



Palliative Rehabilitation in Patients with Cancer: Definitions, Structures, Processes and Outcomes

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Abstract

Purpose of Review This review examines the literature on palliative rehabilitation for patients with advanced cancer, focusing on definitions, structures, processes, and outcomes.

Recent Findings Palliative cancer rehabilitation targets comfort and functional improvement for patients with limited rehabilitation potential across various settings. The palliative cancer rehabilitation team, typically led by a physician, coordinates symptom management and referrals to rehabilitation and other allied healthcare professionals as needed. The outcomes of palliative cancer rehabilitation varied widely by goals, settings, and interventions. Studies in hospice settings generally reported improved symptom control; inpatient rehabilitation had mixed functional outcomes; and outpatient palliative rehabilitation may contribute to enhanced functional and symptom outcomes, especially among patients with higher baseline function.

Summary Palliative cancer rehabilitation emphasizes a collaborative approach that integrates palliative care with rehabilitation interventions, aiming to enhance quality of life and address diverse patient needs. Further research and standardization are necessary to realize its full potential.

Keywords Functional status · Palliative care · Physical and rehabilitation medicine · Neoplasms · Quality of life · Hospices

Abbreviations

WHO	World Health Organization
ECOG	Eastern Cooperative Oncology Group
ICF	International Classification of Functioning, Disabilities, and Health
IPR	Inpatient rehabilitation
RCT	Randomized clinical trial
KPS	Karnofsky Performance Scale
SNFs	Skilled nursing facilities
LTACH	Long-term acute care hospitals
EOL	End-of-life
6MWT	6-Minute walk test

Introduction

The World Health Organization (WHO) defines palliative care as an approach that improves the quality of life of patients facing life-threatening illnesses, such as cancer, through the prevention and relief of suffering [1] and rehabilitation as “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions” [2]. Although palliation and rehabilitation may appear to have opposing goals at times, they can be highly complementary [3]. Indeed, by incorporating the principles and practices of both disciplines, palliative rehabilitation could improve symptoms, function, and thus quality of life in patients with advanced life-limiting illnesses [3]. Recognizing the role of palliative rehabilitation, WHO published a policy statement in 2021 to highlight the importance of integrating palliation and rehabilitation [4]. In 2020, Montagnini et al. described the components of palliative rehabilitation in patients with cancer and summarized its evidence. [5]. Most of the studies considered in that review included studies from the 1990s, 2000s, and/or involving patients across different stages/prognoses of cancer. Here, we provide an updated literature review of the definitions, structures, processes, and outcomes of palliative cancer rehabilitation.

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Search Methodology for Literature Review

A medical research librarian searched MEDLINE (Ovid), PubMed (National Library of Medicine), Embase (Ovid), Scopus (Elsevier), and Web of Science (Clarivate) from inception to August 1, 2023. After consultation with the research team, the librarian selected controlled vocabulary (MeSH and Emtree) and natural language terms for the concepts of advanced cancer, palliative care, and rehabilitation and tailored the search strategy to each database. Results were limited to those published from January 1, 2013, to the present, adult, non-animal studies, and articles published in English. We also reviewed the bibliographies of all included manuscripts.

Definitions of Palliative Rehabilitation in Patients with Cancer

A common operational definition of palliative rehabilitation is essential to outline the structures, processes, and outcomes. The scope and services under palliative rehabilitation have evolved over the past few decades. Different authors have proposed varying classifications and definitions of palliative rehabilitation.

The Dietz classification has been reported as the most influential categorization for cancer rehabilitation [6, 7] and its goals [7]. In 1969, Dietz proposed the following cancer rehabilitation categories:

- 1) "Prevention" by providing instruction and performance training to mitigate the anticipated disability's impact and severity
- 2) "Restoration," to be applicable when the patient is expected to return to their pre-illness functional state without significant residual impairment
- 3) "Support," when "ongoing disease or handicap persists", but proper training and treatment can minimize disability as much as possible
- 4) "Palliation," where "progressive disease" can be expected to lead to "increasing disability" and reduced functional capacity [8].

Notably, supportive and palliative rehabilitation can have overlapping goals to address complications such as bedsores, contractures, hygiene issues, and emotional deterioration associated with decreased mobility [3, 8].

