



Rehabilitation of the Cancer Patient

Bejoy C. Thomas¹, Manoj Pandey²

¹Department of Psychosocial Oncology, University of Calgary, Calgary, Canada

²Department of Surgical Oncology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Abstract: Most of our patients, at the last moment of their lives would perhaps commit to memory that they had died because of cancer. It is up to us to enable them to understand how they can learn to live with it (BCT).

The intention of this article is not to review all the well-known processes of rehabilitation in the context of cancer. Neither is it a treatise on highlighting a lesser-known rehabilitative attribute that assists the cancer patient in survivorship. This article seeks to highlight amongst the oncology fraternity the need to notice the critical role of the patient as a person from the stage of cancer diagnosis to that of survivorship (also death and dying). This continuum is unique to every patient undergoing treatment be it curative or palliative.

Introduction

This article also looks at what cancer centres in the developing countries can provide their patients with to survive with dignity, quality and self-respect without compromising on already stringent hospital resources and facilities. In Centres like ours, in less than two decades (1982-1998), the annual hospital cancer incidence has increased 148 percent [1]. And with annual new patients intake would have crossed the 20,000 by the end of this year. This article therefore intends to focus on the behavioural aspects of the disease and highlight the several ways that the mind as

well as the body are equally - if not more for the former - affected by the global scourge called cancer.

Over the past one-decade, several factors have significantly contributed to change in the cancer care set-up worldwide [2]. Quantity of life has increased with some patients enjoying almost near complete cure and no perceived physical deficits, and others where an aggressive treatment may result in significant physical impairment or disability. Of the factors that have contributed to change in the cancer care setting, issues like greater public desire to access more current information, the unavoidable high costs in treatment, availability of newer varieties and better combinations of treatment, better response rates, and an increasing demand for quality of life after treatment (especially in treatment with curative intent), are common to both developed countries and the developing countries like India. Other factors like the use of complementary therapies, and a focus on

Reprint requests to: Bejoy Thomas, Tom Baker Cancer Centre - Holy Cross Site, Department of Psychosocial Resources, 2202 2nd St. S.W., Calgary, Alberta, Canada T2S 3C1, E-mail: Bejoy.Thomas@albertahealthservices.ca

©2012 Thomas BC et al. Licensee Narain Publishers Pvt. Ltd. (NPPL).

Submitted: August 25, 2012;; Accepted October 10, 2012;
Published: October 26, 2012

survivorship issues are still found wanting in the developing context. The most important aspect of survivorship would be to ensure quick restoration of optimal function, early and continued aggressive rehabilitation interventions provided to the patient – including physical and occupational therapy, prosthetic and orthotic devices, and assistive equipment [2].

Rehabilitation has recently seen many practical innovations and new evidence for specific interventions, but the major advances in rehabilitation as pointed out in one review [3] are more conceptual rather than practical. Firstly, that the approaches to patients have moved from a predominantly medical one to one in which psychological and sociocultural aspects are equally important. Secondly, the need for organised specialist rehabilitation services - for example, for neurological disabilities - is being recognised.

The term 'rehabilitation' usually conjures up images of prosthetic devices, physiotherapy sessions, and physical medicine, as a result of limb or functional loss. In the context of a chronic or terminal disease like cancer, the concept of rehabilitation goes beyond that of functional impairment, and physical re-enablement to embrace psycho-social re-enablement as well. There is more to cancer treatment than just the medico-pharmacological component. Each cancer patient's disease experience is unique and the impact goes beyond the physical manifestations of the disease to include a unique blend of intensities of variables like disease extent, tolerance to specific treatments, prior health, functional level, coping skills, depth of spiritual maturity, support system, education status, etc, [4]. These issues come into play from the time the patient has a suspicious symptom for which a doctor may be consulted, and is confounded in the diagnosis of a cancer. Dealing with the disease and its treatment not only presents a myriad of issues and challenges for persons affected by cancer and their family members as well. Rehabilitation, any or all its components, is therefore a dynamic process and should begin soon after the diagnosis and has to continue

along the duration of the illness and its treatment [5], specifically catering to the needs of individual patients.

Physical disability is a significant problem for patients undergoing cancer treatment [2]. This is often the result of local and distant effects of tumour as well as the treatment sequel. However, the psychological and social disabilities or impacts of the treatment side-effects also demand equal if not more attention. Cancer-related diseases are often treated with modalities that, in themselves, compromise the functioning of normal organ systems [6]. Therefore, practitioners of physical medicine and rehabilitation need to respond dynamically, both to disease progression and to various treatments that may contribute to impairments, disabilities, and handicaps, be it physiological or psychological in nature [6].

Cancer rehabilitation could be defined, as "a team approach to helping both the patients and family remain as independent as possible within the limitations of the disease functionally, emotionally, psychologically, nutritionally, socially, and spiritually throughout the continuum of care" [4, 7]. The complexity of providing care that addresses such varied and individualized needs requires an interdisciplinary approach, not only among physician specialties, but also among all health professionals [4]. A comprehensive and well-coordinated rehabilitation approach that concurrently deals with the physical, psychologic, and social problems caused by the malignancy and the consequent disability usually yields the best results. Most important for the success, however, is the patient's personal interest and ability to participate in the rehabilitation programme and to pursue the established functional goals, supported by family and friends [1].

The key word in the rehabilitation delivery process is 'interdisciplinary' as this would mean functioning from a common platform with consensus amongst a team with a multidisciplinary background.

One must also recognise that medical advances in the treatment of cancer, improve a patient's survival, but often with deficits. It is

learning to compensate for these deficits from medical, physical, social, and psychological perspectives that improves the patient's quality of life [8]. This is the goal of rehabilitation. Further research in this area is required to implement the most clinically effective and cost-effective interventions to minimise disability and maximise quality of life.

The evidence and difference of cancer rehabilitation

A meta-analysis of data from trials of rehabilitation in stroke units has shown that rehabilitation services in such units are effective in reducing both mortality and morbidity, possibly without any extra resources [9]. Furthermore, these benefits can be achieved in routine practice [10], and that they may last for many years [11]. The meta-analysis also highlighted the probably the most important ingredients of rehabilitation: coordination, expertise, and education [9].

Evidence in support of specialist coordinated rehabilitation services is less strong in other fields, but trials have shown benefits for patients with multiple sclerosis [12, 13] mild or moderate head injury [14], and back pain [15].

Consequently the presumption, should now be that most patients with disability will benefit from being seen by a specialist, coordinated rehabilitation service. It is no longer tenable to depict rehabilitation as an expensive placebo service. This view was also shared in a joint report of the King's Fund and the Audit Commission of UK, who stated that deteriorating rehabilitation services in Britain over the past decade are causing "unnecessary dependence and misery, particularly among the older people" [16].

Cancer patients are no different than other chronically ill people, and, the need to understand their current limitations and continue on with their lives is not different from that of patients with impairments caused by stroke, cardiac, respiratory, neurologic or orthopedic diagnoses [6]. What does set cancer patients apart are issues unique to oncology, such as alopecia, neuropathy from chemotherapeutic agents, fatigue, and anorexia related to chemotherapy

and radiation therapy, as well as anxiety and depression related to their diagnosis and treatment [17]. Cancer patients must also cope with such psychological issues as family role reversal, employment issues, insurance issues (predominantly in the Western countries - but slowly picking up in India and other developing countries), and the economic impact of paying for expensive treatments [18-21].

Providing aid to enable their return to their work [22], home, family, and friends is at the core of each individual treatment plan. Rehabilitation is appropriate for the cancer patient both during treatment and postoperatively to decrease fatigue and increase muscle strength and tolerance, provide nutritional counseling and support, treat lymphedema with manual lymph drainage, and help the patient and family learn how to transfer and care for the patient at home. All these treatments will improve the quality of life for the cancer patients and his or her family as well as aid the patient in tolerating rigorous cancer treatments [2, 6].

The goals of cancer rehabilitation

Four goals of cancer rehabilitation that address the scope and course of the illness have been identified [2, 6, 23, 24] - preventive, restorative, supportive, and palliative. Preventive interventions are to be started early, i.e. before or immediately after treatment, and it thereby lessens the impact of expected disabilities and emphasises patient education. These measures also include approaches to improving the patient's physical functioning and general health status. Psychological counseling and/or psychological screening prior to treatment can assist with early identification of adjustments to allow for prompt intervention. At this stage, perhaps no significant physical impairment exists, but therapy could be started to prevent functional loss.

Restorative interventions are processes that attempt to return 'cured or controlled' patients but who have a residual physical impairment and disability to maximum possible previous levels of

physical, psychological, social and vocational functioning.

Supportive rehabilitation attempts to increase the self-care skills and mobility of the cancer patient. Supportive efforts include teaching patients how to use prosthetic devices after amputation, as well as instructing the patient on use of other devices and procedures that assist in self-management, self-care abilities, and independent functioning. Other supportive efforts include provision of emotional support associated with adjustment issues while the patient is learning to cope with physical life changes.

