MANTECH Publications
Journal of Physiotherapy in Medical and Surgical Conditions
Volume 2, Issue 1, January-June 2026

Evidence-Based Physiotherapy Approaches for Cancer Patients before and After Surgical Treatment

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ABSTRACT

Surgery remains a cornerstone of treatment for many cancers, but it imposes considerable physical and functional burdens, and physiotherapy is increasingly recognised as an important component of perioperative cancer care. This review synthesises current evidence on physiotherapy approaches for cancer patients before and after surgical treatment, encompassing prehabilitation and postoperative rehabilitation. It examines preoperative interventions, including exercise, inspiratory muscle training and education delivered as prehabilitation, and postoperative rehabilitation addressing mobility, respiratory function, shoulder and limb dysfunction, lymphoedema, fatigue and quality of life. The literature indicates that prehabilitation improves physical fitness and may reduce postoperative complications and length of stay, while postoperative physiotherapy improves function, manages treatment-related impairments such as lymphoedema and shoulder dysfunction, reduces fatigue and enhances quality of life. The review emphasises an individualised, multidisciplinary approach across the surgical continuum. It concludes that evidence-based physiotherapy is a valuable component of cancer care before and after surgery, and highlights the need for standardisation, wider implementation and further research to optimise outcomes.

KEYWORDS: *Cancer Rehabilitation, Prehabilitation, Physiotherapy, Surgical Oncology, Lymphoedema, Exercise Therapy, Quality of Life, Functional Recovery*

INTRODUCTION

Surgery is a primary treatment modality for many solid cancers, offering the prospect of cure or long-term control, but it imposes significant physical, functional and psychological burdens

on patients [1]. Cancer and its surgical treatment can lead to reduced physical fitness, postoperative complications, impaired mobility, treatment-specific dysfunctions such as shoulder restriction and lymphoedema, fatigue and diminished quality of life [1], [2]. Physiotherapy is increasingly recognised as an important component of perioperative cancer care, contributing both before and after surgery to optimise outcomes.

The concept of prehabilitation has gained prominence as a proactive approach to preparing patients for surgery. Prehabilitation typically combines exercise, including aerobic and resistance training and inspiratory muscle training, with nutritional, psychological and educational support, aiming to improve physical and functional reserve before surgery [2], [3]. The rationale is that patients with greater fitness are better able to withstand the physiological stress of surgery, potentially reducing complications and accelerating recovery, an approach particularly relevant in cancer, where treatment is often urgent yet preceded by a window for optimisation.

Postoperative rehabilitation addresses the functional consequences of cancer surgery. Depending on the type of surgery, physiotherapy manages early mobility and respiratory function, restores shoulder and limb movement, prevents and treats lymphoedema, addresses cancer-related fatigue and supports return to function and quality of life [2], [4]. The specific focus varies across cancer types and procedures, but the overarching goal is to restore function and well-being. Evidence-based physiotherapy across the surgical continuum thus spans prehabilitation and postoperative rehabilitation.

Improvements in cancer survival mean that a growing number of people live for many years after surgical treatment, increasing the importance of functional recovery, management of lasting impairments and quality of life [1]. Physiotherapy contributes directly to these survivorship goals, helping patients not only to survive cancer surgery but to return to active, independent and fulfilling lives. This shift in focus from survival alone toward survivorship has heightened interest in rehabilitation throughout the cancer-surgical pathway.

The problem addressed in this review is the need to synthesise current evidence on physiotherapy approaches for cancer patients before and after surgical treatment, which are often considered separately. Accordingly, this review examines prehabilitation and

postoperative rehabilitation, evaluates the supporting evidence, and emphasises an individualised, multidisciplinary approach to optimise outcomes across the cancer-surgical continuum.

REVIEW METHODOLOGY

This narrative review was based on a structured search of peer-reviewed literature concerning physiotherapy, prehabilitation and rehabilitation in surgical oncology. Databases were searched using terms relating to cancer, prehabilitation, exercise, inspiratory muscle training, postoperative rehabilitation, lymphoedema, shoulder dysfunction, cancer-related fatigue and quality of life. Systematic reviews, randomised controlled trials and relevant guidelines were prioritised, and findings were organised across the surgical continuum, encompassing preoperative prehabilitation and postoperative rehabilitation. The continuum of physiotherapy around cancer surgery is illustrated in Figure 1, and the principal interventions are summarised in Table 1. The synthesis considered evidence across diverse cancer types and procedures, recognising that the relevance of particular interventions depends on the surgery involved. Throughout, emphasis was placed on outcomes meaningful to patients and services, including postoperative complications, length of stay, physical function, treatment-specific impairments such as lymphoedema and shoulder dysfunction, fatigue and quality of life.

