

BREAST CANCER REHABILITATION AND RECONDITIONING

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ABSTRACT – Objective: Breast Cancer (BC), a prominent oncological disease, has become an increasing concern for countless women across the globe. The rising incidences underscore the urgent need for a comprehensive post-treatment rehabilitation strategy to address the challenges posed by intensive treatments. This rehabilitation is not merely about physical recovery but requires a holistic lens, considering disability as an overarching loss of functional integrity. Embracing this perspective enables healthcare professionals to devise strategies that focus on the entirety of a patient's well-being. Central to this approach is the Individual Rehabilitation Project (IRP), a tailored program designed to elevate the post-treatment quality of life. It stresses the importance of early interventions, particularly after surgery, to mitigate potential complications and functional deficits. Physical activities, curated and executed under professional guidance, form a cornerstone of the rehabilitation process. Depending on each patient's specific condition and stage of recovery, a range of exercises is recommended. Beyond the immediate post-surgical phase, patients are introduced to adaptive physical endeavors like fencing and dragon boating. Such activities are not merely for physical recovery but also play a significant role in enhancing self-esteem, self-perception, and overall mental resilience. Once acute and post-acute care has been completed, and a clinical functional stability is reached, BC patients, now better defined as person with BC disability (PwBC). As the narrative unfolds, it becomes clear that BC rehabilitation is an intricate dance between physical recovery and psychological well-being, necessitating an individualized, patient-centric approach. Furthermore, this opinion paper highlights the urgency for rigorous research, especially randomized trials, to refine and validate the efficacy of these rehabilitation procedures, ensuring that patients not only survive but thrive post-treatment.

KEYWORDS: Breast Cancer, Rehabilitation, Quality of Life, Adapted Physical Exercise, Adapted Training Exercise.

INTRODUCTION

Breast Cancer (BC) stands as the leading oncological disease worldwide, with over two million women diagnosed each year¹. Forecasts anticipate a marked surge in BC's global impact over the next two decades. Advances in early diagnosis and a multidisciplinary approach to precision medicine have en-



hanced clinical outcomes for BC, emphasizing the need for post-treatment rehabilitation². In Italy alone, around one million women have received a BC diagnosis, many of whom face sequelae from intensive treatments³.

To address the BC rehabilitation disfunctions, the oncological disease must be seen from a functional perspective and disability must be interpreted as a loss of functional integrity of the person as a whole, linked to several factors. Interaction of these factors is the determinant for the development of disability in cancer patient. Rehabilitation project must, therefore, be adapted to the patient's condition, his/her history and biological behavior of the specific cancer, in order to ameliorate his/her Quality of Life^{4,5}.

Disabling/Rehabilitation Process

Prevention is the best choice to avoid disability. Prevention is defined as that complex of measures useful to prevent the occurrence of diseases and the determination of further irreversible damage when the disease is in progress or in the outcome stage. The rehabilitation model classification (International Classification of Functioning, ICF, 2001) analyzes and describes disability as a bio-psycho-social experience. Prevention is related to the disabling/rehabilitation process. In Figure 1, from the left side, the