During the palliative phase, when increasing disability and advanced disease process may be present, interventions and goals centre around increasing and maintaining the comfort and function of patients with terminal cancer. Palliative goals include pain control, prevention of contractures and pressure sores, prevention of unnecessary deterioration from inactivity, and psychological support for the patient and family members.

Clinical Integration

Blending rehabilitation or chronic care into acute oncology care can be challenging, and yet, in today's world of managed care, it is a model that provides efficient, quality care that meets various accreditation standards and quality benchmarks [4]. Therefore it is not just the presence of the rehabilitation team that is important but its effectiveness, which often depends on how it is organised, supported, and integrated into the daily care of cancer patients [25]. Clinical integration is the process by which patient care is coordinated across various disciplines, activities, and services; the core of which is a multispecialty, interdisciplinary team working like a well oiled engine. The construct of the rehabilitation team is discussed in this chapter. When the team is integrated clinically and administratively, it is easier to work within the cancer programme to collaborate on clinical pathways, monitoring quality, developing standards of practice, developing patient education materials, conducting multidisciplinary

research, and identifying outcome measures. To achieve this, the organisational model and the internal coordination process would have to be well-defined [2, 4, 25].

At a minimum some oncology services have simply referred to the various general rehabilitation resources nearby but without specific coordination or continuity. Or in other cases - like our institution - a consultant physiotherapist or physiatrist is brought to the hospital to provide their services based on the note in the patient file. These options are at least a beginning in our (the developing countries) frame of reference, but this model does not foster team relationships, interdisciplinary communication, or specialty development.

A review of the historical perspectives of earlier cancer rehabilitation programmes is necessary. Works like the successful cancer rehabilitation programme demonstrated by Dietz as early as 1969 [26], the subsequent hiatus that developed after his retirement, the observations made by Lehmann et al. in 1978 [27], and Harvey et al. in 1982 [28], and the lessons learnt at the Texas Medical Centre and the M.D. Anderson Cancer Centre [25]. This would help in the understanding of pitfalls within the hospital organisation in the framing of such a unit. With such input the right corrective measures could be employed and one would be capable of footing a better attempt at an in-house oncology rehabilitation unit.

The Rehabilitation Team

Patient needs determine the number of team members involved in any given case [4]. The health care team needs to develop rehabilitation goals within limitation imposed by the illness, the patient's environment, and available social support. Goals need to be objective, realistic, and attainable within a reasonable time. Structuring goals so that they are attainable within a reasonable time often serves to motivate patients to maintain effort because patients can appreciate gains from active participation in therapy [6]. The trend of outsourcing is diminishing within the health industry with an

approach towards a smooth delivery system of the most varied of treatment approaches under one roof [25]. But, even though blending rehabilitation or chronic care into acute oncology care can be challenging, in today's world of managed care, it is a model that provides efficient, quality care that meets various accreditation standards and quality benchmarks [4]. This approach highlights on an important hallmark of a rehabilitation team - its effectiveness - not just its presence - in the cancer institute. Effectiveness of a rehabilitation team is characterised by its organisation, support functionality, and level of integration into the daily care of cancer patients [29].

An ideal cancer rehabilitation team would be an interdisciplinary cancer rehabilitation and adaptation team with an integrated approach to health [2, 30]. The precise composition of the team may vary from institution to institution, depending on the type of institution, its rehabilitation philosophy, programme size, and range of disabilities encountered, but the challenge would be to remain focused on the patients and their needs [2, 25]. The basic mix of professionals would comprise of the following specialists:

Physiatrist

A physiatrist, one who is specialised in physical medicine and rehabilitation, would be the primary liaison amongst team members, and between the team and the primary oncology treatment providers. The physiatrist is usually the one who directs the rehabilitation team [2, 25]. The physiatrist would need to know and comprehend details of the cancer diagnosis, like organ site, histology, clinical findings, TNM staging and interpretation as to whether the patient can be 'cured or controlled'; disease factors, like life expectancy, or the pace of disease progression; and treatment factors, like the definitive plan of treatment, cost factors, its duration, anticipated efficacy and potential side effects. The physiatrist would need to be knowledgeable to prescribe treatments performed by professionals from other

disciplines, such as physical, occupational, and speech therapy. He/she would also care for neuromuscular disease, musculoskeletal disease, and functional deficits. They also perform electrodiagnostic procedures (like nerve conduction studies [NCS], and electromyography [EMG]) [2, 6].

Oncology/rehabilitation nurse

The role of the oncology/rehabilitation nurse is pivotal in cancer rehabilitation as they are crucial in promoting the rehabilitation goal of maintaining optimal independent functioning. Usually the rehabilitation nurse is appointed as co-ordinator or case manager to assist in organising for the smooth functioning of the rehabilitation team [29]. Besides the administrative role, the oncology/rehabilitation nurse typically is an extension of other members of the team because he/she frequently must assist with treatment interventions initiated almost all the members of the team - be it physiological or psychological or educative. In addition to this, because nurses typically have extensive contact with patients and families. Nurses sometimes function as counsellors, providing significant emotional support for patients and their families. Nurses are also responsible for skin care, bowel and bladder management, and patient/family education.

Social worker

The social worker has many important roles in the rehabilitation of the cancer patient, but especially with respect to discharge planning, facilitating a smooth transition from the hospital to the community, ensuring continuity of care, and securing appropriate follow-up services [2]. The social worker could assist the patient secure financial resources, poor-patient fund, company insurance, ESI benefits, governmental funding resources, etc. In some settings, social workers often serve as leaders for support groups and also may provide active assistance in discharge planning activities, such as arranging home care

services and transfer to other health care settings [6].

Psychologist

Cancer patients and their families often experience a number of psychological and adjustment issues related to illness, treatment, and resulting disabilities. Issues that the psychologist would have to deal with are denial, anger, anxiety, panic, fear, dependent behaviour, depression, and the unmasking of previously controlled psychopathology [2]. The psychologist also provides assessment and treatment to assist in management of cancer-related psychological distress and assists other team members when psychological issues, either in patients or family members, complicate efforts to provide effective therapy. The goal of consultation of the psychologist with other team members is to maximise the benefit derived by the patient during the rehabilitation process. Several strategies are employed to achieve this and a few are discussed later on in the chapter [2, 6, 31].

Physical therapist

The role of the physical therapist includes evaluation of muscle strength, mobility, and joint range of motion (ROM). Treatment interventions provided by the physical therapist may include therapeutic exercises to maintain/increase ROM, endurance activities, and mobility training (eg, transfers, gait, stair climbing) [2, 6]. Physical therapists also can administer various therapeutic modalities, depending on the needs of each individual patient, like superficial or deep heat, cold, trans-cutaneous electro stimulation (TENS), ultrasound, hydrotherapy, traction, and massage. Physical exercise is perhaps the most important therapeutic modality in the rehabilitation management of physical disabilities, and more specially in its impact in combating fatigue [33-38]. The physiotherapist could provide an array of isometric, isotonic, or isokinetic exercises - with isometric and isotonic exercises that could be with minimal or no additional infrastructure [2].

Occupational therapist

Occupational therapists focus on upper-extremity exercises and patients' ability to carry out tasks related to self-care, including activities of daily living (ADL), such as dressing, bathing, meal preparation, and homemaking. These professionals also assist patients to increase performance of ADL abilities, including use of compensatory techniques and adaptive equipment [6]. In addition, occupational therapists evaluate home environments for potential modification, fabricate simple orthotic devices, such as hand splints for immobilisation or to compensate for weak muscles, provide instruction in driving with adaptive devices and implement interventions to promote upper extremity ROM, strength, endurance and coordination [2]. When brain dysfunction is present, a gross assessment of cognitive and visual perceptual skills would have to be performed, and therapy is initiated [2, 8, 39].

Dietician or Nutritionist

Diet and nutrition are important factors in cancer rehabilitation. A healthy diet and adequate nutrition significantly influence the patient's ability to participate actively in an applied therapy programme and are essential for patients undergoing radiation and chemotherapy [40, 41]. The role of the dietician is to evaluate current nutritional status and provide recommendation regarding specific dietary supplements and alternative foods. Dieticians also assist in teaching patients and family members about the importance of appropriate diet in successful rehabilitation [2, 6].

Speech therapist

The speech therapist evaluates and treats communication deficits, dysphagia, and cognitive dysfunction in patients with cancer, especially head and neck cancers with post treatment problems like oral defects, aphasia, swallowing deficits, etc. Speech therapists also train such patients in use of alternative means of speech and

communication, including adaptive communication devices, laryngeal speech, esophageal speech, and use of a prosthetic larynx [2, 6].

