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Special Article

Cancer Rehabilitation and Palliative Care—Exploring the Synergies

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Abstract

With perpetual research, management refinement, and increasing survivorship, cancer care is steadily evolving into a chronic disease model. Rehabilitation physicians are quite accustomed to managing chronic conditions, yet, cancer rehabilitation remains unexplored. Palliative care physicians, along with rehabilitationists, are true generalists, who focus on the whole patient and their social context, in addition to the diseased organ system. This, together with palliative care's expertise in managing the panoply of troubling symptoms that beset patients with malignancy, makes them natural allies in the comprehensive management of this patient group from the moment of diagnosis. This article will explore the under-recognized and underused parallels and synergies between the two specialties as well as identifying potential challenges and areas for future growth. J Pain Symptom Manage 2020;60:1239–1252. *Crown Copyright © 2020 Published by Elsevier Inc. on behalf of American Academy of Hospice and Palliative Medicine. All rights reserved.*

Key Words

Cancer, rehabilitation, synergy, palliative care, QoL, exercise

Introduction

Cancer encompasses a group of disabling diseases, and its prevalence is growing rapidly worldwide. The lifetime prevalence of cancer in North America, from any tissue, is approximately 39.8%.[1] There are an estimated 1.1 million people living with a personal history of cancer in Australia, and this number is projected to increase to almost 1.9 million by 2040; thus, one in 18 people will be diagnosed with cancer.[2] Owing to early detection, treatment, and ongoing supportive care, people are also living longer after diagnosis. Relative five-year survival rates for most cancers have risen from 49% (1975–1977) to more than 70% (2016–2017) in the U.S.[3] In Australia, five-year survival has risen from 50% (1990) to almost 70% in 2019.[4]

Patients with cancer, before, during, and after treatment, invariably experience physical symptoms because of the disease and its management, psychological distress, functional impairment, and diminished quality of life (QOL) (Tables 1 and 2). Often, this process has a profound effect on families and carers (Fig. 1). Improvements in health awareness and an increase in timely cancer diagnosis, treatment, and regular surveillance have resulted in many people living longer with cancer. Their long-term health and well-being will need to be addressed adequately. The challenge for modern medicine is, therefore, the care of patients with cancer from diagnosis to death, where the latter may occur years after the completion of treatment. Supportive cancer care

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Table 1
Possible Cancer-Related Physical Impairments

Neurological	Musculoskeletal	Pain Syndromes	General
Global and specific deficits secondary to primary or secondary brain tumors and treatment	Skeletal metastases	Site-specific pain	Fatigue
Spinal cord compression	Myopathy	CPRS	Nausea
Nerve impingement	GVH disease		Dyspnea
Peripheral neuropathy	Radiation fibrosis		Deconditioning
Ataxia			Frailty
Autonomic dysfunction			Cachexia

GVH = graft vs. host disease; CPRS = complex regional pain syndromes.

strategies and cancer rehabilitation have been developed to reduce the impact of the disease and its treatment (Fig. 2).

Cancer Rehabilitation

Cancer rehabilitation may be defined as medical care that should be integrated throughout the oncology care continuum and delivered by trained rehabilitation professionals who have it within their scope of practice to diagnose and treat patients' physical, psychological, and cognitive impairments in an effort to maintain or restore function, reduce symptom burden, maximize independence, and improve QOL.[6]

The most influential classification system for cancer rehabilitation, throughout the cancer trajectory, is the Dietz classification (Table 3).[7] Later in this article, we will use this structure to outline, in detail, the practice of, and evidence for, cancer rehabilitation in each of these stages.

From small beginnings, cancer rehabilitation is emerging as a discipline with a growing recognition by professional organizations within medical and radiation oncology, cancer surgery, and rehabilitation medicine as a crucial, if not mandatory, component of cancer care.[10–13] A panel of experts, convened by the National Institute of Health, have published practice recommendations.[14] A Cancer Rehabilitation Networking Group has been established within the American Congress of Rehabilitation Medicine. The U.S. Commission on Accreditation of Rehabilitation Facilities has been accrediting inpatient cancer rehabilitation units for several years. Despite this activity, the discipline of cancer rehabilitation remains inadequately understood,[15] underused,[16] and underresourced. In this article, we will describe the objectives and practice of cancer rehabilitation. We shall examine the barriers and challenges for the discipline, its interface with palliative care, and shall argue that there are multiple synergies that could flow from an alliance of cancer rehabilitation, palliative care, and oncology in cancer care.

Role of the Rehabilitation Physician in Cancer Care

The goal of rehabilitation is contained in its etymology—from the Medieval Latin rehabilitationem, which means restoration. From re—again + habitare—make fit.