In 2000, Cole et. al. stated that the Dietz categories "are based on the treatment goals for a patient's rehabilitation". This study evaluated inpatient rehabilitation's impact using Dietz categories that were further then translated as stages I-IV, as "assigned by an oncologist per expected treatment

goals, type of cancer, disease severity, metastases, age, comorbidities, and past health status" [9]. Stage I category prevents/reduces cancer disability and thus has a high-level goal [9]. Stage II category has a modest goal of restoring premorbid health with minor deconditioning [9]. Stage III category has a modest goal to target cancer-related disability in persistent but "controlled" cancer [9]. Stage IV (palliative) goal generally focuses on the patients' comfort due to the terminally ill state [9]. Cole et. al., in their retrospective study, confirmed their hypothesis that patients with more advanced diseases would likely experience smaller improvements in functionality compared to those with less advanced conditions [9].

In 2017, Cheville et. al. proposed "the definition that, in the advanced cancer population, *palliative rehabilitation* is function-directed care delivered in partnership with other clinical disciplines and aligned with the values of patients who have serious and often incurable illnesses in contexts marked by intense and dynamic symptoms, psychological stress, and medical morbidity to realize potentially time-limited goals" [10]. This article suggested that the categorization of general conditioning exercises as palliative rehabilitation for high-performing patients with stage III and IV cancer (i.e., such as those with Eastern Cooperative Oncology Group [ECOG] 0–1 status and minimal symptoms) is "questionable" and that limiting palliative rehabilitation to end-of-life patients overlooks its broader benefits [10].

In 2018, Payne et. al. stated palliative rehabilitation is "an educational, problem-solving process focused on activity limitations, aiming to optimize social participation and well-being and so reduce stress" on the caregiver, which was Wade's rehabilitation definition [11] and adapted by adding "within the context of a life-limiting progressive illness." [12].

In 2020, Chowdhury et. al. stated, "supportive rehabilitation" is for patients with "cancer as a chronic condition", aiming to enable them to adapt to fixed disabilities and reduce the impact of "ongoing disease". It was reported for "slowly progressive... (e.g., prostate cancer, metastatic breast cancer)", as well as "chronic (usually hematological)" malignancies. In contrast, "palliative rehabilitation" was reported by Chowdhury et. al. to be applicable during the "terminal stages" of cancer to enhance the quality of life. The studies that they included for reviewing the benefits of "palliative rehabilitation" had patients with "advanced cancer" [6].

While diverse interpretations of palliative cancer rehabilitation exist, underlying commonalities are discernible in the literature for palliative rehabilitation goals, which are associated with cancer status or prognosis. These shared elements offer a basis for a cohesive purpose of palliative rehabilitation, particularly when these common elements of

palliative rehabilitation can be distinguished from supportive rehabilitation.

Differences and Similarities between Palliative Rehabilitation and Supportive Rehabilitation in Patients with Cancer

Palliative rehabilitation aims to enhance patient comfort [3, 6, 9, 13, 14] and independence as disabilities increase [8, 13] due to advanced [6, 9, 12, 15–17], progressive [8], or incurable [10] cancer. It involves symptom management [3, 10, 18], prevention of immobility-related complications [3, 8, 14, 18], with emotional [8, 18] and existential distress support [18] due to the nature of the condition and potentially time-limited goals [6, 9, 10]. Although traditionally this approach is considered for patients with advanced cancer that is refractory to treatment [10], in patients with poor function or performance status and no longer candidates for further therapies, more recent studies have applied the principles of palliative rehabilitation earlier in the disease trajectory for patients with advanced disease [17].

Due to the anticipated decline in functional status [13, 19], rehabilitation potential for this population is expected to be fair to poor. The rehabilitation interventions during this stage prioritize educating [11, 12, 18] both the patient and their caregivers on conserving energy and optimizing

function [7, 18] amidst the pathophysiological impacts of advanced cancer [18] to reduce the caregiver burden [6, 7].