Vocational counsellor

Vocational counsellors in its truest sense is a non-existent profession in developing countries like ours. Ideally, they assist patients in adaptation to the impact of cancer and treatment on employment. Vocational counsellors provide evaluation of the patient’s suitability for employment and training of the patient, if needed, and serve as liaison between patients and employers. Health care professionals often overlook the impact of cancer on the patient’s vocation as an area requiring possible intervention [2, 6].

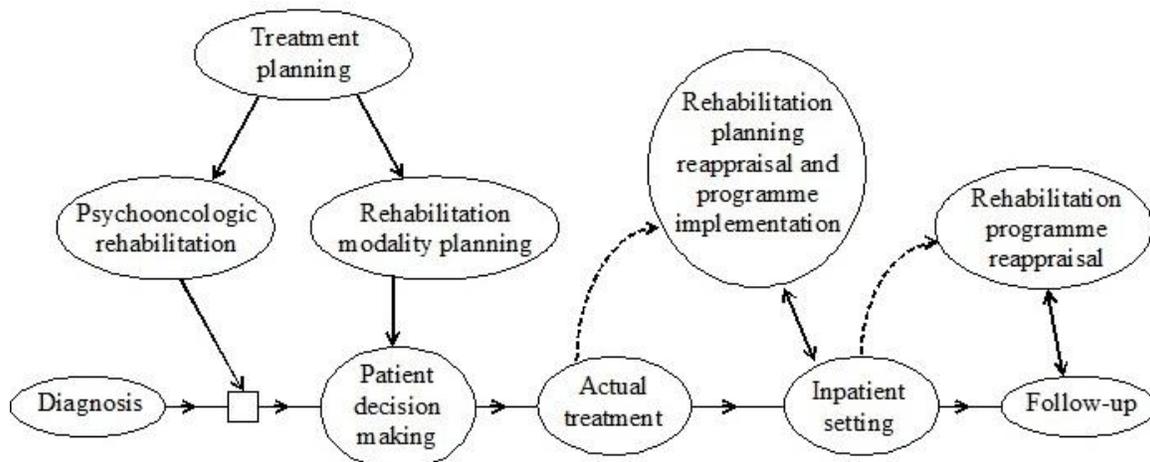
Other than the most common members of the rehabilitation team mentioned above, practitioners from other field also provide important and valuable advice, including religious teachers, dentist, orthotist, and prosthetist. Additionally, rehabilitation programmes benefit from consultative relationships with other care-providing organisations (eg. home health care agencies, community hospice centres) [6, 25, 31, 42, 43].

The Rehabilitation Process

Rehabilitation services are frequently requested too late - if at all ever - in the care of

the cancer patient [2]. The ideal process is show in (Figure 1) where the diagnosis-treatment-outcome phase is described with the rehabilitation input. The rehabilitation interventions could be planned based on disease parameters, and treatment plan and explained to the patient. A psychological appraisal is necessary at this moment to ensure that the patient as well as the family are able to comprehend, process, and make independent, preferably health-promoting decisions based on the information provided to them. The word ‘preferably’ is used because of the ethics involved. Medical practitioners cannot force decision making, and the patient has to make decisions in spite of the duress she/he is undergoing regarding the diagnosis and on coming treatment. To this end, very precise educative and de-stressing measures need to be provided, so that patients can visualise and effectively relate to their treatment.

One method from personal experience that we have found useful is that along with the educative measures like providing the patient sufficient details about the disease, their present status, the probable duration of treatment(s), the cost involved, the potential benefits, the outcomes, etc, having then to see firsthand the happenings in the hospital. A firsthand experience of the hospital without being at the receiving end perhaps prepares the patient mentally for is to come, and not be surprised when it does. Of course ‘guided tours’ are out of question, and the amount of time spent is huge; but it is a line of thought that could be followed. One suggestion



that came from our patients was an educative video showing a cross section of the treatment process - which could give them an insight on what is to follow. The rehabilitation interventions could be planned by the physiatrist and explained to the patient before, during, or immediately following definitive treatment. The physiatrist would then be able to set the general rehabilitation goals and prescribe the evaluations and interventions to be undertaken by the various members of the team. It would be ideal if the hospital has a specific rehabilitation area with facilities and equipment that are conducive to better performance [2]. This would be of help especially in the in-patient period. Feedback from the inpatient rehabilitation period could be utilised to assess the patient status on subsequent follow-up.

The scope of Psychological Rehabilitation

The impact of psychological intervention in cancer patients has been gathering wider notice and respect over the past several years. Its character is now more of 'complementary therapy' even 'adjuvant treatment' [44-46] rather than just some placebo activity. This change is more evident by the greater concerns for QOL as a necessary endpoint in clinical trials [47-54], increased interest in psychoneuroimmunological research [55-63], behavioural intervention studies [64-71], etc.

The psychological rehabilitation component is necessary in the rehabilitation modality because without the right attitude, and need/motivation on the patients' part, all the available techniques, equipments, and expertise is useless. Psychological rehabilitation on its own, is 'mind over matter', has limitations to what it could achieve. But psychological rehabilitation could facilitate good health behaviours like patient compliance to treatment and follow-up. Identifying the patients' specific need and providing a sense of independence has proved to be a key resource in obtaining positive rehabilitation results [72-74].

With cancer treatments becoming more aggressive, the need for new techniques to

manage pain, nausea, and other aversive side effects of therapy have become apparent [32]. Behavioural research and theory offer the possibility of nonpharmacologic intervention methods. Part of a larger movement called behavioural medicine, behavioural intervention with patients undergoing cancer treatment has received wide acceptance from both front-line medical staff and patients. Even though behavioural intervention procedures are amongst the most widely offered psychosocial services at comprehensive cancer centres around the world [75], cancer patients in developing countries like India are yet receive such a component in their treatment package. At the World Health Consensus Conference on pediatric cancer pain management, behavioural methods were identified as a primary treatment for side effects with children undergoing repeated diagnostic and treatment procedures [76]. Similar recommendations have made by the Agency for Health Care Policy and Research [77]. Reasons for the broad acceptance for behavioural methods include the following: the immediacy of their positive impact on patient distress and suffering, the relative ease of their application, and the sense of control their use provides patients at a time when they feel most vulnerable [78].

The application of behavioural approach to the treatment and prevention of disease began in the early 1970s with roots in models like 'The health belief model' [79] and Fishbein and Ajzen's 'theory of reasoned action' [80]. The impetus was on biofeedback in the treatment of headache, asthma, and epilepsy [81]. The success obtained in the training of patients with these disease conditions drew considerable attention [82] and several investigators began to explore in application in a variety of medical disorders [2, 83, 84]. In the early 1980s, investigators began to explore the application of behavioural medicine to cancer and its treatment. Those early works [85-87] focused on the control of aversive side effects of cancer chemotherapy through the use of relaxation, hypnosis and distraction. Today the scope has widened further and newer applications are still being explored. The widening

conceptual base of behavioural intervention is reflected in the terms frequently used to describe the approach; these terms include “broad-spectrum, or multimodal cognitive-behaviour therapy,” “cognitive-behaviour approach,” and behavioural medicine intervention” [32, 88].

Behavioural interventions are concrete in their focus and application [88]. A psychologist in a clinical setting would be interested in what could be done to alter those coping skills and environmental, physical, social, and cognitive factors that affect the person’s behaviour in specific situations. However, in the case of cancer for the psychooncologist, the physical factors that affect behaviour are often difficult to change - e.g. the intensity of the treatment (chemotherapy) which causes negative and aversive side effects [32]. The efforts of the rehabilitative team are focused on teaching the patient and family coping skills [6].

A recent article [32] screened and identified 54 studies (spanning across two decades) using behavioural intervention in cancer patients and observed that eight specific methods have been used to reduce the aversive effects of cancer treatment: 1) contingency management, 2) cognitive/attentional distraction, 3) hypnosis/distracting imagery, 4) systematic desensitisation, 5) emotive imagery, 6) relaxation training, 7) cognitive restructuring, and 8) modelling.

Key issues in Head and Neck Cancer (HNC)

Cancer of the Head and Neck has a negative effect on social, recreational, and sexual functioning [89], and head and neck cancer (HNC) patients irrespective of tumour site have numerous as well as special problems at diagnosis [6, 89, 90]. Besides patients treated for HNC can present with some of the most significant posttreatment morbidity of any group of patients with cancer [6]. Ideally, the process of rehabilitation begins when the cancer is diagnosed and a definitive treatment plan has been established. Based on the treatment modality decided upon, the patient and significant others need to be educated about

posttreatment management of the patient – especially if surgery is involved.

Most important physiological problems faced by HNC patients are speech problems, dry mouth and throat, and swallowing problems, as well as pain [6, 89]. Impaired psycho-social functioning, and psychological distress are also reported with worry, anxiety, mood disorder, fatigue, and depression have been described as the main symptoms [89]. Of the head and neck cancers, patients with hypopharyngeal cancer have reported the worst Health related Quality of Life [90]. Even gender differences are evident with female patients showing poorer emotional functioning [90], and older patients show better emotional and social functioning than younger patients [90].

