previous levels of physical, psychologic, social, and vocational functioning is expected, without the presence of handicap or residual disease.¹³ Postoperative range-of-motion exercises for clients undergoing mastectomy or head and neck resection are examples of interventions included in this category. Cardiopulmonary conditioning and mobility training after surgery, chemotherapy, or radiation also is considered restorative care.

Supportive exercise. Supportive exercise is dosed when ongoing disease is controlled or slowly progressing, to maintain a degree of function and independence.¹³ The focus may include identifying ways to accommodate existing disabilities. Instruction in the use of adaptive equipment may be provided to assist in self-management, self-care abilities, and independent functioning. Interventions to improve memory and complex cognitive processing may be prescribed after brain tumor resection. Education and

training regarding prosthetic devices may occur after amputation.

Palliative exercise. Palliative exercise is prescribed to prevent or reduce complications when increasing disability is expected from relentless disease progression.¹³ Maintaining a balance between optimal function and comfort becomes a key issue. Goals include pain control, prevention of contractures and pressure sores, prevention of unnecessary deterioration from inactivity, and energy conservation. The inclusion of family, friends, and caregivers is important when establishing an exercise prescription.

In all cases, the needs and goals of the patient are the primary foundation of exercise prescription, and the intent is to encourage meaningful and self-directed health-related behaviors, that may be modified and adapted to the changing needs of the patient.

Positive outcomes are motivating to survivors and nurses.

The Role of Rehabilitation Therapists

Individualized treatment plans and outcome goals are the hallmark of oncology rehabilitation. Patients may present with complex comorbidities and side effects of surgery, chemotherapy, and radiation that may require a referral to a rehabilitation therapist, such as a speech pathologist, physical therapist, or occupational therapist. The role of oncology rehabilitation, therefore, has expanded to encompass a wide range of conditions and functional concerns, including, but not limited to, cancer-related fatigue, chemotherapy-induced peripheral neuropathy, balance/coordination deficits, lymphedema, radiation fibrosis, postoperative limitations, cardiopulmonary deconditioning, difficul-

ty swallowing, weight loss/weight gain, muscle weakness and pain, cognitive changes, depression, body image changes, and hormonal side effects. The impact of such an intervention to the survivorship care plan may be physically, psychologically, and socially profound. The case study illustrates this point (Sidebar).

Nurses and Exercise Prescription

Positive outcomes are motivating to survivors and nurses. Many oncology nurses, however, are challenged by a lack of formal oncology rehabilitation services in their specific care setting. Nurses may be the primary providers for exercise prescription. In these situations, early exercise intervention can be introduced and progressed by the nurse along with other strategies taught in nursing education along the cancer continuum.

1. Medical clearance

The American College of Sports Medicine risk stratification tool is a resource that allows healthcare professionals to identify individuals who may need additional supervision during exercise or possibly medical clearance.¹⁴ The risk tool can be used

in combination with a physical assessment by the nurse or health-care provider.

2. Breathing retraining¹⁵

An emotionally stressful period often produces an altered breathing pattern, in which diaphragmatic function is reduced and an anxiety-linked, upper-chest pattern evolves. Early recognition and correction of dysfunctional breathing patterns may improve anxiety levels, postural control, and somatic complaints.

Awareness of faulty breathing patterns. With the patient in a semireclined position, have him or her place one hand on the stomach and the other on the upper chest. Ask the patient to take a deep breath. Chances are he or she will take a big breath instead, through the mouth, inflating the upper chest only. Cue the patient to inhale gently through the nose, involving the upper chest, lower chest, and finally activating the diaphragm at the peak of inspiration. Using his or her hands as guides, the patient can appreciate the difference between vigorous big and gentle deep breathing.¹⁵

Relaxation of the upper chest, shoulders, and accessory muscles. In the same position, have the patient clasp his or her hands on top of the head. This helps put the upper chest muscles into "neutral," and usually the patient immediately can feel the diaphragm recruited into action. The diaphragm descends as the patient breathes in and the stomach gently rises, then relaxes as he or she exhales. Bending the knees will help the patient loosen tense abdominal muscles.¹⁵