The rehabilitation physician, (also known as a physiatrist), uses the traditional biopsychosocial framework to address impairment, with the broad goals of

Table 2
Possible Treatment-Related Side Effects

Surgery	Chemotherapy	Radiotherapy	Hormonal Therapy	Immunotherapy
Adhesive capsulitis	Cardiotoxicity	Skin changes	Fatigue	Autoimmune disease
Lymphedema	Nephrotoxicity	Fibrosis	Osteoporosis	Diabetes
Dysphagia	Neurotoxicity	Mucositis	Weight gain	Thyroid dysfunction
Dysarthria	Fatigue	Esophagitis	Alopecia	Neuropathy
Dysphonia	Nausea	Pneumonitis	Mood changes	Pruritus
Decreased exercise capacity	Mucositis	Proctitis	Venous thromboembolism	Pneumonitis
Cognitive dysfunction	Diarrhea	Cystitis	Gynecomastia	Diarrhea
	Skin and hair changes	Cognitive dysfunction	Memory impairment	Skin changes
	Cognitive dysfunction		Sexual dysfunction	Weight gain

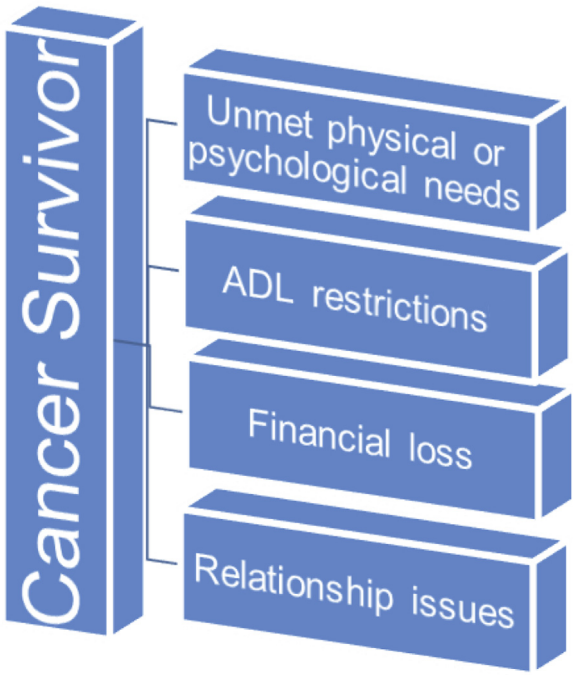

Fig. 1. Consequences of cancer and treatment for cancer survivors. Details the impact of cancer on different aspects of life. ADL = activities of daily living.

minimizing disability and maximizing function and independence, in all aspects of a patient's life.

The World Health Organization (WHO) defines rehabilitation as a set of measures that assist individuals, who experience or are likely to experience disability, to achieve and maintain optimum functioning in interaction with their environments (WHO, 2011).[17]

A rehabilitation assessment always begins with a comprehensive history and physical examination, with particular focus on an extended social and functional history (Table 4). This may be supplemented by a broad array of specialized, validated, and clinical assessment tools (Table 5). Certain investigations may be indicated, including pathology testing, imaging, nerve conduction studies, and electromyography.

Such evaluations assist rehabilitation physicians to identify current and potential physical and functional impairments affecting their daily life and formulate a detailed rehabilitation prescription, as either an inpatient or an outpatient, or both. The plan may include optimization of medication management, various procedures for pain management, that is, peripheral nerve blocks, intra-articular injections, periradicular injections, and botulinum toxin injections. Patients may require referral to specialized allied health services (e.g., a prosthetist, orthotist, physical therapist, hydrotherapy, occupational therapist, speech pathologist, social worker, nutritionist, or a lymphedema therapist). Physiatrists may also develop a graded return to work program and assist with resumption of avocational pursuits.

The strength of rehabilitation medicine, as with palliative care, lies in the collective wisdom and clinical experience of its multidisciplinary structure (Fig. 3).

Evidence for Cancer Rehabilitation

Preventative Rehabilitation or Prehabilitation

Prehabilitation occurs when a treatment plan is developed after diagnosis and before the commencement of acute treatment. It includes physical and