Quality of Life research in patients treated for head and neck cancer was considered in its infancy stage in 1996 [91]. Six years down the line, QOL and psychosocial research has improved considerably, with scope for more. Speech and eating have been identified as predictors of QOL in HNC [92, 93], and stage of the disease appears to have the strongest impact on Health related Quality of Life [90] even though site and stage specific QOL studies are few [94]. Another important point to be made clear is that very little is known about rehabilitation outcomes over a longer period of time [89, 94]. Studies that have incorporated rehabilitation endpoints have observed that patient concerns are significantly different from those of their family members across different periods [95]. Besides this, five major concerns have been identified in families of a HNC patient: cancer and its meaning, social relations, experience with hospitalisation, treatment, and futures placement, and very importantly, all these concerns were perceived as threatening and harmful to both the patient as well as the immediate family [95]. However, the role of family involvement in the rehabilitative programme is undisputed [94].

Treatment outcomes, irrespective of mode of treatment [96], have problems and issues that necessitate rehabilitative psychological intervention. Studies show that a higher

percentage of patients treated with commando procedures still experience severe psychological distress between 2 to 6 years after their last treatment than do patients treated with radiotherapy for a T1 carcinoma of the glottic larynx [94]. Another study had shown that irrespective of the degree of disfigurement, patients felt that disadvantages outweighed the advantages of therapy, and the difficulties encountered (post treatment) in daily living were too harsh [97]. Patients with extensive disfigurement compared to those that had minor disfigurement shows greater impact in change in self image, worsened relationship with a partner, reduced sexuality, and an increased social isolation [97]. Besides, perceived social support and degree of dysfunction are significantly correlated to rehabilitation [96]. Even though general and disease specific quality of life worsen initially following extensive surgery and radiation therapy, patients have been found to return to baseline (pre-treatment sample age-matched with patients with head and neck trauma) score by 6 months and may even surpass baseline scores in 1 year [98]. However as one study has pointed out, the effect of facial disfigurement may continue irrespective of the rehabilitation outcomes [96].

The need for rehabilitation in HNC patients have been justified [92, 98-100] and rehabilitation outcomes can also depends on diagnostic procedures [101], and the way resections and reconstructions [98] are planned. The impetus is that baseline QOL scores (if not better) could be achieved early with precise professional help.

Key issues in Breast Cancer (BC)

Several factors impinge on QOL in the breast cancer patient. Illness demands are experienced in every aspect of a women's life, including her identity, daily routines, family and social experience, and her perception of the past, present, and future. [102]. Even after treatment, certain sensations remain prevalent (numb, tender), severe (burning, sharp), and distressing (cramping, painful) [103]. Most would experience intrusive thoughts (often identified as 'cancer-

specific worries' or 'cancer-specific distress' significantly interfere with patients ADL and a variety of life domains [103, 104]. Five themes have also been identified as concern areas in women with breast cancer - body appearance, social support, health activism, menopause, and learning to live with a chronic illness [105]. A point to be taken into consideration is that developing countries present more with advanced disease (T3 and T4). This will duly interfere with general health-related parameters and social life of the patients and thereby adversely affects their overall QOL [106].

The most prevalent and distressing symptom of cancer therapy is cancer treatment-related fatigue [107]. Fatigue is not influenced by the patient's age, stage of disease, time since surgery, weight, and length of time since diagnosis, and significantly increases over the course of treatment, and is highest during the last week of treatment [108]. Fatigue is significantly related to symptom distress, psychological distress, and self-reported fatigue relief strategies [107-109]. Exercise has been shown to significantly reduce fatigue [107], and that it is critical that it be targeted in the second week of treatment [108]. Carry over effect of exercise is evident but lasts for one day, and low to moderate workouts are considered an optimum [107].

In addition to fatigue, the actual treatment too is an important source of impact. Mastectomy patients, irrespective of mastectomy alone or mastectomy with reconstruction, have more physical symptoms than lumpectomy patients [110]. Mastectomy versus breast conservation across all ages of women shows that significant problems like general psychological distress, marital satisfaction, and overall sexual functioning do not differ between the two groups [111], while some studies have also indicated that these variables do not differ when compared amongst mastectomy and lumpectomy patients [112, 113]. However, research indicates that the three treatment groups do not differ in problems faced emotionally, socially, in role or sexual functioning [110, 113]. Patients who underwent reconstruction after mastectomy were more likely

to report that breast cancer had a negative effect on their sex lives than lumpectomy patients. Patients who underwent only mastectomy too had sex related problems but not as intense as the reconstruction group [110]. This could also be because of the fact that reconstruction is opted more by younger patients, and that younger patients have more problems than older cohorts [110, 111]. Reconstruction does significantly improve 'social-functioning' and 'mental health' and also overall QOL [114]. Studies also show that women with breast conservation rate their bodies more highly and are more comfortable with nudity and breast caressing. There is also some evidence that breast conservation offers more 'psychological protection' for younger women [111, 115].

Compared to survivors with no adjuvant therapy, those who received chemotherapy have significantly more sexual problems, and those treated with tamoxifen experience more vasomotor symptoms [113]. However, irrespective of treatment modality, overall QOL in Breast Cancer patients are similar, but not having to undergo adjuvant treatment would indicate better physical functioning [113]. The toxicity and distress associated with High Dose Chemotherapy (HDC) is evident in the overall decline of QOL and sub domain scores. But QOL deterioration ceases after completion of treatment - except for physical functioning, and within a year QOL scores do return to baseline, if not higher than baseline. Therefore HDC could be administered if rehabilitation programmes could be implemented to improve the immediate treatment impact on QOL [116].

Only minor differences in the prevalence of needs are reported in urban and rural women with breast cancer [117].

Patient well-being differs with the specific phase of cancer and rehabilitation strategies need to be modified appropriately. To this end the 'impact' needs to be measured appropriately with tools that are sensitive and discretion on the part of the investigator is needed. One study highlighted this when it found that the Brief Symptom Inventory wanting in identifying

differences across phases of disease unlike the Short Form-36 (SF-36), or the Rehabilitation Evaluation System-Short Form (CARES-SF) [118]. Another area that demands interest is the patient's locus of control. Women with breast cancer report significantly lower internal locus and higher external locus of control and also chance perceptions of control [119]. Even very simple techniques like providing written instructions to stress the importance of exercise to rebuild arm strength immediately following the surgery is found to have a long-lasting positive impact on affect [LB15]. Studies have also pointed out that beyond the first year after diagnosis, a woman's quality of life is more likely influenced by her age or exposure to adjuvant therapy than by her breast surgery [110, 112].

Key issues in Cancers of the Brain

Few of the most challenging cancer diagnoses presented for rehabilitative intervention are brain neoplasms [8], primarily because there is little qualitative information on preoperative quality of life of patients with brain tumours [120]. Also in addition to the broad spectrum of problems faced by any cancer diagnosis, other significant impairments are also observed [121, 122]. A few outcomes commonly seen in stroke, cerebral aneurysm, or traumatic brain injury (TBI) like - hemiparesis, aphasia, and cognitive deficits [121, 123-125], are also evident in brain cancer patients. But what sets apart management of brain cancer from trauma or aneurysm conditions to the brain, is that there is a progressive functional decline, constantly changing disability and uncertain prognosis [121, 123, 126, 127]. Yet in spite of the similarities observed and suggestions that rehabilitation intervention would be beneficial for the brain cancer patients it has not received much welcome [8, 128]. This could be because of lack of awareness on the part of the specialist or just no conviction in rehabilitation benefits for brain cancer patients [8].

Principles of neurorehabilitation that are applied to persons with traumatic brain injury, stroke, and traumatic spinal cord injury are found

to be equally appropriate for patients with brain and spinal cord tumours [129]. These principles include the prevention of medical complications, the treatment of medical problems such as pain, spasticity, and neuropathic bowel and bladder; and the improvement of patient' mobility and activities of daily living [129].

As current treatment has a limited effect on length of survival for the patient, the main rationale for selecting a particular treatment may be its impact on patient QOL [130]. Cognitive deficits are the most important problem that prevents patients from achieving premorbid levels of autonomy and occupation. Besides, studies have shown that tumour size does not correlate linearly with impairment of quality of life [120]. Another factor observed is that patients with a tumour located in the anterior region (right side) report poorer quality of life than those with a tumour located posteriorly (left side) [120]. Large tumours apparently damage several parts of the brain and/or raise intracranial pressure to a level that exceeds the brain's compensatory capacity. As the location of the brain tumour thus affects perceived quality of life, any measurements of the quality of life of patients with brain tumours should take into account the location and laterality of the tumour [120]. Perhaps this is why QOL does not appear to correlate well with functional outcomes [131].