Abdominal/low-chest breathing pattern retraining. Concentrate on low-chest breathing, with gentle inhaled dissolving into the exhale without

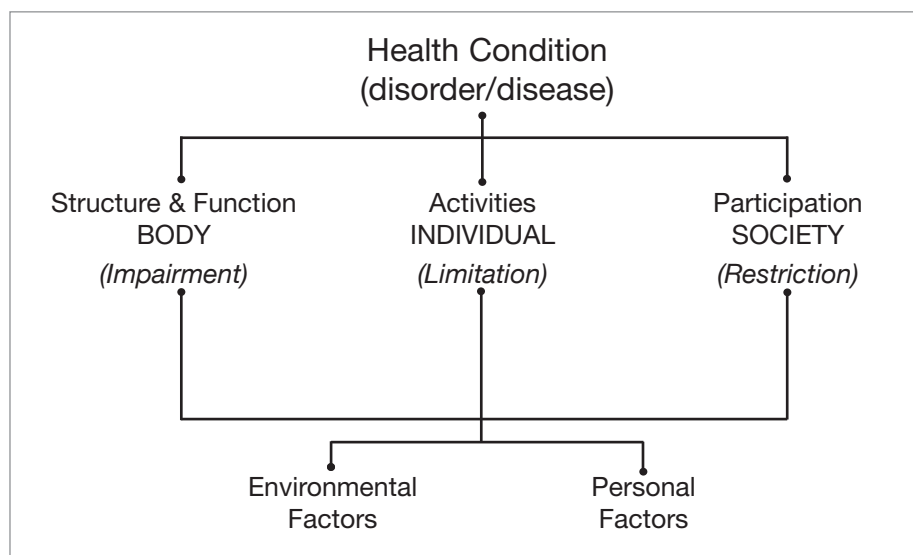


Figure. International Classification of Functioning, Disability, and Health Model
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pause, until the end of the exhale is reached. Cue the patient to exhale twice as long as the inhale. The patient may practice in a semireclined, seated, or standing position. Aim at getting the number of breaths down to 6 to 8 breaths per minute. This should be

practiced for 10 minutes, a minimum of 3 to 4 times per day.¹⁵

Awareness of normal breathing rates and rhythms. Restoring an energy-efficient, low-chest, nose-breathing pattern, with a relaxed pause at the end of the

exhale often restores normal breathing rates. Ultimately, the patient should integrate corrected breathing patterns, both at rest and during activity.¹⁵

3. Postural correction

Kyphosis. This commonly observed exaggeration warrants treatment in the oncology population, as it augments the flexion moment on the vertebral bodies, thus rendering the patient more vulnerable to vertebral compression fracture. Altered alignment of the body may lead to postural pain syndrome and increase the propensity for falls because of the forward shift in the center of gravity.¹⁶ Observe and cue patients to correct faulty postures such as forward head, downward gaze, rounded shoulders, and a flexed or slumped spine.

Change sitting posture often. Inactivity can be one of the biggest culprits in back, neck, and shoulder pain after sitting for long periods. Continually shifting the pelvis and doing a few chair exercises may help reduce muscle tension.

Use of lumbar support. Advise the patient regarding purchase of a lumbar support cushion or use of an improvised form, such as a small pillow or rolled towel.

4. Scar management

As soon as the physician will allow, the patient should be instructed in scar management, and multiple techniques and treatments are available.¹⁷ Gentle stretching of the scar will reduce contractures, which may decrease range of motion and/or function.

5. Self manual lymph drainage

Proper diaphragmatic breathing. Deep breathing helps to empty the larger lymphatic ducts. The enhanced clearance of the lymphatic system may reduce lymphedema risk or assist in the management of lymphedema. Have the patient perform 5 to 10 repetitions before the warm-up.

Lymph node bed stimulation. Instruct the patient to move his or her hands in circular motions over the lymph node bed, using the palm of the hand. The stroke should be firm enough to stretch the skin, but not cause discomfort or a rubbing sensation. In the groin, the motion should be toward the greater trochanter, not the genitals. The patient should perform 5 to 10 repetitions over each lymph node bed (axilla and inguinal).