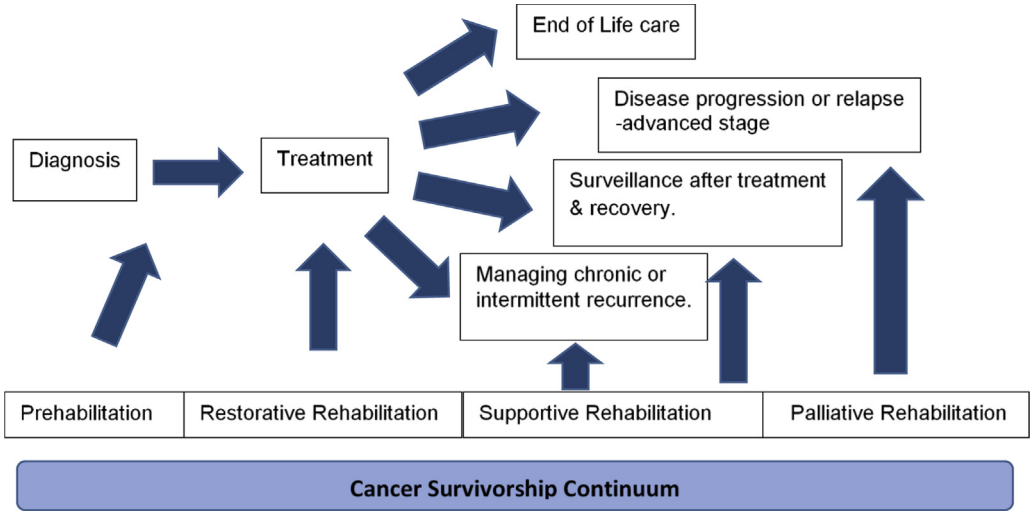

Fig. 2. Dietz classification of cancer rehabilitation in the treatment continuum: Exercise promotes significant improvements in clinical, functional, and in some populations, survival outcomes and can be recommended regardless of the type of cancer. Exercise is beneficial before, during, and after cancer treatment, across all cancer types, and for a variety of cancer-related impairments.[5]

Table 3
Dietz Classification of Cancer Rehabilitation[7–9]

Preventative Rehabilitation	Restorative Rehabilitation	Supportive Rehabilitation	Palliative Rehabilitation
Also referred to as prehabilitation or prospective surveillance Early intervention and exercise to identify potential impairments and prevent or delay complications related to cancer or therapies	For cancer patients with potential to attain a full functional recovery, restorative rehabilitation offers comprehensive therapy to regain function to return to work or school	For patients with temporary or permanent deficits from cancer and/or treatments, and patients with slowly progressive or chronic cancer, supportive rehabilitation can give the opportunity to re-establish and maintain functional independence	For patients with treatment refractory cancer or advanced disease, less intense palliative rehabilitation may play a role in assisting the patient and their family by maximizing patient comfort and reducing caregiver burden

Table 4
Rehabilitation Assessment

Medical History & Examination	Social History and Supports	ADLs
Cancer history, including treatment Medical comorbidities Drug-related side effects Clinical examination	Current financial status, e.g., pensioner, self-funded retiree Spouse's age and health status Children/siblings (location, ability & willingness to provide support) Home physical environment: External & internal steps and rails Bathroom set up, existing safety modifications, and equipment Mobility: Sitting & standing balance Transfers Gait Walking aids: (duration, handedness, compliance, and reason for use) Number of falls in preceding six months Driving status: Number of accidents in the past 12 months	Personal care: Showering, dressing, toileting, & feeding Level of assistance required & frequency (informal/formal community support services) Personal alarm system Medication administration Home management tasks: Cooking, cleaning, shopping, laundry, banking, etc. Level of assistance required and frequency (informal/formal community support services)

ADLs = activities of daily living.

Table 5
Functional Assessment Tools[8]

General Performance	Mobility/Balance	Pain	Fatigue	Cognitive Function	Distress
FIM SF-36 KPS EQ-5D	TUG test 2MWT Tinetti score Berg balance scale	Visual analogue scales Brief Pain Inventory	Visual analogue scales Piper Fatigue Scale FACIT-F	FMMSE FAB RUDAS MoCA ACE-R Neuropsychometry	Distress thermometer HADS

FIM = Functional Independence Measure; SF-36 = Short Form-36 (quality of life); KPS = Karnofsky Performance Scale; EQ-5D = EuroQoL-5D; TUG = Timed Up & Go Test; 2MWT = Two-Minute Walk Test; FACIT-F = Functional Assessment of Chronic Illness Therapy—Fatigue Scale; FMMSE = Folstein Mini-Mental Status Examination; FAB = Frontal Assessment Battery; RUDAS = Roland Universal Dementia Assessment Scale; MoCA = Montreal Cognitive Assessment; ACE-R = Addenbrooke's Cognitive Examination—Revised; HADS = Hospital Anxiety and Depression Scale.

psychological assessments that establish a baseline functional level, identify impairments, and provide interventions that promote physical and psychological health to reduce the incidence and/or severity of future impairments.[8] With effective exercise prescription, prehabilitation is useful in reducing the length of hospital stay and postoperative complications as well as enhancing recovery and QOL after surgery.[18] Data exist for esophageal,[19] colorectal,[20–23] lung,[24–27] prostate,[28] and head and neck cancer.[29]

Prehabilitation interventions vary according to the diagnosis. Common modalities may include cardiopulmonary prehabilitation, strengthening, stretching and endurance exercises, aerobic exercise, nutritional

Fig. 3. Rehabilitation interventions. Illustrates various rehabilitation modalities. OT = occupational therapist.

management, psychological counseling, oral and swallowing exercises for head and neck malignancies, and pelvic floor exercises. Most prehabilitation occurs in an outpatient setting.

Some of the goals of prehabilitation are as follows:[8]

- Improvement in cardiorespiratory health.
- Improvement of musculoskeletal function and balance and reduced falls risk.
- Cognitive behavioral strategies to reduce anxiety and improve adaptation and sleep hygiene.
- Optimization of surgical outcomes via modification of risk factors, for example, smoking cessation.
- Nutritional assessment.
- Preoperative exercise to improve postoperative potential, for example, continence outcomes after perineal surgery and communication and swallowing function after head and neck surgery.
- Strategies to return to school, work, or home with adaptive equipment and structural modifications.