In contrast, supportive rehabilitation aims to minimize [8, 13, 14] and/or adapt to fixed disabilities [6, 14, 18] in patients affected by cancer or its treatments due to slowly progressive [6], controlled, or chronic cancer [6, 9] since some patients with incurable cancer may live for many years [20]. It applies to patients with permanent [6, 7, 18], improving [6], and/or stable impairments. Due to anticipated improvement (but not full restoration) or stability of disability [13], the rehabilitation potential for this population would be good to fair. Supportive rehabilitation aims to enhance the self-care abilities and mobility of patients and includes physical exercises [3, 7].

While palliative and supportive rehabilitation have their own distinct elements of rehabilitation goals, there can also be overlapping generalized rehabilitation goals for supportive and palliative rehabilitation (as summarized in Fig. 1). Palliative versus supportive rehabilitation terms should be used based on rehabilitation goals, needs, and potential [18]. The rehabilitation goals and potentials are in turn based on various patient and disease characteristics, such as patient preferences, motivation, age, prognosis [21], treatment status and complications, functional impairments or disabilities, cognitive ability [13], medical co-morbidities [3, 7, 8], mobility barriers within the living environment [3],

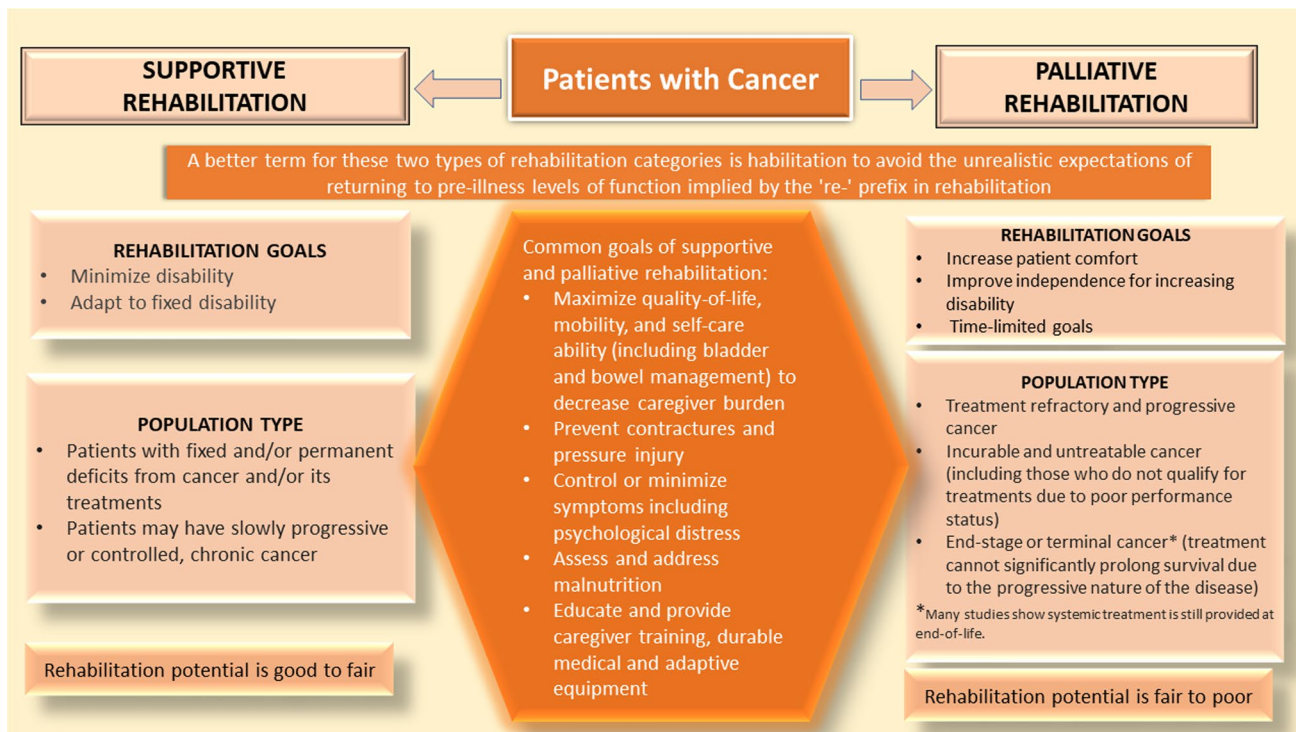


Fig. 1 Conceptual Framework of Palliative Rehabilitation and Supportive Rehabilitation in Patients with Cancer. These two terms fall along the continuum of rehabilitation services, share some common features, and have distinct elements