Self manual lymph drainage before exercising. By performing the drainage procedure before exercise, the patient may

prepare the body for the increased lymph flow associated with exercise.¹⁸

6. Warm-up

Gradual increases in activity over 5 to 10 minutes. Preferably, the warm-up should include the same exercise mode that the patient will use for training. The warm-up increases body temperature and allows the body to acclimate to higher metabolic demands.

Monitor vital signs for abnormal changes in heart rate or blood pressure.

Stretching after the warm-up may reduce muscle injury.^{19,20} Stretching should account for an additional 5 to 10 minutes of the total warm-up time to reduce muscle stiffness and injury.

7. Physical activity

Adapted, slowly progressive aerobic and resistance training. Encourage these activities for survivors in any of the 6 phases of the cancer continuum.

Aerobic exercise 5 times per week. The American College of Sports Medicine suggests at least 150 minutes per week of aerobic exercise.⁹ Remember, your patient may need to work up to this level slowly.

Interval training. Training in intervals has been shown to be less stressful on the cardiopulmonary system.²¹ Intervals can be divided into 30 or 60 seconds of activity.

Progressive resistance training. Resistance training should progress very slowly.⁹ If your patient reports increased pain or fatigue with progression, then return to the prior amount of resistance or no weight, until symptoms resolve. Assess for deep-vein thrombus. Then, slowly progress the patient, watching for any adverse symptoms.

Balance training. Include balance training to address the increased fall risk related to cancer treatment.²²

8. Lymphedema prevention

Exercise has been shown not to increase the risk of lymphedema.^{23,24}

Patients with lymphedema slowly should progress physical activity and weight lifting.²³

Assess limb changes over 24 hours after initiating new modes of physical activity or increasing resistance with weight training. Assess for deep-vein thrombus if the client complains of pain and/or increased limb girth. Some patients will need to wear a garment when exercising to control the increased lymph flow that occurs during exercise.

Case Study: Can MT benefit from an exercise intervention?

MT is a 58-year-old woman diagnosed with stage III colon cancer 1 year ago. She underwent colon resection, lymph node dissection (3+/24 nodes), and completed chemotherapy (leucovorin/fluorouracil/oxaliplatin and leucovorin/fluorouracil/irinotecan) 6 months ago. She has a history of 2 failed coronary artery bypass grafts, 5 cardiac stents, a pacemaker, and right knee osteoarthritis with a previous ligament repair.

MT is a concert violinist and music teacher. At the height of her career, she was groomed for the position of concert mistress of her metropolitan symphony. She presents to the clinic with severe chemotherapy-induced peripheral neuropathy in the hands and feet. She has been unable to play her violin for 1 year because of pain. Because of loss of income from teaching, she was forced to sell 2 violins to pay for cancer treatment.

Physical Therapy Intervention

Using the *International Classification of Functioning, Disability, and Health* model, the various domains of MT's quality of life are considered (Figure). MT was prescribed individualized exercise interventions that directly addressed physiologic structure and function, activities of daily living, and social participation.

At the impairment level, reducing her neuropathy symptoms from proximal to distal was facilitated by exercises and kinesiotaping to desensitize pain receptors. At the limitation level, pain-free ambulation was achieved through the use of Nordic walking poles, redistributing weight-bearing forces through all 4 extremities. Balance training using the Nintendo Wii Fit program provided re-education of damaged proprioceptive nerves in the feet. Finger dexterity drills using the Wii Fit and other various media were progressed gradually to "fingering" on the violin, followed by timed intervals of "fingering and bowing" on the violin.

After 2 months of intensive physical therapy, MT was able to play her violin for 30 minutes without fingertip pain. She independently completed a home exercise program on her own Nintendo equipment and adhered to a routine Nordic pole walking program. At 4 months, MT obtained gainful employment outside the home and was ready to start teaching violin on a part-time basis.