Patients with brain tumours undergoing inpatient rehabilitation appear to make functional gains in line with those seen in similar patients with TBI or stroke [132]. Length of stay (LOS) tends to be shorter among tumour patients, but as had been pointed out in a review [8] could be because of a difference in the approach to discharge planning on the part of the rehabilitation team, better psychosocial support systems facilitating discharge, and fewer behavioural problems complicating discharge.

Studying QOL or related psycho-social factors too need to be carefully conducted. Karnofsky's performance scale assessments made by doctors showed no difference between the two hemispheres [120]. And other studies have show that the Karnofsky performance scale is less

sensitive than the Functional Independence Measure (FIM), and the Disability Rating Scale (DRS) in detecting change in functional status [131, 133], contradictory findings have also been reported [134].

Key issues in Cancers of the Spine

Rehabilitation of patients with spinal cord tumours aims to relieve their symptoms, improve their quality of life, enhance their functional independence, and prevent further complications. Rehabilitation is particularly important as it increases the survival rate of these patients [8].

The outcomes of patients with neoplastic spinal tumours have shown positive results [123, 135]. Rehabilitation is found to improve FIM scores [136] reflecting an improvement in the patients ADL and functional capability. As for the lasting effects, maintenance of independent functioning (self-care and ambulation) at one year after inpatient rehabilitation was found satisfactory [8].

Hacking et al (1993) [137] had identified six factors that were prognostic indicators for the probability of survival of >1year, and as means of selecting spinal cord tumour patients for intensive inpatient rehabilitation. However, this controversial selection criterion should not prevent patients from gaining access to an inpatient rehabilitation programme. Other studies have identified psychosocial predictors of lumbar surgery outcome - presurgical anxiety and depression is predictive of failure to return to work; presurgical somatic anxiety and depression is predictive of failure to report improvement in pain [138].

Key issues in Cancers affecting Sexuality

Understanding of the impact of the disease on a patient's psychosexual self-concept and on social and emotional functioning is important, especially given that most of the available treatments substantially compromise sexual functioning [139]. Sexual dysfunction may develop early in the patient's disease course its, develop during active antineoplastic treatment

and symptom management, or first become apparent after active cancer treatment is finished [140]. In the case of female cancer, studies have suggested that global and profound sexual dysfunction are evident in significant numbers of long-term breast cancer as well as gynaecologic cancer survivors, predominantly not due to loss of body part, but due to the after effects of systemic therapy like chemotherapy and even Tamoxifen [141, 142, 143, 144].

The impact of cancer is a change in self-perception and functionality in various roles – including that of a sexual partner. Sexual dysfunctions are also likely to affect physical comfort and may alter psychological well being, mood, and perceptions of individual sexuality. Systemic treatments like chemotherapy give rise to a number of physical side effects to such as: hair loss, nausea and vomiting, tiredness and weakness, anorexia, numbness and tingling, stomatitis, etc, and these can interfere with feeling or acting sexual, and the frequency of sexual contact [144]. Common problems that are associated with cancer treatment for men are loss of desire for sex during and after treatment, and erectile dysfunction [140, 145, 146].

In spite of the fact that the frequency and types of sexual problems patients experience are well documented, very few treatment programmes for sexual dysfunction in cancer patients have been designed or tested. [142] There are a variety of treatment modalities available for sexual dysfunction after cancer. The more complex and severe problems will require professional intervention for optimal care. Sexual counselling could be provided for individuals, couples, or as groups. The advantages or lacunae of these different formats have not been compared for cancer survivors. Medical help like testosterone replacement, cutting down on doses of antidepressants, psycho-educational material, interventions like topical treatments, hormone manipulation may help [140, 144]. Proper identification of the problem is necessary, and this could be preliminarily assessed from the results of the overall QOL assessment but the ideal and most important assessment tool, if a

problem is evident, is the clinical interview. Several query areas have also been identified as vital. However, sexual rehabilitation should not be reserved only for patients who have finished anticancer therapy and have achieved remission [140, 142].

Authors' Contribution

BCT: Did the literature search and prepared the manuscript

MP: Conceived and designed the study and edited the final manuscript.

Conflict of Interests

The authors declare that there are no conflict of Interests

Ethical Considerations

None

Acknowledgement

None

Funding

None

References

- [1]. Annual report, regional Cancer Centre, Trivandrum, Kerala, India. 1983 and 2001.
- [2]. Ragnarsson KT, Thomas DC. Principles of cancer rehabilitation medicine. In Blast RC Jr, Kufe DW, Pollick RE, Weichselbaum RR, Holland JF, Frei E III. (eds). Holland-Frei Cancer Medicine e5. BC Decker Inc, Canada. 2000.
- [3]. Wade DT, de Jong BA. Recent advances in rehabilitation. *BMJ* 2000;320:1385-1388. [[PubMed](#)].
- [4]. Frymark SL. Providing cancer rehabilitation services. *Cancer Management* 1998;3:8-13.
- [5]. Gerber L, Hicks J, Klaiman M, Thornton B, Parks R, Robertson S, et al. Rehabilitation of the cancer patient. 5, Chapter 56, 2925-2956. De Vita VT, Hellman S, Rosenberg SA. *Cancer: Principles and Practice of Oncology*. Lippincott-Raven. Philadelphia, 1997.
- [6]. Kaplan RJ. *Cancer and Rehabilitation*. eMedicine Journal 2001; 2. Available at:

- <http://www.emedicine.com/pmr/topic226.htm>
[Accessed on 16th February, 2002.]
- [7]. Canadian strategy for cancer control: Supportive care/cancer rehabilitation workgroup final report. 2002. Available at: <http://209.217.127.72/csccl/pdf/finalsupportiveJan2002.PDF> [Accessed on 29th March, 2002.]
- [8]. Kirshblum S, O'Dell MW, Ho C, Barr K. Rehabilitation of persons with central nervous system tumors. *Cancer* 2001; 92:1029-1038. [PubMed].
- [9]. Stroke Unit Trialists' Collaboration. Collaborative systematic review of the randomised trial of organised inpatient (stroke unit) care after stroke. *BMJ* 1997; 314:1151-1159. [PubMed].
- [10]. Rudd AG, Irwin P, Rutledge Z, Lowe D, Morris R, Pearson MG. The national sentinel audit of stroke: a tool for raising standards of care. *J R Coll Physicians Lond* 1999; 33:460-464. [PubMed].
- [11]. Indredavik B, Bakke F, Slordahl SA, Rokseth R, Haheim LL. Stroke unit treatment improves long-term quality of life. A randomised controlled trial. *Stroke* 1998; 29:895-899. [PubMed].
- [12]. Freeman JA, Langdon DW, Hobart JC, Thompson AJ. The impact of inpatient rehabilitation on progressive multiple sclerosis. *Ann Neurol* 1997; 42:236-244. [PubMed].
- [13]. Di Fabio RP, Soderberg J, Choi T, Hansen CR, Schapiro RT. Extended outpatient rehabilitation: its influence on symptom frequency, fatigue, and functional status for persons with progressive multiple sclerosis. *Arch Phys Med Rehabil* 1998; 79:141-146. [PubMed].
- [14]. Wade DT, King NS, Wenden FJ, Crawford S, Caldwell FE. Routine follow-up after head injury: a second randomised controlled trial. *J Neurol Neurosurg Psychiatry* 1998; 65:177-183. [PubMed].
- [15]. Van Tulder MW, Esmail R, Bombardier C, Koes BW. Back schools for non-specific low back pain. In: *Cochrane Collaboration. Cochrane Library. Issue 3.* Oxford: Update Software, 1999.
- [16]. Bower H. Investing in rehabilitation is beneficial. *BMJ* 1998; 316:571.
- [17]. Stafford RS, Cyr PL. The impact of cancer on the physical function of the elderly and their utilization of health care. *Cancer* 1997; 80:1973-1980. [PubMed].
- [18]. Pandey M, Singh S, Behere SP, Roy SK, Shukla VK. Quality of life in patients with early and advanced breast cancer. *Eur J Surg Oncol* 2000; 26: 20-4. [PubMed].
- [19]. Pandey M, Sebastian P, Ahamed IM, Ramdas K, Thomas BC. A case-control study into the quality of life of women with breast cancer. *Cancer Strategy* 2000; 2: 61-68.
- [20]. Pandey M, Thomas BC, Ramdas K, Eremenco S, Nair MK. Quality of life in breast cancer patients: Validation of a FACT-B Malayalam version. *Quality of Life Research* 2002; 11:87-90. [PubMed].
- [21]. Pandey M, Thomas BC. Rehabilitation of cancer patients. *Journal of Postgraduate Medicine* 2001; 47: 62-65. [PubMed].
- [22]. Ward DE. Rehabilitation programme strives to get cancer patients back to work. Available at: <http://www.osu.edu/units/cancer/rehab.htm> [Accessed on 18th June 2001].
- [23]. Dietz JH. *Rehabilitation oncology.* New York: Wiley; 1981.
- [24]. Hinterbuchner C. Rehabilitation of a physical disability in cancer. *NY State J Med* 1978; 78:1066-1069. [PubMed].
- [25]. Grabois M. Integrating cancer rehabilitation into medical care at a cancer hospital. *Cancer* 2001; 92:1055-1057. [PubMed].
- [26]. Dietz HJ Jr. Rehabilitation of the cancer patient: its role in the scheme of comprehensive care. *Clin Bull* 1974; 4:104-107. [PubMed].
- [27]. Lehmann JF, DeLisa JA, Warren CG, deLateur BJ, Bryant PL, Nicholson CG. Cancer rehabilitation: assessment of need, development and evaluation of a model of care. *Arch Phys Med Rehabil* 1978; 59: 410-19. [PubMed].
- [28]. Harvey RF, Jellinek HM, Habeck RV. Cancer rehabilitation: an analysis of 36 program approaches. *JAMA* 1982; 247:2127-2131. [PubMed].
- [29]. Schmidt KD. Cancer rehabilitation services in a tertiary care centre. *Cancer* 2001; 92:1053-1054. [PubMed].
- [30]. DePompolo RW. Development and administration of a cancer rehabilitation programme. *Phys Med Rehabil State Atr Rev* 1994; 8:413-423.
- [31]. Redd WH, Montgomery GM, DuHamel KN. Behavioural intervention for cancer treatment side effects. *J Natl Cancer Inst* 2001; 93:810-823. [PubMed].
- [32]. Winningham ML, MacVicar MG. The effect of aerobic exercise on patient reports of nausea. *Oncol Nurs Forum* 1988; 15:447-150. [PubMed].
- [33]. MacVicar MG, Winningham ML, Nickel JL. Effects of aerobic interval training on cancer patients' functional capacity. *Nurs Res* 1989; 38:348-351. [PubMed].
- [34]. Winningham ML. Therapeutic exercise: guidelines and precautions. In: Winningham ML, Barton-Bruke M, editors. *Fatigue in cancer: a multidimensional approach.* Sudbury, MA: Jones & Bartlett, 200:339-50.
- [35]. Winningham ML, MacVicar MG, Bruke C. Exercise for cancer patients: guidelines and precautions. *Physician Sportsmed* 1986; 14:125-131.
- [36]. Dimeo FC, Tilmann MH, Bertz H, et al. Aerobic exercise in the rehabilitation of cancer patients after high dose chemotherapy and autologous peripheral stem cell transplantation. *Cancer* 1997; 79:1717-1722. [PubMed].