psychosocial factors, and caregiver availability [7]. Several assessment tools are available to aid in assessing functional status including mobility and cognition, symptoms including depression and distress, nutrition, and co-morbidities [3, 6]. Rehabilitation potential is evaluated based on observations of "carry-over" and functional gain, and relies largely on rehabilitation providers' experiential knowledge rather than population-based predictive models, making it less reliable [22]. When prescribing rehabilitation, it is imperative to establish clear rehabilitation goals, assess rehabilitation potential, define a realistic timeframe, and reassess all of these factors periodically. This ensures cohesive rehabilitation goal setting among all healthcare stakeholders, including the patients, their family, or caregiver, and the healthcare providers. While the patients and their family may not prioritize specific rehabilitation categories, alignment among healthcare providers is crucial for consistent communication and mutual understanding regarding the anticipated rehabilitation goal and time frame to avoid patient disappointments.

Structure and Process of Palliative Cancer Rehabilitation

There are many studies of palliative rehabilitation in patients with advanced cancer [9, 12, 15–17, 19]. In the literature, there exists considerable heterogeneity regarding the settings, team composition, and extent of palliative rehabilitation.

Palliative Rehabilitation Goals

The practical implementation of rehabilitation is grounded in the International Classification of Functioning, Disabilities, and Health (ICF) [3]. The ICF, developed by the WHO [23], serves as a comprehensive framework that guides rehabilitation professionals to develop a holistic understanding of a patient's health condition, considering both the physical impairments and their impact on the individual's overall functioning and participation in daily life [3]. This framework facilitates person-centered care by tailoring interventions to the specific needs and goals of each individual [3] and provides a common language for communication among rehabilitation professionals.

The general goals of rehabilitation encompass enabling individuals with disabilities to reach and maintain their optimal physical, sensory, intellectual, psychiatric, and social functional levels, empowering them to adapt their lives for greater independence [3], and minimizing stress on caregivers [11]. These goals can be set for short and long periods [11] depending on the health care delivery setting, which can be changed over time.

The overarching rehabilitation goals remain relevant for patients engaged in palliative rehabilitation, albeit in

consideration of a poor prognosis. The anticipated decline in functional capacity resulting from progressive disease necessitates a shift in focus from rehabilitation to habilitation. In the realm of palliative rehabilitation, Jennings suggests using the term 'habilitation' instead of 'rehabilitation' to avoid unrealistic expectations of returning to pre-illness levels of function implied by the 're-' prefix [24]. Thus, adaptations to functional decline and compensatory strategies are notable goals of palliative rehabilitation [19] to maximize the patient's independence across various activities of daily living, encompassing tasks such as mobility, personal hygiene, dressing, meal preparation, and engaging in leisure pursuits [18]. Cheville noted that the primary goal of palliative rehabilitation is to diminish reliance on mobility and self-care tasks (including bladder [25] and bowel management) while providing comfort and emotional support, and with the provision of compensatory strategies and assistive devices [7]. Frequently assessing rehabilitation goals and adjusting them as needed is also important [7, 26] due to the dynamic nature of cancer [7].

Among the studies of palliative rehabilitation, the goals have varied from improving physical function [9, 15, 26–29], cognition [9, 29], nutrition [15, 17], comfort [9], symptoms [15, 17, 26, 30–32], psychological wellbeing [16, 17, 29–31, 33, 34] to health-related quality of life [29, 33]. This is because patients commonly exhibit a multitude of symptoms, with a median of 11 being linked to the advanced disease and its treatment [16]. Substantial evidence supports the implementation of rehabilitation interventions aimed at alleviating prevalent symptoms among patients with advanced cancer [35].

Proper dietary intake during palliative rehabilitation significantly contributes to a patient's ability to participate in the rehabilitation process. Weight loss in patients with cancer brings about detrimental outcomes, including a worsened prognosis, increased chemotherapy-related toxicity, increased fatigue, and impaired social interaction, particularly during meals [18]. These repercussions significantly impact the patient's energy and tolerance level with rehabilitation interventions and ultimately quality of life [18]. The dietician's responsibility involves assessing the patient's existing nutritional status and offering tailored dietary recommendations to address specific needs [18].