Restorative Rehabilitation

Restorative rehabilitation may be offered after surgery or when a patient is receiving chemotherapy, radiotherapy, or immunotherapy, with curative intent; rehabilitation often continues after completion of treatment. This intervention attempts to return patients to their previous levels of physical, psychological, social, and vocational functioning.[9] Research suggests that a multidisciplinary approach may result in better outcomes and provide the opportunity and support for patients to cope with treatment modalities.[8] Multiple studies have revealed some benefit from restorative rehabilitation for certain cancer populations, for example, esophagus,[30] colorectal,[23,31]

lung,[25,26] pancreatic,[32] gastric,[33] prostate,[34] hematological,[35] and laryngeal cancers.[36]

Restorative rehabilitation is usually multimodal, with a combination of early mobilization and physical therapy, nutritional management, breathing exercises, with or without formal respiratory rehabilitation, relaxation techniques, and lymphedema therapy. Most surgical, and some nonsurgical cancer patients, commence therapy as an inpatient and continue therapy in an outpatient setting, supplemented by a home exercise program, to maintain the gains achieved earlier in the program.

Cavalheri et al.[37] published a Cochrane review in 2019 concluding that exercise training increased exercise capacity and quadriceps strength and improved general health-related quality of life (HRQoL), as well as decreasing dyspnea, after lung resection for non-small cell lung cancer.

When patients are receiving various cancer treatments, rehabilitation may be helpful in preventing the predicted decline in QOL related to the disease and treatment side effects.

The benefits of multimodal rehabilitation to maintain QOL during radiotherapy have been reported by Clark et al.[38] in 2013 and Rummans et al.[39] in 2006. Monga et al.[28] demonstrated improved QOL and less fatigue with a unimodal (physical exercise) rehabilitation approach for patients with prostate cancer in a retrospective study.

Multimodal rehabilitation has also been studied in patients with cancer during chemotherapy. Adamsen et al.[40] randomized 269 patients with 21 different cancer diagnoses, including solid tumors and hematological malignancies, into intervention and control groups. After six weeks, the intervention group demonstrated less fatigue, improved aerobic capacity, greater strength, improved vitality, and better emotional well-being, including a significant improvement in depression.

Supportive Rehabilitation

As the number of cancer survivors grows, there has been an increasing focus on survivorship as a distinct part of oncology care. This group has been the subject of a series of reports published by the U.S. Institute of Medicine, highlighting the physical and psychological dimensions of survivorship[41,42] and proposing a framework for patient-centered care.[43]

Supportive rehabilitation involves rehabilitation for patients with cancer as a chronic condition. Interventions are designed to teach patients to accommodate fixed disability and minimize debilitating changes from ongoing disease. It increases self-care ability (e.g. via self-help devices) for patients whose cancer has progressed and functional impairments have worsened. Other goals include preventing disuse atrophy, contractures, loss of muscle strength, and decubitus ulcers.[9]

A Cochrane database review of 40 trials with 3694 participants, involving colorectal, head and neck, lymphoma, and breast cancer patients (1927 participants in an exercise group and 1764 participants in a comparison group), with exercise interventions after the completion of active cancer treatment, concluded that exercise may have beneficial effects on HRQoL and certain HRQoL domains for cancer-specific concerns, such as body image, self-esteem, fatigue and anxiety, in survivors of breast cancer. Exercise interventions included strength training, resistance training, walking, cycling, yoga, Qigong, or Tai Chi.[44] A review of survivors of prostate cancer revealed that supervised clinical exercise can improve continence, fitness, fatigue, body constitution, and QoL.[45]

Cancer-related fatigue (CRF), along with QoL and function, has been shown in a randomized study in Germany to improve with a multimodal rehabilitation program consisting of physical therapy, patient education, group exercise, and psycho-oncologic counseling, and the benefits were maintained for three months in the intervention group, compared with the control group receiving a conventional rehabilitation program.[46] Another smaller randomized controlled trial (RCT) of patients with gynecological cancers also showed similar benefit with aerobic exercise.[47] In a study of patients with treated lymphoma, Courneya et al.[48] concluded that strength and interval training is useful in maximizing return to work in cancer survivors.

In a recent review, Jamal et al.[49] concluded that with increases in survivorship for patients with head and neck cancer, our current attention is turning to QoL issues for which rehabilitation interventions (speech pathology, physical therapy, social work, psychology, nutritional support, nursing care, etc.) are required to prevent, restore, compensate, and palliate symptoms and sequelae of treatment for optimal functioning.