- [37]. Pinto BM, Maruyama NC. Exercise in the rehabilitation of breast cancer survivors. *Psychooncology* 1999;8:191-206. [PubMed].
- [38]. Andersen BL. Psychological interventions for cancer patients to enhance the quality of life. *J Consult Clin Psychol* 1992;60:552-568. [PubMed].
- [39]. O'Dell MW, Barr K, Spanier D, Warnick RE. Functional outcome of inpatient rehabilitation in persons with brain tumours. *Arch Phys Med Rehabil* 1998;79:1530-1534. [PubMed].
- [40]. Winningham ML. Strategies for managing cancer related fatigue syndrome: A rehabilitation approach. *Cancer* 2001;92:988-997. [PubMed].
- [41]. Dreosti IE. Nutrition, cancer, and aging. *Ann N Y Acad Sci* 1998;854:371-377. [PubMed].
- [42]. Lane JM, Christ GH, Khan SN, Backus SI. Rehabilitation for limb salvage patients: Kinesiologic parameters and psychologic assessment. *Cancer* 2001;92:1013-1019. [PubMed].
- [43]. Santiago-Palma J, Payne R. Palliative care and rehabilitation. *Cancer* 2001;92:1049-1052.
- [44]. Wyatt GK, Friedman LL. Physical and psychosocial outcomes of midlife and older women following surgery and adjuvant therapy for breast cancer. *Oncol Nurs Forum* 1998;25:761-768. [PubMed].
- [45]. Moynihan C, Bliss JM, Davidson J, Burchell L, Horwich A. Evaluation of adjuvant psychological therapy in patients with testicular cancer: randomised controlled trial. *BMJ* 1998;316:429-435. [PubMed].
- [46]. Lovejoy NC, Matteis M. Cognitive-behavioural interventions to manage depression in patients with cancer: research and theoretical initiatives. *Cancer Nurs* 1997;20:155-167. [PubMed].
- [47]. Klastersky J, Paesmans M. Response to chemotherapy, quality of life benefits and survival in advanced non-small cell lung cancer: review of literature results. *Lung Cancer* 2001;4:S95-101. [PubMed].
- [48]. Gunnars B, Nygren P, Glimelius B; SBU-group. Assessment of quality of life during chemotherapy. *Acta Oncol* 2001;40:175-84. [PubMed].
- [49]. Sloan JA, Varricchio C. Quality of Life endpoints in prostate chemoprevention trials. *Urology* 2001;57:235-240. [PubMed].
- [50]. Heidenreich A, Hofmann R. Quality-of-life issues in the treatment of testicular cancer. *World J Urol* 1999;17:230-238. [PubMed].
- [51]. Kiebert GM, Curran D, Aaronson NK, Bolla M, Menten J, Rutten EH, et al. Quality of life after radiation therapy of cerebral low-grade gliomas of the adult: results of a randomised phase III trial on dose response (EORTC trial 22844). *Eur J Cancer* 1998;34:1902-1909. [PubMed].
- [52]. Thongprasert S. Lung cancer and quality of life. *Aust N Z J Med* 1998;28:397-399. [PubMed].
- [53]. Fitzsimmons D, Johnson CD. Quality of life after treatment of pancreatic cancer. *Langenbecks Arch Surg* 1998;383:145-151. [PubMed].
- [54]. Curran D, van Dongen JP, Aaronson NK, Kiebert G, Fentiman IS, Mignolet F, et al. Quality of life of early-stage breast cancer patients treated with radical mastectomy or breast-conserving procedures: results of EORTC Trial 10801. *Eur J Cancer* 1998;34:307-314. [PubMed].
- [55]. Schussler G, Schubert C. The influence of psychosocial factors on the immune system (psychoneuroimmunology) and their role for the incidence and progression of cancer. *Z Psychosom Med Psychother* 2001;47:6-41. [PubMed].
- [56]. Nagabhushan M, Mathews HL, Witek-Janusek L. Aberrant nuclear expression of AP-1 and NFkappaB in lymphocytes of women stressed by the experience of breast biopsy. *Brain Behav Immun* 2001;15:78-84. [PubMed].
- [57]. Koenig HG. Psychoneuroimmunology and the faith factor. *J Gen Specif Med* 2000;3:37-44. [PubMed].
- [58]. Solomon GF, Amkraut AA, Kasper P. Immunity, emotions and stress (with special reference to the mechanism of stress effects on the immunity system). *Annals of Clinical Research* 1974;6:313-322. [PubMed].
- [59]. Lissoni P, Bolis S, Brivio F, Fumagalli L. A phase II study of neuroimmunotherapy with subcutaneous low-dose IL-2 plus the pineal hormone melatonin in untreatable advanced hematologic malignancies. *Anticancer Res* 2000;20:2103-2105. [PubMed].
- [60]. Kiecolt-Glaser JK, Glaser R. Psychoneuroimmunology and cancer: fact or fiction? *Eur J Cancer* 1999;35:1603-1607. [PubMed].
- [61]. Coker KH. Meditation and prostate cancer: integrating a mind/body intervention with traditional therapies. *Semin Urol Oncol* 1999;17:111-118. [PubMed].
- [62]. Garssen B, Goodkin K. On the role of immunological factors as mediators between psychosocial factors and cancer progression. *Psychiatry Res* 1999;85:51-61. [PubMed].
- [63]. Cohen S, Herbert TB. Health psychology: psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annu Rev Psychol* 1996;47:113-142. [PubMed].
- [64]. Gallagher LM, Steele AL. Developing and using a computerized database for music therapy in palliative medicine. *J Palliat Care* 2001;17:147-154. [PubMed].
- [65]. Servaes P, Verhagen C, Bleijenberg G. Fatigue in cancer patients during and after treatment: prevalence, correlates and interventions. *Eur J Cancer* 2002;38:27-43. [PubMed].
- [66]. Walker LG, Walker MB, Ogston K, Heys SD, Ah-See AK, Miller ID, et al. Psychological, clinical and