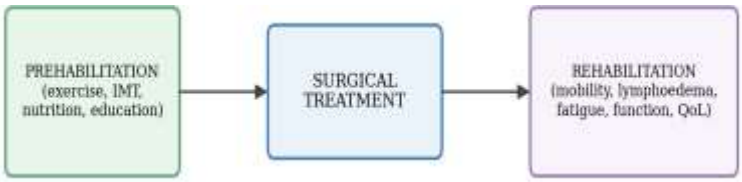

Figure 1: The continuum of evidence-based physiotherapy before and after cancer surgery

Table 1: Physiotherapy interventions across the cancer-surgical continuum.

Phase	Principal interventions
Prehabilitation	Aerobic and resistance exercise, inspiratory muscle training
Preoperative education	Preparation, expectations, breathing techniques
Early postoperative	Mobilisation, respiratory physiotherapy
Recovery rehabilitation	Shoulder/limb mobility, lymphoedema management
Ongoing rehabilitation	Exercise for fatigue, function and quality of life

PHYSIOTHERAPY APPROACHES

Prehabilitation before Surgery

The approaches below are presented across the surgical continuum, from prehabilitation to long-term rehabilitation, but they are most effective when planned as a connected pathway rather than as isolated episodes of care.

Multimodal prehabilitation, combining exercise with nutritional and psychological support, appears more effective than exercise alone, reflecting the multiple factors that influence a patient’s capacity to withstand surgery [2], [3]. This integrated model has become the preferred approach where resources and time permit.

Prehabilitation has emerged as an evidence-based approach to optimising patients before cancer surgery. Exercise-based prehabilitation, often combined with inspiratory muscle training, nutritional and psychological support, improves preoperative physical fitness and functional capacity [2], [3]. Evidence indicates that prehabilitation, particularly multimodal programmes, can improve fitness and may reduce postoperative complications and length of stay, especially in major thoracic and abdominal cancer surgery. The approach is most valuable when the preoperative interval allows meaningful conditioning.

A distinctive feature of prehabilitation in oncology is the tension between the desire to optimise the patient and the imperative not to delay cancer treatment [2], [3]. Because the preoperative window is often short, prehabilitation programmes must be intensive and efficient, and even brief interventions of a few weeks have been associated with measurable gains in fitness. Identifying which patients benefit most, particularly those who are frail or deconditioned, allows limited prehabilitation resources to be directed where they yield the greatest return.

Early Postoperative Physiotherapy

These early interventions are particularly important after major thoracic and upper-abdominal cancer resections, where the risk of postoperative pulmonary complications is high and the consequences of immobility are significant [2], [4].

In the early postoperative period, physiotherapy focuses on mobilisation and respiratory function to prevent complications and promote recovery [2], [4]. Early ambulation and

breathing exercises reduce the risk of postoperative pulmonary complications and deconditioning, particularly after major thoracic and abdominal cancer surgery, mirroring the benefits seen in non-cancer surgery. Early physiotherapy thus addresses the immediate physical consequences of surgery and initiates the recovery of function.

The principles of early postoperative physiotherapy in cancer surgery largely mirror those established in general surgery, but the cancer context adds considerations such as the effects of neoadjuvant treatment, nutritional compromise and the psychological burden of a cancer diagnosis [1], [2]. These factors can reduce physiological reserve and motivation, making skilled, encouraging physiotherapy especially important in initiating recovery and re-establishing confidence in movement after major oncological surgery.

Management of Treatment-Specific Impairments

Complex decongestive therapy for lymphoedema, combining manual lymphatic drainage, compression, skin care and exercise, is the established standard of care and can substantially reduce limb volume and improve function when applied consistently [5]. Patient education in self-management is integral, since lymphoedema is typically a chronic condition requiring ongoing attention.

Cancer surgery frequently produces specific functional impairments that physiotherapy is well placed to manage. After breast and axillary surgery, shoulder dysfunction and restricted range of motion are common, and physiotherapy restores shoulder mobility and function [4], [5]. Lymphoedema, a frequent and distressing complication of lymph-node surgery, is managed through complex decongestive approaches including manual lymphatic drainage, compression and exercise [5]. After head, neck and other surgeries, targeted physiotherapy addresses region-specific dysfunction, illustrating the tailored nature of postoperative rehabilitation.