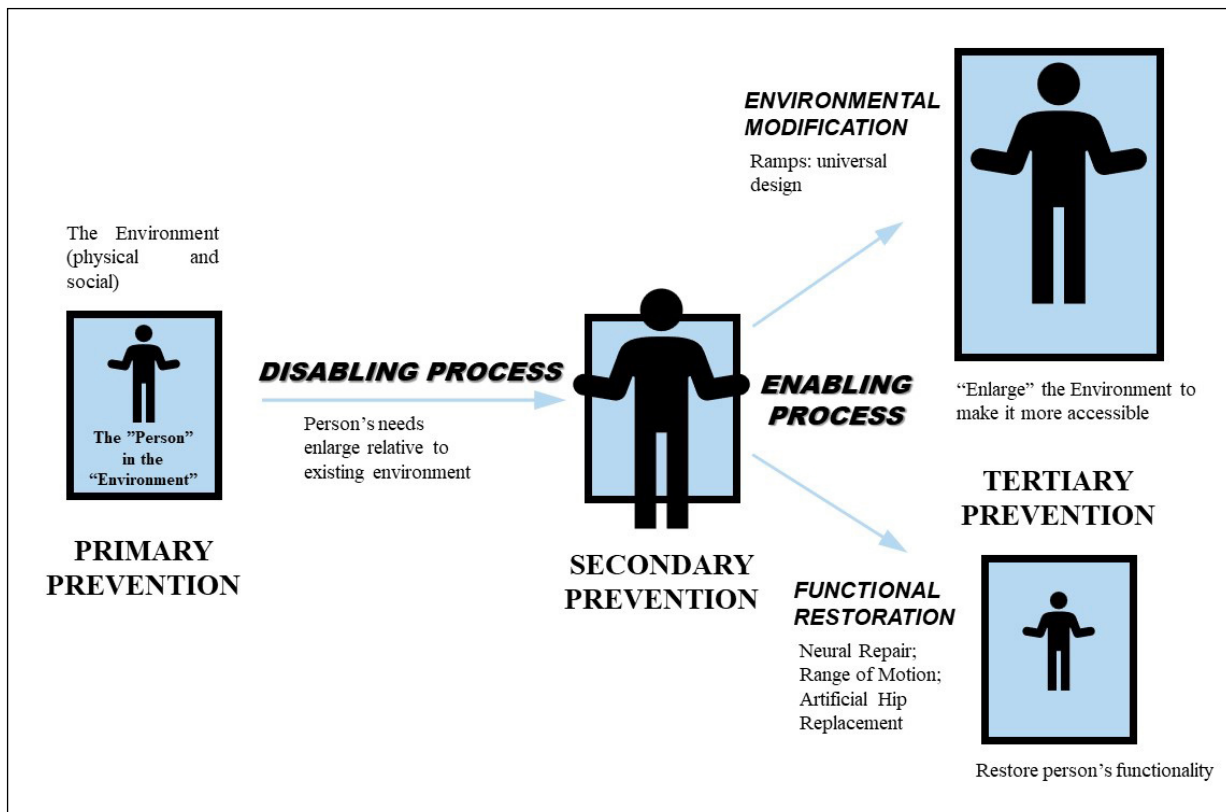


Figure 1. Prevention related to the disabling/rehabilitation process (IOM, 1997).

Authors depict the living condition of a person without health problems who is fully integrated in his/her social, affective, and work environment (the rectangle); for example the person usually attends the school, goes to play in the street with friends; he/she has no special needs in reaching study or work locations; in the family, he/she is well integrated with his/her blood relatives so as to be an active and at the same time passive element of collegial choices in shared life dynamics. The central part of the figure depicts a man who has suffered, due to trauma or illness, a disabling process, that is, an altered func-

tioning such that it impacts on three levels: the loss of a function/structure, the limitation of activities and the reduction of participation in social and community life. Two distinct but both socially necessary aspects of the rehabilitation process are depicted in the third part of the figure: the first (top right), in cases where the functional limitation persists after stabilization of outcomes, is aimed at reducing and eliminating barriers and simplifying acts or actions in such a way as to enable the person with a disability to perform his or her tasks and maintain the best possible quality of life; the second (bottom right), in cases where there is partial or complete recovery of the temporarily lost function, is aimed at enhancing the individual's recovered function, restoring an acceptable quality of life. Disability is determined by the relationship between psychophysical functions and environmental, social, and cultural factors concerning the individual. Primary prevention aims to prevent the occurrence of disease. For example, recommending that healthy people engage in physical activity is a form of primary prevention, indeed physical activity is associated with a decreased risk of some types of cancers including: colorectal, breast, esophagus, lung, liver, cervical, endometrial, kidney, brain, and blood cancers⁶. Secondary prevention is implemented from the time the injury is determined until it reaches clinical-functional stability. For example, a patient in a coma from a head injury is unable to voluntarily move any part of the body, does not relate to other people, is unable to communicate with the external environment, and thus if he or she remained in bed in the hospital without medical, nursing, and physiotherapeutic care, skin lesions, termed pressure or decubitus ulcers, would be determined in a few days, which over time could deepen and be the cause of death due to infection and alteration of lympho-hemic homeostasis resulting from them. Tertiary prevention focuses on people who have reached the stage of clinical-functional stability with the aim of improving quality of life and maintaining the achieved functional status. For example, a person operated on for femoral neck fracture with hip prosthesis will not recover anatomically and physiologically the injury, but rather the functional condition prior to the injury: thanks to the implantation of a metal prosthesis, it will be possible to drive a car, walk and, in some cases, play sports, sometimes even the one she played before the injury. In the general population, life expectancy has increased significantly due in part to these primary, secondary, and tertiary prevention programs.