A second category of supportive rehabilitation applies to people with slowly progressive disease (e.g., prostate cancer, metastatic breast cancer) or chronic (usually hematological) malignancy. At this stage, the aim of rehabilitation is dependent on the patient's identified goals, taking into consideration symptoms related to cancer and ongoing treatment, remaining functional abilities, and social circumstances. In the context of living with and beyond cancer, exercise intervention can improve CRF, HRQoL, and physical function (in the studies by Mishra et al.[44] and Stout et al.[5]), although maintaining motivation is the challenge, and there is a lack of data available regarding how to improve motivation.[50]

Two major studies are worth mentioning. The first is a multimodal intervention for cachexia in patients

with advanced cancer undergoing chemotherapy; a randomized Phase 3 interventional trial with the aim of preventing the development of cachexia, rather than providing treatment, late in the disease trajectory.[51] The second is a two-arm single-institutional RCT of outpatient cancer rehabilitation for patients older than 65 years with functional impairment (the CARE program) in the U.S.[52]

The intervention group received individual physiotherapy (PT) and occupational therapy (OT) assessment in a tailored program, lasting up to 12 weeks, according to their needs. The other arm was a usual care group that receives a brochure outlining services and contact information for supportive care programs, but not referral for PT/OT. At follow-up, both PT/OT ($P = 0.02$) and usual care ($P = 0.03$) groups experienced a decline in functional status. PactS (physical function, activity expectations, and self-efficacy) scores between groups ($P = 0.04$) were significantly improved in the intervention group. Several barriers were noted regarding implementation of the intervention program, and the authors suggested that further research is needed to facilitate improved access to PT and OT.[53]

Palliative Rehabilitation

In this stage, interventions are focused on minimizing or eliminating complications and providing comfort and support in the terminal stages of disease to improve QoL physically, psychologically, and socially, while respecting the wishes of the patient and their loved ones. Such programs are designed to alleviate symptoms, such as pain, dyspnea, fatigue, nausea, and edema and prevent contractures and decubitus ulcers, using medication, heating modalities, positioning, breathing assistance, relaxation, and the use of assistive devices.

Palliative rehabilitation is offered by rehabilitation physicians and their multidisciplinary team. Palliative care physicians and their multidisciplinary team may also provide a program of rehabilitative palliative care, which is well established in the hospice setting in the U.K. Rehabilitative palliative care has been defined as a paradigm integrating rehabilitation, enablement, self-management, and self-care into the holistic model of palliative care to provide support to enjoy the fullest possible life until the patient's demise.[54] In both groups, proposed therapies and care plans are customized to the individual's needs and wishes.

A small number of uncontrolled, prospective studies comparing outcomes before and after rehabilitation intervention,[55,56] as well as some randomized trials[57,58] show that general rehabilitation can improve function and QoL and reduce symptom burden (without worsening fatigue) in patients with cancer, even if the illness is at an advanced stage.[59,60]

Salakari et al.[61] performed a systematic review of 13 randomized trials published between 2009 and 2014 (1169 participants), evaluating the benefits of general rehabilitation among patients with advanced cancer; seven were limited to physical exercise alone. The review was suggestive of significant improvement in general well-being and QoL with physical exercise. Rehabilitation delivered positive effects on fatigue, general conditioning, mood, and coping with cancer. Physical function was not addressed.

In a 2017 RCT of patients with advanced cancer ($n = 60$), one-half received a dedicated PT program, whereas the other half, the control group, did not. The intervention group received a 30 minute PT session, including active exercises, myofascial release, and proprioceptive neuromuscular facilitation techniques, three times per week for two weeks. The intervention group demonstrated a significant reduction in the severity of fatigue and its impact on daily functioning. In addition, the PT program improved the patients' overall sense of well-being and reduced the intensity of coexisting symptoms, such as pain, drowsiness, anorexia, and depression.[62]

Maddocks et al.[63] concluded that even in individuals with cancer cachexia with advanced disease, skeletal muscles have the capacity to respond to exercise training.

A flexible, multidisciplinary, and integrative model of palliative rehabilitation for newly diagnosed advanced cancer was recently used in a single-center RCT (the Pal-Rehab Study Protocol[64]) to investigate the effect of concurrent palliative rehabilitation with standard oncology treatment vs. standard treatment alone. The study concluded that a more flexible model gave the patients higher levels of satisfaction along with a higher level of adherence to the 12-week group exercise program.[65]

In addition to enabling independence with activities of daily living and reducing the burden to one's caregivers, therapeutic interventions such as physical therapy may also be perceived as giving patients hope and a feeling of general well-being.

The Role of Palliative Care

Cancer rehabilitation and palliative care are two distinct, although inter-related, disciplines. Cancer rehabilitation has been defined earlier in this article. Palliative care is defined by the WHO as an approach that improves the QOL of patients and their families

facing life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial, and spiritual.[66]

Clearly, there are similarities between the disciplines. Both disciplines are multidisciplinary, focus on the effect of the illness and its treatment, use a broad set of interventions, and concentrate on the needs of the individual patient and their carers. The differences lie in their objectives and emphases. Palliative care primarily concentrates on symptom management, psychosocial support, and spiritual support of a patient and their family up to and including the death. Cancer rehabilitation concentrates on the preservation and, where possible, restoration of function throughout the cancer trajectory, to maximize independence and improve QOL. As Silver et al.[6] observed, the two disciplines are aligned in goal setting but distinct in approach.