Emotional support during palliative rehabilitation is also important [16, 18, 34]. Distress refers to challenging emotional experiences stemming from psychological, social, spiritual, or existential uncertainties [18]. It becomes clinically significant when it affects social engagement and daily functioning [18]. In patients with advanced cancer, this may manifest as difficulties in interacting with clinicians, seeking appropriate care, adhering to treatments, coping with losses, and navigating existential uncertainties [18]. Psychosocial clinicians within the palliative rehabilitation team [16, 26,

34] not only assist with distress management but also aid in physical symptoms [26] such as pain, insomnia, and fatigue [18].

Palliative Rehabilitation Healthcare Team Members

The core members of the rehabilitation team (i.e. physical therapists, occupational therapists, physical medicine & rehabilitation physicians) play a vital role in predicting each patient's rehabilitation potential to optimize resource utilization [22]. Their regular clinical decisions involve assessing the potential benefits of rehabilitation interventions for individual patients, determining when to initiate rehabilitation, the appropriate intensity of interventions, identifying the point at which further rehabilitation may not yield meaningful outcomes [22], and taking into account the risk of chronicity or permanent impairment.

Many of the studies on palliative rehabilitation in patients with cancer integrated the rehabilitation team with palliative care services to include an interdisciplinary [9, 16, 34, 36] or multidisciplinary [17, 33] team of physicians, nurses, physical therapists, occupational therapists, social workers, and dietitians [16, 17, 34, 36, 37]. Other members sometimes included a speech pathologist [9], psychologist, chaplain [17], and pharmacist [37]. Some studies specified the type of involved physicians to include an oncologist, physiatrist [9], palliative care physician [37], and “referring” / family physician [15]. These are summarized in Fig. 2. A physician

is typically required for medication management and initiating proper referrals to other allied members of the palliative rehabilitation team.

Of note, a randomized controlled trial (RCT) was conducted recently to establish a highly adaptable, multidisciplinary outpatient clinic model for palliative rehabilitation. The patients were randomized to usual oncologic care with or without palliative rehabilitation [17]. The core palliative rehabilitation service comprised of two consultations with a palliative care physician and a palliative care nurse, with the option of a 12-week engagement with a palliative rehabilitation team (comprising physicians, nurses, physical therapists, psychologists, social worker, dietitian, occupational therapist, and chaplain) as needed [17]. Within the small sample size of 132 patients, 20% received the two initial consultations only, 45% participated in the optional physical exercise group program, and 35% received optional (median of two) consultations from the palliative rehabilitation team (primarily led by nurses) without participation in the physical exercise group program [17].

Palliative Rehabilitation Settings

Recognizing that rehabilitation activities are not tied to any particular setting is essential [26] (see Fig. 3 for summary). Palliative rehabilitation was reported in many settings including home [19], outpatient facilities [16, 17, 34, 36], inpatient rehabilitation [9, 27, 28], home hospice [38],

Fig. 2 Palliative Cancer Rehabilitation Team Composition. In addition to the core rehabilitation team, palliative rehabilitation services often include members with expertise in medical supportive care and others with expertise in psychosocial supportive care. These teams can be interdisciplinary or multidisciplinary