Individual Rehabilitation Project (IRP)

As already stated in the introduction, in patients with BC, multidisciplinary treatments have led to a reduction in morbidity and mortality. However, the outcomes of these debilitating therapies can impact the quality of life of these patients⁷. Physiatrist (Physical and Rehabilitation Medicine Doctor, PRM) structures a tailored IRP so that the patient achieves the highest possible quality of life; to do this, it is necessary to frame the patient clinically, functionally, and socially, and to implement a series of diagnostic-functional tests useful for understanding the margins of recovery and defining the timing and the quality of the re-educational programs. IRP defines, through PRM that coordinates, the prognosis, expectations and priorities of the patient and his/her family members in order to ensure a constant flow of information to the general practitioner. It should then predict whether the patient will be able to be treated and how much he/she will recover in terms of functional capacity (rehabilitation prognosis). IRP is thus the set of propositions that PRM implements in order to improve the quality of life of the patient affected by an acute event. IRP is composed of the various functional re-educational programs, such as the speech therapy program, therapeutic motor program, adapted physical/training motor program, and instrumental physiotherapy program. IRP, operating in a synergistic and coordinated manner, will enable the patient to pursue gradual improvements that will lead to the achievement of the set goal.

Physical Activity and Disabling/Rehabilitation Process

Three professionals come into play in these procedures, under the supervisions and prescriptions of Physiatrists: Motor Scientists (MS), Physiotherapists (PT), Professional with a Master's Degree in Training and Adapted Activity (AdMS).

At the stage when the individual is living in full balance and health with his/her own environment (work, family, social), physical activity corresponds to physical exercises or sports played, respectively Physical Exercise (gym, weight room, Pilates) and Training Exercise (soccer, volleyball, swimming). In this first phase of the primary prevention, MS educate people on playful physical activities (e.g., jumping rope, jumping, running) (Figure 2).