The timing of intervention for treatment-specific impairments is important. Early, graded shoulder exercise after breast and axillary surgery restores movement while respecting wound healing, and early identification and management of lymphoedema improve outcomes, since established lymphoedema is more difficult to control than its early stages [4], [5]. This argues for proactive surveillance and timely physiotherapy rather than referral only once impairments become severe, reflecting a preventive as well as restorative philosophy.

Fatigue, Function and Quality of Life

Cancer-related fatigue is among the most common and distressing symptoms reported by patients and, paradoxically, responds better to exercise than to rest [6]. This counter-intuitive finding has made structured physical activity a central component of survivorship care, helping to break the cycle of fatigue, inactivity and deconditioning that can otherwise persist long after treatment ends.

Beyond specific impairments, physiotherapy addresses the broader consequences of cancer and its treatment, particularly cancer-related fatigue and reduced quality of life [6]. Exercise therapy is a well-established intervention for cancer-related fatigue, with strong evidence that it reduces fatigue and improves physical function and quality of life. Structured, individualised exercise programmes support recovery, restore function and enhance well-being across the survivorship trajectory. The reported benefits of physiotherapy across these outcomes are summarised in Figure 2 and Table 2.

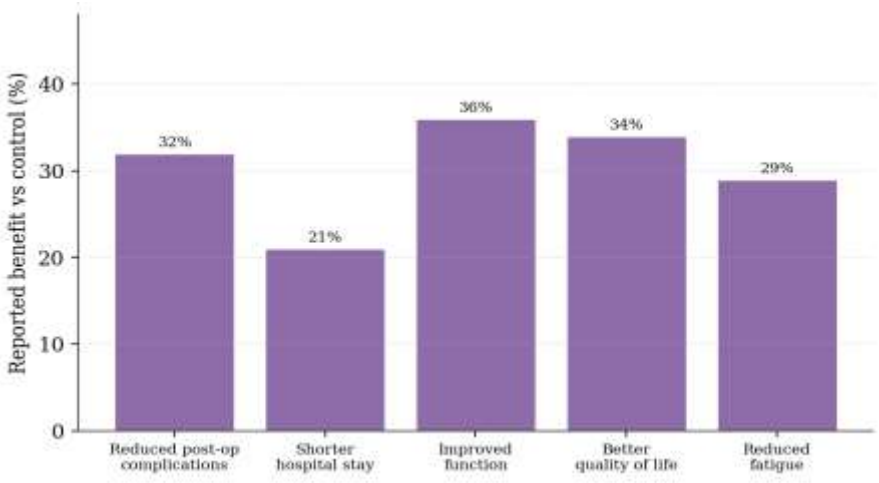

Figure 2: Reported benefits of physiotherapy across outcomes in surgical cancer care

The breadth of reported benefits, spanning complications, function, fatigue and quality of life, reflects the multiple ways in which physiotherapy acts across the cancer-surgical pathway [2], [6]. The strongest and most consistent effects are seen for function and quality of life, outcomes that matter greatly to patients and that purely medical treatment does not directly address.

Table 2: Summary of evidence for physiotherapy approaches in cancer surgery

Approach	Evidence level	Main reported benefit
Prehabilitation	Moderate-strong	Improved fitness, fewer complications
Early postoperative physio	Strong	Reduced complications, faster recovery
Lymphoedema management	Strong	Reduced swelling, better function
Exercise for fatigue / QoL	Strong	Less fatigue, improved quality of life

DISCUSSION

The evidence reviewed indicates that evidence-based physiotherapy is a valuable component of cancer care across the surgical continuum, contributing both before and after surgery. Prehabilitation improves preoperative fitness and may reduce postoperative complications and length of stay, while postoperative physiotherapy promotes recovery, manages treatment-specific impairments such as shoulder dysfunction and lymphoedema, reduces cancer-related fatigue and improves function and quality of life [2], [4], [5], [6]. The breadth of these benefits reflects the wide-ranging impact of cancer and its surgical treatment on physical function.

A central theme is the value of intervention across the entire surgical continuum rather than at a single point. Prehabilitation and postoperative rehabilitation are complementary, with preoperative optimisation enhancing resilience to surgery and postoperative rehabilitation restoring function, and the integration of both offers the greatest potential benefit [2], [3]. This continuum-based approach aligns with the recognition that recovery from cancer surgery is a process beginning before the operation and extending well into survivorship, and it supports proactive, planned rehabilitation.