- pathological effects of relaxation training and guided imagery during primary chemotherapy. *Br J Cancer* 1999;80:262-268.[\[PubMed\]](#).
- [67]. Hellbom M, Brandberg Y, Glimelius B, Sjoden PO. Individual psychological support for cancer patients: utilisation and patient satisfaction. *Patient Educ Couns* 1998;34:247-256.[\[PubMed\]](#).
- [68]. Bottomley A. Group cognitive behavioural therapy with cancer patients: the views of women participants on a short-term intervention. *Eur J Cancer Care* 1998;7:23-30.[\[PubMed\]](#).
- [69]. Watt D, Verma S, Flynn L. Wellness programs: a review of the evidence. *CMAJ* 1998 27;158:224-230.[\[PubMed\]](#).
- [70]. Walker LG. Behavioural oncology: psychosocial aspects of understanding and treating malignant disease. *Eur J Surg Oncol* 1996;22:543-545.[\[PubMed\]](#).
- [71]. Greer S, Moorey S, Baruch JD, Watson M, Robertson BM, Mason A, et al. Adjuvant psychological therapy for patients with cancer: a prospective randomised trial. *BMJ* 1992;304:675-680.[\[PubMed\]](#).
- [72]. O'Toole DM, Golden AM. Evaluating cancer patients for rehabilitation potential. *West J Med* 1991;155:384-387.[\[PubMed\]](#).
- [73]. Yoshioka H. Rehabilitation for the terminal cancer patient. *Am J Phys Med Rehabil* 1994;73: 199-206.[\[PubMed\]](#).
- [74]. Marciniak CM, Sliwa JA, Spill G, Heinemann AW, Semik PE. Functional outcome following rehabilitation of the cancer patient. *Am J Phys Med Rehabil* 1996;77:54-57.[\[PubMed\]](#).
- [75]. Coluzzi PH, Grant M, Doroshov JH, Rhiner M, Ferrell B, Rivera L. Survey of the provision of supportive care services at National Cancer Institute-designated cancer centres. *J Clin Oncol* 1995;13:756-764.[\[PubMed\]](#).
- [76]. DuHamel KN, Vickberger SM, Redd WH. Behavioural interventions in paediatric oncology. In: Holland J, Breitbart W, Jacobsen P, Lederberg M, Loscalzo M, Massie MJ, et al, editors. *Handbook of psycho-oncology: psychological care of the patient with cancer*. New York (NY): Oxford University Press; 1998.
- [77]. Acute pain management guideline panel. Acute pain management: operatives in medical procedures and trauma. Clinical practice guidelines AHCPR Publ No. 92-0032. Rockville (MD): Agency for Health Care Policy and Research, Public Health Service, US Department of Health and Human Services; 1992.
- [78]. Meyer TJ, Mark MM. Effects of psychosocial interventions with adult cancer patients: a meta-analysis of randomised experiments. *Health Psychol* 1995;14:101-108.[\[PubMed\]](#).
- [79]. Hochbaum G. Public participation in medical screening programmes (DHEW Publication No. 572, Public Health Service). Washington, DC: US Government Printing office. 1958. Cited in: Taylor SE. *Health Psychology* 3rd ed. McGraw-Hill Inc. Singapore.1995
- [80]. Fishbein M, Ajzen I. Belief, attitude, intention, and behaviour: An introduction to theory and research. Reading, MA: Addison-Wesley. 1975. Cited in: Taylor SE. *Health Psychology* 3rd ed. McGraw-Hill Inc. Singapore.1995.
- [81]. Basmajian JV. (ed) *Biofeedback: Principles and practice for clinicians* (3rd ed) Williams & Wilkins; Baltimore, MD. 1989.
- [82]. Birk L. *Biofeedback: behavioural medicine*. NewYork (NY): Grune & Stratton; 1973.
- [83]. Turk DC, Zaki HS, Rudy TE. Effects of intraoral appliance and biofeedback/stress management alone and in combination in treating pain and depression in patients with temporomandibular disorders. *J Prosthet Dent*. 1993; 70(2):158-64.[\[PubMed\]](#).
- [84]. Taylor SE. *Health Psychology* 3rd ed. Pp:396-397. McGraw-Hill Inc. Singapore.1995.
- [85]. Lyles JN, Burish TG, Krozely MG, Oldham RK. Efficacy of relaxation training and guided imagery in reducing aversiveness of cancer chemotherapy. *J Consult Clin Psychol* 1982;50:509-524.[\[PubMed\]](#).
- [86]. Morrow GR, Morrell C. Behavioural treatment for the anticipatory nausea and vomiting induced by cancer chemotherapy. *N Engl J Med* 1982; 207: 1476-1480.[\[PubMed\]](#).
- [87]. Redd WH, Andresen GV, Minagawa RY. Hypnotic control of anticipatory emesis in patients receiving cancer chemotherapy. *J Consult Clin Psychol* 1982;50:14-19.[\[PubMed\]](#).
- [88]. Taylor SE. *Health Psychology* 3rd ed. P95. McGraw-Hill Inc. Singapore.1995.
- [89]. De Boer MF, McCormick LK, Pruyne JF, Ryckman RM, van den Borne BW. Physical and psychosocial correlates of head and neck cancer: a review of the literature. *Otolaryngol Head Neck Surg* 1999;120:427-436.[\[PubMed\]](#).
- [90]. Hammerlid E, Bjordal K, Ahlner-Elmqvist M, Boysen M, Evensen JF, Biorklund A, et al. A prospective study of quality of life in head and neck cancer patients. Part I: at diagnosis. *Laryngoscope* 2001;111:669-680.[\[PubMed\]](#).
- [91]. Moore GJ. Quality of life after radiation therapy for base of tongue cancer. *Oncology (Huntingt)* 1996;10:1643-1648.[\[PubMed\]](#).
- [92]. Karnell LH, Funk GF, Hoffman HT. Assessing head and neck cancer patient outcome domains. *Head Neck* 2000;22:6-11.[\[PubMed\]](#).
- [93]. Blalock D. Speech rehabilitation after treatment of laryngeal carcinoma. *Otolaryngol Clin North Am* 1997;30:179-188.[\[PubMed\]](#).
- [94]. de Boer MF, Pruyne JF, van den Borne B, Kneegt PP, Ryckman RM, Verwoerd CD. Rehabilitation outcomes of long-term survivors treated for head