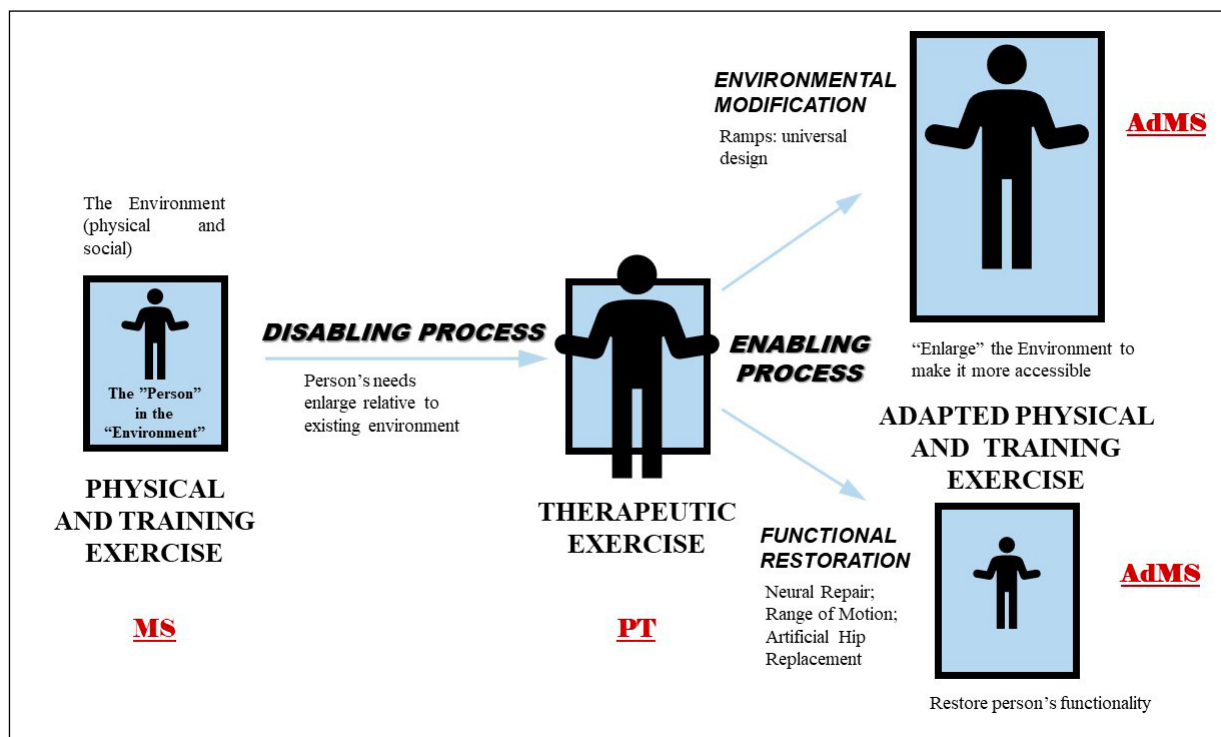


Figure 2. Relationship between physical activity and the disabling/rehabilitation process: the main professionals involved in the process (IOM, 1997, revised by the authors). MS: Graduate in Physical Education; PT: Physiotherapist; AdMS: Professional with a master's degree in Training and Adapted Activity.

After a disabling disease or trauma, the patient may be engaged in exercise that can be framed in the procedures of therapeutic exercises that are feasible after a disabling event in the health care setting, general hospitals or inpatients and outpatient rehabilitation clinics. In this acute and post-acute care, PT will be in charge of the patient, intervening in the disabling process during hospitalization through exercises finalized to the recovery of the motor disorders. It is a rehabilitation-type intervention in which PRM frames the patient clinically, functionally, and socially and implements a series of functional diagnostic tests useful for understanding the timing and margins of recovery and setting up an IRP.

In the third phase, once the post-injury rehabilitation programs have been performed and clinical-functional stability has been achieved, the person with disability will be able to return to physical activity, albeit adapted to the disabling condition. This will be implemented in gyms and/or open spaces, which are typical of physical exercises and sports activities. AdMS will lead the Person with disability during the adapted physical exercises (APE) and adapted training exercises (ATE), carried out in the pool, gym, open spaces. APE is a set of physical exercises adapted to the disability, out of the rules of a sports activity. Examples of APE include gymnastic procedures, e.g., adapted free-body gymnastics three times a week in a person after an acute episode of low back pain. ATE is a set of physical exercises adapted to the disability with the rules of a sports activity. Examples of ATE include track and field, swimming and soccer after anterior cruciate ligament (ACL) reconstruction surgery of the knee, once appropriate muscle strength and muscle tension ratio between the quadriceps femoris and the posterior thigh muscles have been achieved. AdMS will study the limitations brought about by the disability, studying useful and non-damaging exercise procedures and be able to explain to the person how to carry out the exercises, in quality and quantity; for example, AdMS will determine the magnitude of the load, what kind of external resistance to apply, whether with elastics or isotonic, isometric or isoinertial contraction, and again the environment where to perform the treatment, whether in water or in the gym or on vibrating platforms.

Breast Cancer Rehabilitation and Reconditioning

Cancer-related fatigue is a common symptom experienced by cancer patients and cancer survivors that profoundly affects all aspects of the quality of life⁸. Disabilities resulting from BC treatment often reduce the quality of daily life and affect working and social life⁹. In BC patients following surgery, motor

deficits in the shoulder or upper extremity are most often functional, and mostly related to immobility or impaired mobility due to tissue tension generated by postsurgical edema and scarring process. Shoulder and elbow abduction and flexion deficits are commonly reported by patients¹⁰. In the acute and post-acute phases, PRM will prepare an IRP for the BC patient. IRP will be carried out by the rehabilitation team within healthcare settings, general hospitals or inpatients/outpatient rehabilitation units. It consists of a series of re-educational procedures dedicated to motor, cognitive, behavioral, and hygienic recovery, to be performed immediately after the bodily injury in order to assure the best possible recovery. Early introduction in postoperative period of a re-educational program performed by PT plays a key role in long-term reduction of secondary complications for the upper extremity through a therapeutic home program and education on proper postural hygiene measures¹¹.

While any surgical procedure may interfere with arm mobility (total mastectomy, axillary cord dissection, or sentinel lymph node biopsy), it is recommended to start early motor re-education of the operated limb to facilitate veno-lymphatic circulation of the arm, prevent joint stiffness, and avoid functional immobility¹².

As early as the first postoperative day, BC patients can begin a program of exercises aimed at maintaining the elasticity and flexibility of the muscles surrounding the gleno-humeral joint to allow the movements of flexion, extension, abduction, adduction, and internal and external rotation. Initial exercises focus on deep breathing, relaxation and stretching of the neck and arm muscles to promote proper postural alignment¹³. All of this allows for an increase in shoulder mobility and function in activities of daily living (ADL).