CANCER REHABILITATION SETTINGS			ADDITIONAL SETTINGS FOR PALLIATIVE CANCER REHABILITATION	
↑ MORE FREQUENT THERAPY	INPATIENT REHABILITATION (IPR)			
	<ul style="list-style-type: none"> <input type="checkbox"/> Good rehabilitation potential; make a meaningful recovery on functional assessment scores within a short time frame <input type="checkbox"/> Requires two or more rehabilitation services <input type="checkbox"/> Requires 24-hour nursing care and physician (usually physiatrist) or physician extender visits at least 3 times a week for medical management with weekly interdisciplinary team meetings 	<ul style="list-style-type: none"> <input type="checkbox"/> Therapy is more intensive; must participate in a total of three or more hours of therapy per day (or 15 hours in a week) <input type="checkbox"/> Must be medically stable; symptoms should be well controlled for frequent rehabilitation participation <input type="checkbox"/> Average length of stay 10-14 days <input type="checkbox"/> Inside specialized rehabilitation facilities or acute care hospitals 		
↓ LESS FREQUENT THERAPY	SKILLED NURSING FACILITY (SNF) OR LONG-TERM ACUTE CARE HOSPITAL (LTACH)		PALLIATIVE CARE	
	<ul style="list-style-type: none"> <input type="checkbox"/> Requires at least one hour of skilled nursing (such as intravenous antibiotics) or rehabilitation care daily, five days a week to qualify for SNF. <input type="checkbox"/> Need continuous monitoring and complex medical care, such as complex wounds, chest tubes, or dependence on ventilators to qualify for LTACH 	<ul style="list-style-type: none"> <input type="checkbox"/> Physician or physician extender visits at least weekly <input type="checkbox"/> Average length of stay 25-60 days <input type="checkbox"/> Can participate in about 30 to 90 minutes of therapy 3 to 5 times weekly; thus, less intense compared to IPR 	<ul style="list-style-type: none"> <input type="checkbox"/> Variable rehabilitation programs depending on the individual program and setting (i.e., location, inpatient, outpatient) 	
↓ LESS FREQUENT THERAPY	OUTPATIENT REHABILITATION		HOSPICE	
	<ul style="list-style-type: none"> <input type="checkbox"/> Needs reliable transportation <input type="checkbox"/> More intensive program at a facility compared to home health rehabilitation 	<ul style="list-style-type: none"> <input type="checkbox"/> May receive one or more rehabilitation services up to three times per week 		<ul style="list-style-type: none"> <input type="checkbox"/> Variable rehabilitation programs depending on the individual program and setting (i.e., location, inpatient, outpatient)
	HOME HEALTH REHABILITATION			
	<ul style="list-style-type: none"> <input type="checkbox"/> Limited transportation to access rehabilitation facilities <input type="checkbox"/> Possibly bed-ridden patients 	<ul style="list-style-type: none"> <input type="checkbox"/> Home safety evaluation possible <input type="checkbox"/> May receive one or more rehabilitation services up to three times a week 		

Fig. 3 Palliative Cancer Rehabilitation Settings. Palliative cancer rehabilitation can be delivered in all conventional rehabilitation settings as well as in palliative care or hospice settings

hospice day care unit [33], inpatient hospice [39], palliative care units [37, 40] and under palliative care [41].

A systematic review revealed that the majority of rehabilitation studies in palliative and hospice care settings focused on physical therapy, particularly utilizing massage and exercise, to enhance cancer-related symptoms and improve patients' engagement in daily physical activities [26]. Upon enrollment in hospice and palliative care programs, however, patients can encounter irregular access to physical therapy services [42]. There might also be a lack of awareness among healthcare professionals regarding the significance of rehabilitation in preserving safe and comfortable functionality amid physical deterioration [43]. In 2011, the American Physical Therapy Association endorsed and elucidated the role of physical therapists in hospice and palliative care, encompassing concepts of continuity of care, equitable access to services, interdisciplinary collaboration, education of therapists, and advocating for suitable coverage and reimbursement [44].

Hospice care is appropriate for individuals facing life-threatening or terminal illnesses, and most reimbursement sources typically mandate a prognosis of six months or less [45, 46]. Thus, predicting the survival of patients in advanced cancer stages carries therapeutic, psychological [47], and rehabilitation implications. The hospice team includes the patient's physician, a hospice physician (or

medical director), nurses, hospice aides, social workers, spiritual care providers or counselors, bereavement professionals, and speech, physical, and/or occupational therapists [45]. Thus, the core professionals needed for palliative rehabilitation are often available in the hospice setting.

In a survey study published in 2012, both medical oncologists and physiatrists were less likely to refer or accept patients with very poor prognoses for inpatient rehabilitation when provider-reported clinical experience increased [48]. Since then, it has been suggested that some patients with a life expectancy of less than 3 months may desire to undergo 2 weeks of inpatient rehabilitation if it reduces caregiver burden [21]. This may be appropriate if the patients (qualify for inpatient rehabilitation and) are under the care of a cancer rehabilitation physiatrist who may be more comfortable in managing patients with advanced cancer [21], and have access to palliative care consultation services. This is needed due to the high rate of medical complications with symptom burden [49] that affects intensive inpatient rehabilitation participation [50].