Over time, the sharpness of these distinctions has blurred. At the interface of the disciplines, lies the work of palliative care in integrating the expertise of PT, dieticians, occupational therapy, and speech therapy in overall care.[67–69] Where that integration exists, it mainly, although not wholly, concentrates on attempting to restore or maintain function, preparing patients to return home, supporting outpatients in the community, or in their deteriorating phase. There are two problems here. First, the level of such integration in palliative care services varies considerably around the world. The second is the pathway and timing of referral to palliative care. The work of palliative care is predicated on patients with cancer being referred in a timely fashion. Unfortunately, many clinicians equate palliative care with terminal care or fear that raising the name of the discipline will evaporate patient hope. As a result, referrals may come as late as the terminal phase itself. Ideally, referrals are made sufficiently early in the trajectory of the cancer process to allow the skills of the allied health professionals to help.

The services provided by palliative care are broad. Historically founded in the care of patients with cancer, the discipline increasingly focuses on nonmalignant diseases. Multidisciplinary palliative care teams work in three main locations—consultative services in hospitals, in-patient palliative care units, and community palliative care. In terms of cancer, there is a strong focus on the management of symptoms secondary to the underlying malignancy and its treatment, an exploration of the psychosocial dimensions of cancer, support for families, and care of the dying patient.

The range and scope of palliative care has expanded over the years. The recognition of its importance by the discipline of medical oncology has undergone a significant shift in the modern era. In a seminal article, Temel et al.[69] showed that the addition of early palliative care to standard oncology practice provided an advantage in HRQoL, symptoms, and survivorship in patients with advanced non-small cell lung cancer. A series of studies in the context of other advanced malignancies showed similar results.[70,71] This culminated in authoritative guidelines by the American Society of Clinical Oncology, expressly recommending the early involvement of palliative care in all cancer patients with a high symptom burden or metastatic malignancy.[72] This recommendation has been internationally recognized.[73] Nevertheless, and despite this shift in perspective, there remain significant deficits in the provision of palliative care globally.[74]

As significant as the American Society of Clinical Oncology guidelines were, they did not recommend the involvement of palliative care in the management of all patients with cancer. In contrast, the definition of cancer rehabilitation includes care at all times in the cancer trajectory, from diagnosis and before treatment (prehabilitation), through treatment and its sequelae to the final stages of life. That span is one of its inherent strengths.

Role of Palliative Care at the Interface With Cancer Rehabilitation

Assuming an alliance between palliative care and cancer rehabilitation existed, what would be the role of the former discipline? That role would require a perspective both internal and external to itself. Internally, it would necessitate the best practice of palliative care in the skilled identification and assessment of symptoms and psychosocial and spiritual distress of the patient and their family and a plan to meticulously address these issues. As part of that plan, palliative care should simultaneously look externally to cancer rehabilitation in all aspects of care. These approaches have their respective strengths and, as such, highlight the potential dividends that may flow where both disciplines, and in an alliance with oncology, work together. A crucial aspect of any alliance is the preparedness of palliative care clinicians to reach out to and learn from their rehabilitation colleagues and to set aside preconceptions.[75] Another role of palliative care is advocacy—explaining and reinforcing the importance of cancer rehabilitation to the disciplines of oncology/hematology. Furthermore, palliative care has a role in collaborative research with cancer rehabilitation, identifying the potential benefits of the individual components and whole approach of the disciplines. Finally, palliative care has, and will continue to have, a crucial role in the education of students in medicine, nursing, and allied health in the

principles and practice of the discipline and, as part of this, the importance of cancer rehabilitation in the overall architecture of care.

The Role of Cancer Rehabilitation at the Interface With Palliative Care

It is equally important to examine the role of cancer rehabilitation at the interface with palliative care. In essence, this requires in the former discipline an openness to understanding the philosophy and practice of the latter. In particular, it is important that cancer rehabilitation understands the holistic response to suffering as well as appreciating the work in preserving and restoring function that occurs in palliative care services. Second, it requires a creative approach by cancer rehabilitationists in developing a truly multidisciplinary approach where both disciplines are involved in patient care. The synergies that may flow from this alliance are discussed in the next section. The points made in the previous section regarding the role of palliative care in education and advocacy apply equally to cancer rehabilitation.