Once acute and post-acute care has been completed, and a clinical functional stability is reached, BC patients, now better defined as person with BC disability (PwBC), are reconditioned to the typical APE. It will, therefore, be possible to practice APE or ATE for the functional recovery of the operated limb and the improvement of self-perception and self-esteem. APE include gymnastic procedures, e.g., adapted free-body gymnastics three times a week, or pilates. ATE is a set of physical exercises adapted to the disability, within the rules of a sports activity: fencing and dragon boat.

Fencing adapted to PwBC combines an introduction to two different fencing weapons (foil and sabre) with physical exercises. Fencing is a suitable sport to combat fatigue, pain and limited mobility in the arms. It is also a sport in which willpower is crucial during combat. Therefore, practicing fencing allows one to develop the desire to fight and win. Considering the high technical component of the two fencing specialties, an adapted form of fencing is proposed that allows PwBC to enjoy the training more. As it is an asymmetrical sport, they are encouraged to alternate the grip of the weapon several times during training so that both limbs are used equally, and the operated side is not neglected. The choice of the two conventional fencing weapons is not accidental. Extensive use of parries forces the fencer to make wider movements that allow for greater involvement of the shoulder joint¹⁴.

Another example of ATE is dragon boat. It is a human-powered watercraft that originated in China more than 2000 years ago and is a competitive sport worldwide. Furthermore, abreast in a boat, conceived in Canada in 1996, was the first team of dragon boat racers comprising BC patients. Dragon boat paddling is a repetitive, vigorous physical exercise that increases flexibility, aerobic capacity and strength and provides an important positive message to all PwBC. Exercise interventions in PwBC have positive effects on survival, quality of life and weight; in addition, preliminary evidence suggests that exercise may also reduce the risk of cancer recurrence. One of the mechanisms responsible for the health benefits of regular exercise could be the cumulative anti-inflammatory effects of repeated exercise, which reduces oxidative stress by increasing the antioxidant capacity of the cell, enhancing DNA repair systems and improving intracellular protein repair systems. Indeed, oxidative stress is an important factor for the onset, progression, and recurrence of cancer. Regular exercise can reduce pro-inflammatory cytokines in people with chronic conditions, and this reduction relates to improvements in aerobic fitness¹⁵.

CONCLUSIONS

In order to address the BC rehabilitation problems, the oncological disease must be seen from a functional perspective and disability must be interpreted as a loss of functional integrity of the person as a whole, linked to several factors, in order to ameliorate his/her quality of life. Prevention is the best choice to avoid disability. Prevention is related to the disabling/rehabilitation process. IRP is the set of propositions that PRM implements in order to improve the quality of life of the patient affected by an acute event. AdMS will lead the person with disability during the APE and ATE, carried out in the pool, gym, open spaces. Disabilities resulting from BC treatment often reduce the quality of daily life and af-

fect working and social life. BC IRP consists of a series of re-educational procedures dedicated to motor, cognitive, behavioral, and hygienic recovery, to be performed immediately after the bodily injury in order to assure the best possible recovery. Early introduction in postoperative period of a re-educational program performed by PT plays a key role in long-term reduction of secondary complications for the upper extremity through a therapeutic home program and education on proper postural hygiene measures. Once acute and post-acute care has been completed, and a clinical functional stability is reached, BC patients, now better defined as person with BC disability (PwBC), are reconditioned to the typical APE. It will, therefore, be possible to practice APE or ATE for the functional recovery of the operated limb and the improvement of self-perception and self-esteem. APE include gymnastic procedures, e.g., adapted free-body gymnastics three times a week, or pilates. ATE is a set of physical exercises adapted to the disability, within the rules of a sports activity: fencing and dragon boat. To ameliorate the future of PwBC, it will be necessary to start randomized controlled trials and meta-analyses on the usefulness of rehabilitation and APE in shortening recovery times and improving their quality of life.

ACKNOWLEDGEMENTS:

The authors are grateful to the patients and their family support for the patience in following our advice and for the willpower shown during the rehabilitation project. The authors also acknowledge who supported the publication of this opinion paper.

FUNDING:

No funding is declared for this article

AUTHOR CONTRIBUTIONS:

Conceptualization: CF; Methodology: MS, Gi Vi; Writing – Original Draft: MS, Gi Vi, AI, DG, Gi Va, CT; Writing - Review & Editing: MS, Gi Vi, AI, DG, Gi Va, CT; Supervision: CF- OCB.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT:

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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