In the outpatient setting, palliative rehabilitation programs predominantly involved patients with a good performance status [15, 16, 34, 36]. Some of these programs may represent a hybrid between supportive and palliative rehabilitation depending on the specific rehabilitation goals, the

rehabilitation potential of the patients, and the extent of the intervention.

Outcomes of Palliative Cancer Rehabilitation

Palliative Care and Hospice Settings

In a 2012 pilot RCT involving 24 patients with “terminal” cancer at a university hospital randomly assigned to two treatment groups. Group A ($n = 12$) received physiotherapy comprising diverse massage techniques, mobilizations, and exercises, while Group B ($n = 12$) received “simple” hand contact/touch in specific pain areas, both over six 30–35 min sessions across 2 weeks [31]. Both groups demonstrated pain reduction and mood enhancement.

A 2013 RCT comparing rehabilitation interventions delivered by a hospice day care unit multidisciplinary team to usual care for patients with active, progressive, recurrent cancer (enrollment of 41 participants with 36 completing the trial and majority with ECOG of 2) showed significantly improved primary outcomes of the psychological subscale of the Supportive Care Needs Survey in the intervention arm (adjusted difference -16.8, 95% CI -28.34 to -5.3; $P = 0.006$). Notably, the incremental cost-effectiveness ratio (£19,390 per quality-adjusted life year) exhibited significant differences [33].

In a 2017 RCT within a palliative care service, 60 patients with advanced cancer were randomized into treatment ($n = 30$ with Karnofsky Performance Scale [KPS] 46) and control ($n = 30$ with KPS 48) groups, with the treatment group undergoing thrice-weekly physiotherapy sessions comprising active exercises, myofascial release, and proprioceptive neuromuscular facilitation techniques over 2 weeks, while the control group did not engage in structured exercise [32]. Patients in the exercise group had a significant reduction in fatigue scores and improvement in daily function.

A 2020 systematic review on physiotherapy in hospice care found that structured exercise programs, massage, transcutaneous electrical nerve stimulation, and compression bandaging exhibit efficacy in relieving symptoms among patients with advanced cancer in hospice care, correlating with enhanced quality of life, yet further rigorous studies are required to fortify these review findings [51].

Inpatient Rehabilitation Settings

No RCT of inpatient rehabilitation was found. Retrospective palliative rehabilitation studies on inpatient rehabilitation cohorts have indicated lower overall functional improvements (using the Functional Independence Measure and Activity Measure for Post-Acute Care scores) when compared to patients with more favorable prognoses [9, 28]. A recent retrospective study on inpatient rehabilitation for elderly patients

with active cancer noted overall functional improvements and established poor outcomes as either 1) discharge to long-term care or 2) mortality within three months following completion of inpatient rehabilitation [27]. These outcomes were selected based on the fundamental premise that inpatient rehabilitation aims to support a safe transition back to community living and assumes a reasonable life expectancy, thus justifying the investment of additional weeks spent in the hospital [27]. These adverse outcomes were observed in a quarter of the patient cohort, and the statistically significant independent associations ($p < 0.05$) encompassed factors such as high baseline dependency, presence of metastatic disease, lower mobility scores upon inpatient rehabilitation admission, complications during acute care, as well as values at or above the 75th percentile for lactate dehydrogenase and alkaline phosphatase [27].

Outpatient Settings

In a prospective series involving 116 patients, Chasen et al. in 2013 reported a 58% completion rate of an 8-week Palliative Rehabilitation Program. Reasons for non-completion included disease progression, personal reasons, death, or patients feeling too well. The likelihood of completing the program was higher among individuals with a baseline C-reactive protein < 10 . The study reported moderate-to-large within-group effects on symptoms such as anxiety, depression, overall well-being, feeling tired, and fatigue (effect size = 0.38–0.55). Improvements were observed in the 6-min walk test (6MWT) (effect size = 0.80), Time Up and Go (effect size = 0.65), Functional Reach Test (effect size = 0.44), and overall nutritional risk (effect size = 0.46). However, no statistical difference was found in the Berg Balance Scale or Hand Grip Strength. There was a significant enhancement in ECOG (effect size = 0.9) although the majority had a good baseline ECOG status of 1–2 [15].