Synergies Between Cancer Rehabilitation and Palliative Care

What dividends may result from the two disciplines of cancer rehabilitation and palliative care working together? The synergies lie at several levels. Like the disciplines themselves, this discussion starts with the identification of the needs of the patient and their family. There are three near-universal phenomena with cancer: the experience of symptoms, emotional distress, and functional impairment. The discipline of palliative care has a 'forensic' interest in the pathophysiology and management of symptoms. Palliative care has been shown to improve symptoms and QOL.[76] Cancer rehabilitation focuses on the assessment and management of functional limitations. Cancer rehabilitation improves functional outcomes [8] and QOL, even in patients with advanced malignancy.[56] It is the *combination* of these approaches that will present the greatest dividend to the patient and their carers. Indeed, the American College of Surgeons' Commission on Cancer requires that patients have access to both disciplines.[77]

Synergies lie deeper, however, than simply the benefits of each discipline acting in parallel. Evidence shows that the work of each benefits and fulfills the objective of the other. In a systematic review of 13 studies of the effects of cancer rehabilitation in patients with advanced cancer who were receiving palliative care, Salakari et al.[61] found significant improvements in QoL and general well-being as well as positive effects on fatigue, mood, and coping with cancer. In a systematic review of rehabilitation in advanced cancer, Albrecht and Taylor[55] showed that including rehabilitation in a palliative care program can have a positive effect on multiple cancer-related symptoms. Conscious of the benefits of early palliative care, cited previously, Nottelmann et al.[65] conducted an RCT involving patients with newly diagnosed advanced cancer. The control group received standard oncology care; the intervention group received standard oncology care plus palliative rehabilitation tailored to the individual patient. The latter consisted of an initial consultation with palliative care health professionals with follow-up and, in addition, for eligible patients, a 12-week group program, including exercise and supplementary individual consultations. The intervention group reported high levels of satisfaction.

Synergy and Coreferral

It may be that an expanded cancer rehabilitation service is itself a source of referral to palliative care, and vice versa, where appropriate, outside the conventional referral pathway from medical and radiation oncology and hematology. A good example is cancer pain, which may be the source of significant impairment in function and QOL. Quickly conscious of that impairment, a cancer rehabilitation service would refer to palliative care. Similarly, a patient with CRF and deconditioning may be referred by palliative care to cancer rehabilitation. This reciprocity of referral would allow the patient to receive a wide and comprehensive set of interventions.

Cancer Rehabilitation—Challenges and Barriers

For the discipline of cancer rehabilitation, there is a disconnection. Although multiple bodies have recommended cancer rehabilitation and many cancer patients would benefit from its integration into standard oncology care, the discipline is underused. Cheville et al.[78] reported that less than 30% of women with advanced breast cancer who had functional impairment received rehabilitation services. Similarly, and strikingly, Pergolotti et al.[16] found that only 9% of older adults with cancer used PT or OT, despite having a modifiable functional limitation detected by a comprehensive geriatric assessment. Why is cancer rehabilitation underused? What are the challenges and barriers for the discipline?

Lack of Professional Awareness and Understanding

A significant barrier to the referral of cancer patients to both cancer rehabilitation and palliative

care is professional misconceptions about their roles. Palliative care may be seen to be purely terminal care and only to be introduced when all active treatment options are exhausted; rehabilitation is often confused with community exercise and fitness programs or viewed as ineffective. Both disciplines are far broader than these narrow perceptions. Perceptions are important. In a study of medical oncologists regarding their opinion of the appropriateness of rehabilitation for patients with advanced cancer, there were significant variations in view.[15] This raises the issue of the training in, and exposure to, rehabilitation medicine for medical students and trainees in oncology (medical, radiation, and surgical), hematology, and palliative care. The creation and nurturing of alliances between the disciplines is also a matter of medical leadership.

Cancer Patients' Levels of Interest in Participation

One of the major barriers to cancer rehabilitation is the interest and knowledge of patients with cancer in the nature of the discipline and what benefits may flow from interventions. In one study, 1179 patients with cancer were given a cancer rehabilitation interest questionnaire that comprises 16 different rehabilitation activities. The interest in cancer rehabilitation for patients in this study was 21%. Most interested were women, young patients, university educated, and those who received their diagnosis 12 months earlier. About 30% of the participating cancer patients reported an interest in information and support groups, physical training, and support from a hospital social worker. Patients with a low level of education reported a low interest in cancer rehabilitation.[79]

Workforce Shortage

One of the reasons for low utilization is a workforce shortage of rehabilitation physicians and allied health professionals generally and, specifically, of those with experience or training in oncology.[80]

Lack of Research

There is a clear need for further research in this area. Lyons et al.[81] described the research gap in cancer rehabilitation in two general areas—testing the effects of specific interventions beyond functioning, on survival, health care utilization, and costs and, second, testing the overall efficacy of multidisciplinary rehabilitation delivered concurrently with oncology treatment.

Lack of Clinical Guidelines

For an emerging discipline, the relative dearth of research and the lack of clinical guidelines have been impediments to growth. Gradually, however, expert standards and recommendations are emerging. Arguably, the most authoritative are the recommendations of the expert panel convened by the U.S. National Institutes of Health, which covered all aspects of establishing and growing a cancer rehabilitation service.[14] As Lyons et al. stated, more needs are to be done.[81]

Other Factors

Other factors that challenge the provision of cancer rehabilitation include economic issues, such as a lack of private health insurance in nations without universal health insurance coverage and the challenge, in many nations, of service coordination across sectors, for example, hospital and the community.