Coordination across the cancer multidisciplinary team is essential to realise these benefits, since physiotherapy must be integrated with surgical, oncological and nursing care and timed appropriately around other treatments [2], [4]. When rehabilitation is planned as part of the overall cancer pathway rather than added as an afterthought, its contribution to recovery and survivorship is maximised.

The management of treatment-specific impairments highlights the tailored nature of cancer

physiotherapy. Different surgeries produce characteristic dysfunctions, such as shoulder restriction after breast surgery or lymphoedema after lymph-node dissection, each requiring specific, evidence-based interventions [4], [5]. At the same time, the broad benefits of exercise for fatigue, function and quality of life apply across cancer types, providing a unifying foundation. The combination of condition-specific and general approaches, delivered through an individualised, multidisciplinary model, characterises effective cancer rehabilitation. Its clinical significance lies in restoring function, managing disabling complications and improving the quality of survivorship.

The psychological dimension of cancer rehabilitation also merits emphasis. A cancer diagnosis and its surgical treatment carry substantial emotional burden, and physical activity has well-documented benefits for mood, anxiety and self-efficacy in addition to its physical effects [2], [6]. Physiotherapy thus contributes to psychological as well as physical recovery, and its delivery within a supportive, multidisciplinary framework that addresses the whole person is central to its value in cancer care.

Several challenges and limitations apply. Despite supportive evidence, physiotherapy and prehabilitation are not yet universally integrated into cancer-surgical pathways, reflecting limitations in awareness, resources, access and the often short preoperative interval. The evidence base varies across interventions and cancer types, being strong for exercise, lymphoedema management and shoulder rehabilitation and more limited for some prehabilitation contexts, and heterogeneity complicates comparison. These considerations indicate the need for wider implementation, standardisation and further high-quality research.
In summary, the convergence of strong evidence for exercise, lymphoedema care and shoulder rehabilitation, together with growing support for prehabilitation, makes a compelling case for embedding physiotherapy throughout the cancer-surgical pathway rather than offering it selectively [2], [6].

CONCLUSION

Positioned across the surgical continuum, physiotherapy helps patients enter surgery in better condition, recover more quickly afterwards and regain function and quality of life during survivorship [2], [3].

Evidence-based physiotherapy is a valuable component of cancer care before and after surgical

treatment. Prehabilitation improves preoperative fitness and may reduce postoperative complications and length of stay, while postoperative rehabilitation promotes recovery, manages treatment-specific impairments such as shoulder dysfunction and lymphoedema, reduces cancer-related fatigue and improves function and quality of life. An individualised, multidisciplinary approach across the surgical continuum offers the greatest benefit, combining condition-specific interventions with the broad benefits of exercise. Despite strong rationale and supportive evidence, physiotherapy remains incompletely integrated into cancer-surgical pathways, and wider implementation, standardisation and further high-quality research are needed to optimise outcomes for cancer patients undergoing surgery.

LIMITATIONS

This review has several limitations. As a narrative review rather than a systematic review with meta-analysis, it is subject to selection bias and does not provide pooled quantitative estimates. The breadth of cancer types and interventions covered limits the depth of analysis for each, and the evidence base varies in quality, being strong for some interventions, such as exercise for fatigue and lymphoedema management, and more limited for prehabilitation in certain contexts. Heterogeneity in cancer types, surgical procedures, interventions and outcome measures limits direct comparison, and the review emphasises widely studied approaches, potentially underrepresenting emerging or cancer-specific interventions.

FUTURE SCOPE

Future research should include high-quality randomised controlled trials evaluating prehabilitation and postoperative physiotherapy across specific cancer types and procedures, with standardised protocols and outcome measures, including postoperative complications, function and quality of life. Studies on optimising the content, timing and intensity of prehabilitation within the often-limited preoperative window are needed, as is research into integrating physiotherapy into cancer-surgical pathways and improving access. Investigation of technology-supported, home-based and tele-rehabilitation models could extend the reach of effective care, and long-term studies of functional and survivorship outcomes would further strengthen the evidence base for physiotherapy in surgical oncology.

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Received Date: May 20, 2026

Accepted Date: June 14, 2026

Published Date: June 30, 2026

Citation: Dr. Ira Banerjee, Aniruddh Rao, Shreya Kapoor, Nilesh Patil. Evidence-Based Physiotherapy Approaches for Cancer Patients before and after Surgical Treatment. Journal of Physiotherapy in Medical and Surgical Conditions. 2026; 2(1): 44-53p.