Feldstain et al. conducted an 8-week Palliative Rehabilitation Program including mostly patients with a favorable ECOG performance status of 1–2. Compared to baseline, the mean 6MWT distance increased significantly from 372.55 m (SD 137.71) at baseline to 412 m (SD = 144.31), $p < 0.001$. Additionally, the study reported a significant increase in self-efficacy from 27.86 (SD = 6.16) to 31.23 (SD = 5.77), and a decrease in depression from 7.14 (SD = 3.91) to 5.95 (SD = 3.51), $p = 0.002$ [36]; the latter was maintainable at 3 months [16]. A secondary analysis revealed reductions in distress (from 55.6% to 38.9%; $p < 0.001$) [34].

Overcoming Barriers to Delivery of Palliative Cancer Rehabilitation

Palliative cancer rehabilitation should be defined by its specific rehabilitation goals and the time frame in which

these goals are to be achieved. These factors are inherently dependent on the patient's cancer status and prognosis, which directly influence the potential outcomes of the rehabilitation process. The goals of palliative rehabilitation encompass adapting to deteriorating functional status, with a focus on improving physical function, self-care tasks, cognition, nutrition, comfort, mood, and symptom management to improve overall quality of life. Although prognosis has an important role in tailoring rehabilitation goals, it is often difficult to predict in the advanced cancer setting. Clinicians are frequently incorrect and the tools are suboptimal [52]. Introducing an exercise program in palliative care can be challenging due to the possible complex clinical presentation and multiple symptoms experienced by patients with limited life expectancy [53]. Additionally, engaging in exercise necessitates personal dedication, driven by motivation, ability, and determination [53] for exercise adherence and fulfillment of rehabilitation goals.

The palliative rehabilitation team typically requires a physician (for prescriptions and referrals), and a rehabilitation professional (to deliver rehabilitation service), with the optional involvement of other healthcare members as needed, through interdisciplinary or multidisciplinary care models in various healthcare settings. Successful integration of rehabilitation professionals into palliative care and vice versa will require active efforts in education to improve mutual understanding and system processes to promote teamwork [10].

The studies on palliative care and hospice settings primarily showed symptom improvement, inpatient rehabilitation settings showed mixed functional improvement, and outpatient settings (mostly in patients with a higher level of function at baseline) typically observed improvements in symptoms and function. The process of acceptance to a specific rehabilitation program is, however, influenced by diverse stakeholder groups, including healthcare professionals, payors, patients, and their surrogates, each holding significantly different perspectives regarding an acceptable outcome [54]. There is a wide range of programs with heterogeneous outcomes. Ideally, palliative rehabilitation research would include standardized and validated outcome measurements on symptoms and function regardless of the rehabilitation delivery setting.

The paucity of research also remains a major impediment to implementation. For example, skilled nursing facilities (SNFs) have been reported to be a prevalent site for providing palliative rehabilitation, yet no available reports detail its effectiveness in this setting [10]. Given the comparatively less ambitious intensity and goals of rehabilitation services in SNFs, it theoretically aligns well with the needs of palliative care patients [10]. This applies to long-term acute care hospitals (LTACH) and home health rehabilitation (without hospice service) as well. Patients facing advanced-stage

cancer encounter potentially challenging transitions in care after hospitalizations [55]. Notably, patients discharged to post-acute care facilities like SNFs or LTACH, often experience diminished physical capabilities, significant physical and psychological symptom distress, and reduced survival rates [55]. Research on palliative rehabilitation interventions in these settings is warranted.

Conclusions

Palliative rehabilitation integrates palliative care and rehabilitation principles and practices to improve outcomes in many different care settings. Diverse programs exhibit varying outcomes, highlighting the necessity for further research and standardization efforts to address barriers hindering the implementation of evidence-based practices across different settings. The available evidence supports that palliative rehabilitation could improve some outcomes such as symptoms even when patients are expected to decline over time. Further studies are needed to optimize the interventions and improve palliative rehabilitation delivery.

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Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing Interests The authors declare no competing interests.

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