Telerehabilitation—Rehabilitation via Telehealth

Australia has been progressively adopting telehealth services, out of necessity, because of the concentration of many medical subspecialties in the major cities situated on the coastline, coupled with the relatively underserviced population, widely dispersed in regional, rural, and remote locations over our vast landmass. The coronavirus pandemic has rapidly accelerated the adoption of telehealth, and our local experience has yielded a mix of positive and negative outcomes.

Positive factors include the following:

- Improved accessibility to health consultations, particularly for those with significant frailty or mobility impairment.
- Convenience for both the caring team as well as the patient and their caregivers.
- Maintenance of isolation requirements to reduce potential spread of coronavirus, which serendipitously has markedly reduced the incidence of other viral illnesses locally, such as influenza, when comparison is made to equivalent months in past years. This is particularly important for those who are immunocompromised as a consequence of their disease and/or treatment.

Negative factors include the following:

- Inability to examine patients and fully determine the extent of impairments.
- Difficulty fully engaging with patients and caregivers, particularly for new patients where rapport has not been established at an earlier face-to-face consultation.
- As a physical specialty, it is challenging for allied health teams to implement and evaluate exercise programs, self-care, and home assessments; swallowing evaluations and provide wound care.

- Older patients often lack the requisite information technology hardware and/or software or the experience to participate in telehealth consultations, often resulting in videoconference consultations being downgraded to voice-only telephone calls.

Notwithstanding these factors, telerehabilitation is becoming increasingly useful for people with cancer. The COPE, (Collaborative Care to Preserve Performance in Cancer), study, a three-arm randomized trial by Cheville et al.,[82] revealed that collaborative (primary and specialist care) telerehabilitation modestly improved function, pain, and QoL with a reduction in hospital utilization and inpatient length of stay.

Cancer Rehabilitation—a Brief National Case Study

Cancer rehabilitation is not yet a well-established concept in Australian medicine, despite 30–40 years of evidence worldwide revealing benefits in all the stages of the cancer care continuum. The main foci of cancer care have been treatment and surveillance. An examination of cancer rehabilitation in Australia reveals the same disconnection, as set out above, with the lack of recognition by cancer bodies and professional organizations of its importance as well as under-developed services.

A 2017 study conducted by Dennett et al.[83] found that current services are hugely insufficient in meeting the needs of the cancer population, with only 31 cancer rehabilitation programs identified nationwide, across both the public and private sectors, whereas there are approximately 350 cardiac and 270 pulmonary rehabilitation programs currently available in Australia. The available programs mostly include exercise and education components, with education covering issues related to exercise, nutrition, fatigue, relationships, and sleep.

Jefford et al.[84] found from a population-level cross-sectional study in 2017 that substantial proportions of Australian cancer survivors demonstrated problems with mobility, pain, anxiety, depression, and daily activity limitations, one, three, and five years after diagnosis. In addition, up to a third of survivors in this study reported wanting more information on the physical aspects of living with and after cancer, including advice regarding diet, lifestyle, physical activity, and exercise.

Cancer Australia released a national framework, titled Principles of Cancer Survivorship in 2017.[85] It recognizes the importance of supportive physical, psychological, and social care, as well as holistic care that is coordinated between various providers throughout the cancer care continuum. The breadth of this care is a reminder to all disciplines, including cancer rehabilitation, of the importance of attention to the psychosocial and existential dimensions of the suffering associated with cancer. This attention is a strength of palliative care and bolsters the argument for an alliance of disciplines, each benefiting from an involvement of the other.

The Clinical Oncology Society of Australia (COSA) has also developed a consensus-based model of survivorship care that describes the crucial elements of such care, although this has not yet been implemented.[86] COSA published a position statement on cancer survivorship care in 2019 concluding that at present, the evidence base remains incomplete, and successful implementation will require research, education, coordination, and advocacy. The COSA survivorship model of care provides a template for change, guiding the key steps for implementation into the future.[86]

Conclusion

In the modern era, three phenomena have emerged. The first is a growing number of cancer survivors and a recognition of their complex needs. The second is the international recognition of the importance of early palliative care in patients with advanced cancer or who are highly symptomatic, coupled with continuing deficits in service provision. The third is an enlarging body of evidence that rehabilitation can benefit the function and QOL of patients with cancer and, furthermore, that this benefit can occur at any point along the cancer continuum. From this, emerged the concept and practice of a discipline, cancer rehabilitation, devoted to all patients with cancer, where the skills of a multidisciplinary rehabilitation team could be used. With time, this care has become an imperative. As Silver stated,[3] gaps in providing cancer rehabilitation services to those who would benefit equates to *unnecessary* physical and psychological suffering. Although endorsed, the discipline continues to be challenged by issues of public and professional perception, inadequate staffing and funding, and the need for research. The disciplines of cancer rehabilitation and palliative care are natural allies and, over time, the level of mutual respect, understanding, and combined work will hopefully strengthen that alliance, for the betterment of our patients.

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