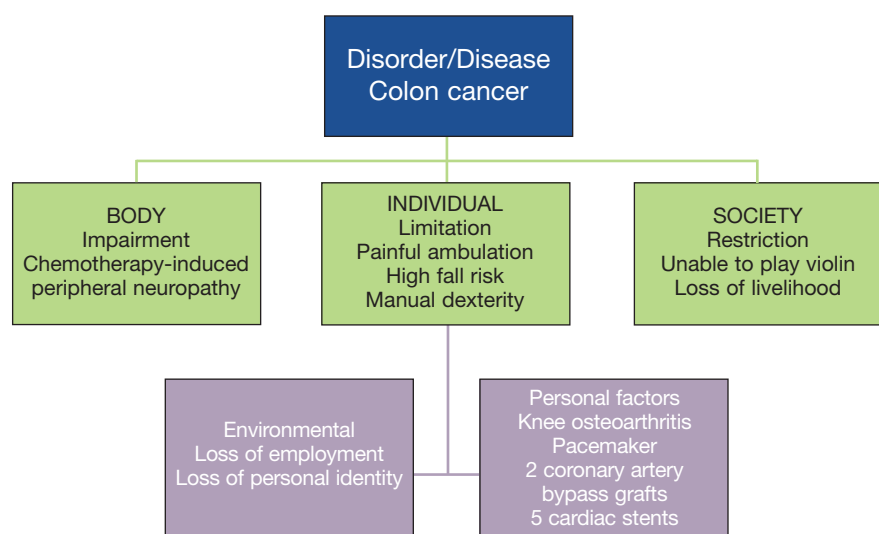


Figure. *International Classification of Functioning, Disability, and Health* Model Applied to MT's Case

9. Cool-down

Gradual declines in activity for 5 to 10 minutes. End the cool-down with gentle stretches with holding times of at least 30 seconds. Monitor vital signs for a return to baseline values.

Measuring Outcomes

Baseline physical activity measures can be collected during any phase of the cancer continuum. An earlier understanding of physical activity levels, however, allows the healthcare provider to quickly identify declines and be proactive in identifying appropriate interventions. Multiple self-report questionnaires and physical activity barriers are available. Commonly used tools include the SF-36 health survey,²⁵ Disabilities of the Arm, Shoulder, and Hand questionnaire,²⁶ the Functional Assessment of Cancer Therapy,²⁷ the Timed Get-Up-and-Go test,²⁸ and the Short Physical Performance Battery.²² These tools allow the provider to assess baseline status and changes in quality of life and physical performance after the initiation of exercise training.

Disease-Specific Exercise Prescription

Each cancer has specific exercise considerations related to the site of the tumor and/or the treatment. An exercise program for a survivor of breast cancer should include range-of-motion exercises for the shoulder, but also include abdominal and scapular exercises. Of particular interest are exercises focused on the serratus anterior, because it commonly is affected by sur-

gical interventions. Gynecologic and prostate cancer survivors may benefit from pelvic floor exercises. Survivors of lung cancer and multiple myeloma may require more attention on endurance-building tasks. The exercise plan, however, should be individualized to the client and his/her limitations, barriers, and restrictions as outlined in the ICF model.

The American College of Sports Medicine suggests at least 150 minutes per week of aerobic exercise.

Conclusion

Exercise plays a role in healthy living throughout the cancer continuum. Exercise training can reduce cancer risk, as well as strengthen the body and mind before treatment. With our increasing understanding of the physiologic benefits of exercises, we now are encouraging survivors to exercise during treatment to attenuate the side effects of cancer treatment. After treatment, exercise has been shown to improve quality of life, physical function, and survival. The goals of exercise need to be individualized for each survivor.

We have introduced the ICF model as a framework to develop an exercise program along with general recommendations, which can be used across multiple disease sites. This information will provide additional resources for nurses in their endeavors to address the indi-

vidualized survivorship care plans for the patients they serve. ●

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Readers Survey

Do you think “mid-level provider” is an accurate term or an insult?

In the September issue, we published an editorial entitled “I Am a Nurse Practitioner, NOT a Mid-Level Provider,” in which author Alison Moriarty Daley provided an argument against this phrase. We asked our online reading community what they think about “mid-level provider.”

- 17% accepted mid-level provider as an accurate term
- 50% agreed with Ms Daley that it is an insult
- 33% didn't think it mattered since nobody knows what the term means

Our sincere thanks to all who participated in this survey. If you want to participate in this month's survey, see page 18 for details.

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