- and neck cancer. *Head Neck* 1995;17:503-515.[\[PubMed\]](#).
- [95]. Mah MA, Johnston C. Concerns of families in which one member has head and neck cancer. *Cancer Nurs* 1993;16:382-387.[\[PubMed\]](#).
- [96]. Baker CA. Factors associated with rehabilitation in head and neck cancer. *Cancer Nurs* 1992;15:395-400.[\[PubMed\]](#).
- [97]. Gamba A, Romano M, Grosso IM, Tamburini M, Cantu G, Molinari R, et al. Psychosocial adjustment of patients surgically treated for head and neck cancer. *Head Neck* 1992;14:218-223.[\[PubMed\]](#).
- [98]. Netscher DT, Meade RA, Goodman CM, Alford EL, Stewart MG. Quality of life and disease-specific functional status following microvascular reconstruction for advanced (T3 and T4) oropharyngeal cancers. *Plast Reconstr Surg* 2000;105:1628-1634.[\[PubMed\]](#).
- [99]. Clarke A, Cooper C. Psychological rehabilitation after disfiguring injury or disease: investigating the training needs of specialist nurses. *J Adv Nurs* 2001;34:18-26.[\[PubMed\]](#).
- [100]. Hammerlid E, Persson LO, Sullivan M, Westin T. Quality-of-life effects of psychosocial intervention in patients with head and neck cancer. *Otolaryngol Head Neck Surg* 1999;120:507-516.[\[PubMed\]](#).
- [101]. Logemann JA, Roa Pauloski B, Rademaker A, Cook B, Graner D, Milianti F, et al. Impact of the diagnostic procedure on outcome measures of swallowing rehabilitation in head and neck cancer patients. *Dysphagia* 1992;7:179-186.[\[PubMed\]](#).
- [102]. Loveys BJ, Klaich K. Breast cancer: demands of illness. *Oncol Nurs Forum* 1991;18:75-80.[\[PubMed\]](#).
- [103]. Baron RH, Kelvin JF, Bookbinder M, Cramer L, Borgen PI, Thaler HT. Patients' sensations after breast cancer surgery. A pilot study. *Cancer Pract* 2000;8:215-222.[\[PubMed\]](#).
- [104]. Trask PC, Paterson AG, Wang C, Hayasaka S, Milliron KJ, Blumberg LR, et al. Cancer-specific worry interference in women attending a breast and ovarian cancer risk evaluation program: impact on emotional distress and health functioning. *Psychooncology* 2001;10:349-360.[\[PubMed\]](#).
- [105]. Wilmoth MC, Sanders LD. Accept me for myself: African American women's issues after breast cancer. *Oncol Nurs Forum* 2001;28:875-879.[\[PubMed\]](#).
- [106]. Pandey M, Singh SP, Behere PB, Roy SK, Singh S, Shukla VK. Quality of life in patients with early and advanced carcinoma of the breast. *Eur J Surg Oncol* 2000;26:20-24.[\[PubMed\]](#).
- [107]. Schwartz AL, Mori M, Gao R, Nail LM, King ME. Exercise reduces daily fatigue in women with breast cancer receiving chemotherapy. *Med Sci Sports Exerc* 2001;33:718-723.[\[PubMed\]](#).
- [108]. Irvine DM, Vincent L, Graydon JE, Bubela N. Fatigue in women with breast cancer receiving radiation therapy. *Cancer Nurs* 1998;21:127-135.[\[PubMed\]](#).
- [109]. Longman AJ, Braden CJ, Mishel MH. Side effects burden in women with breast cancer. *Cancer Pract* 1996;4:274-280.[\[PubMed\]](#).
- [110]. Rowland JH, Desmond KA, Meyerowitz BE, Belin TR, Wyatt GE, Ganz PA. Role of breast reconstructive surgery in physical and emotional outcomes among breast cancer survivors. *J Natl Cancer Inst* 2000;92:1422-1429.[\[PubMed\]](#).
- [111]. Schover LR. Sexuality and body image in younger women with breast cancer. *J Natl Cancer Inst Monogr* 1994:177-182.[\[PubMed\]](#).
- [112]. Hughes KK. Psychosocial and functional status of breast cancer patients. The influence of diagnosis and treatment choice. *Cancer Nurs* 1993;16:222-229.[\[PubMed\]](#).
- [113]. Ganz PA, Rowland JH, Meyerowitz BE, Desmond KA. Impact of different adjuvant therapy strategies on quality of life in breast cancer survivors. *Recent Results Cancer Res* 1998;152:396-411.[\[PubMed\]](#).
- [114]. Brandberg Y, Malm M, Blomqvist L. A prospective and randomized study, "SVEA," comparing effects of three methods for delayed breast reconstruction on quality of life, patient-defined problem areas of life, and cosmetic result. *Plast Reconstr Surg* 2000;105:66-74.[\[PubMed\]](#).
- [115]. Schover LR. The impact of breast cancer on sexuality, body image, and intimate relationships. *CA Cancer J Clin* 1991;41:112-120.[\[PubMed\]](#).
- [116]. Macquart-Moulin G, Viens P, Palangie T, Bouscary ML, Delozier T, Roche H, et al. High-dose sequential chemotherapy with recombinant granulocyte colony-stimulating factor and repeated stem-cell support for inflammatory breast cancer patients: does impact on quality of life jeopardize feasibility and acceptability of treatment? *J Clin Oncol* 2000;18:754-764.[\[PubMed\]](#).
- [117]. Girgis A, Boyes A, Sanson-Fisher RW, Burrows S. Perceived needs of women diagnosed with breast cancer: rural versus urban location. *Aust N Z J Public Health* 2000;24:166-173.[\[PubMed\]](#).
- [118]. Hanson Frost M, Suman VJ, Rummans TA, Dose AM, Taylor M, Novotny P, et al. Physical, psychological and social well-being of women with breast cancer: the influence of disease phase. *Psychooncology* 2000;9:221-231.[\[PubMed\]](#).
- [119]. Bremer BA, Moore CT, Bourbon BM, Hess DR, Bremer KL. Perceptions of control, physical exercise, and psychological adjustment to breast cancer in South African women. *Ann Behav Med* 1997;19:51-60.[\[PubMed\]](#).
- [120]. Salo J, Niemela A, Joukamaa M, Koivukangas J. Effect of brain tumour laterality on patients' perceived quality of life. *J Neurol Neurosurg Psychiatry* 2002;72:373-377.[\[PubMed\]](#).

- [121]. Bell KR, O'Dell MW, Barr K, Yablon SA. Rehabilitation of the patient with brain tumour. *Arch Phys Med Rehabil* 1998;79:S37-S46.
- [122]. Mellette SJ, Blunk KL. Cancer rehabilitation. *Semin Oncol* 1994;21:779-782. [PubMed].
- [123]. Marchiniak CM, Sliwa JA, Spill G, Heinemann AW, Semik E. Functional outcome following rehabilitation of the cancer patient. *Arch Phys Med Rehabil* 1996;77:54-57. [PubMed].
- [124]. Clinchot DM, Bogner JA, Kaplan PE. Cerebral aneurysms: analysis of rehabilitation outcomes. *Arch Phys Med Rehabil* 1997;78:346-349. [PubMed].
- [125]. Brandmaster ME. Stroke rehabilitation. In: DeLisa JA, Gans BM, editors. *Rehabilitation medicine: principles and practice* (3rd ed.) Philadelphia: Lippincott-Raven, 1998:1165-89.
- [126]. O'Dell MW, Barr K, Spanier D, Warnick R. Functional outcome of inpatient rehabilitation in persons with brain tumours. *Arch Phys Med Rehabil* 1998;79:1530-1534. [PubMed].
- [127]. Huang ME, Cifu DX, Keyser-Marus L. Functional outcome after brain tumour and acute stroke: a comparative analysis. *Arch Phys Med Rehabil* 1998;79:1386-1390. [PubMed].
- [128]. Boake C, Meyers CA. Brain tumour rehabilitation: survey of clinical practice [abstract]. *Arch Phys Med Rehabil* 1993;74:1247.
- [129]. Kirshblum S, O'Dell MW, Ho C, Barr K. Rehabilitation of persons with central nervous system tumours. *Cancer* 2001;92:1029-1038. [PubMed].
- [130]. Weitzner MA, Meyers CA. Cognitive functioning and quality of life in malignant glioma patients: a review of literature. *Psychooncology* 1997;6:169-177. [PubMed].
- [131]. Huang ME, Wartella JE, Kreutzer JS. Functional outcomes and quality of life in patients with brain tumors: a preliminary report. *Arch Phys Med Rehabil* 2001;82:1540-1546. [PubMed].
- [132]. Huang ME, Wartella J, Kreutzer J, Broaddus W, Lyckholm L. Functional outcomes and quality of life in patients with brain tumours: a review of the literature. *Brain Inj* 2001;15:843-856. [PubMed].
- [133]. Bremer BA, Moore CT, Bourbon BM, Hess DR, Bremer KL. Perceptions of control, physical exercise, and psychological adjustment to breast cancer in South African women. *Ann Behav Med* 1997;19:51-60. [PubMed].
- [134]. Brazil L, Thomas R, Laing R, Hines F, Guerrero D, Ashley S, et al. Verbally administered Barthel Index as functional assessment in brain tumour patients. *J Neurooncol* 1997;34:187-192. [PubMed].
- [135]. Yoshika H. rehabilitation for terminal cancer patients. *Am J Phys Med Rehabil* 1994;73:199-206. [PubMed].
- [136]. McKinley WO, Huang ME, Brunswold KT. Neoplastic versus traumatic spinal cord injury: an outcome comparison after inpatient rehabilitation. *Arch Phys Med Rehabil* 1999;80:1253-1257. [PubMed].
- [137]. Hacking HG, Van As HH, Lankhorst GJ. Factors related to the outcome of inpatient rehabilitation in patients with neoplastic epidural spinal cord compression. *Paraplegia* 1993;31:367-374. [PubMed].
- [138]. Trief PM, Grant W, Fredrickson B. A prospective study of psychological predictors of lumbar surgery outcome. *Spine* 2000;25:2616-2621. [PubMed].
- [139]. Taylor SE. *Health Psychology* 3rd ed. Pp:436-437. McGraw-Hill Inc. Singapore.1995.
- [140]. McKee AL Jr, Schover LR. Sexuality Rehabilitation. *Cancer* 2001;92:1008-1012. [PubMed].
- [141]. Ganz PA, Rowland JH, Desmond K, Meyerowitz BE, Wyatt GE. Life after breast cancer: understanding women's health-related quality of life and sexual functioning. *J Clin Oncol* 1998;16:501-514. [PubMed].
- [142]. Schover LR, Montague DK, Lakin MM. Sexual problems. In: DeVita VT, Hellman S, Rosenberg SA, editors. *Cancer: principles and practice of oncology*. 5th ed. Philadelphia: Lippincott-Raven: 1997:2857-72.
- [143]. Anderson BL. Quality of life for women with gynaecologic cancer. *Curr Opin Obstet Gynecol* 1995;7:69-76. [PubMed].
- [144]. The importance of sexual rehabilitation after breast cancer treatment. *Primary Cancer Care* 1995;15. Available at: <http://www.cancernetwork.com/journals/primary/p9510b.htm> [Accessed on: 16th February 2002].
- [145]. Bates TS, Wright MP, Gillatt DA. Prevalence and impact of incontinence and impotence following total prostatectomy assessed anonymously by the ICS-male questionnaire. *Eur Urol* 1998;33:165-169. [PubMed].
- [146]. Schrader-Bogen CL, Kjellberg JL, McPherson CP, Murray CL. Quality of life and treatment outcomes: prostate carcinoma patients' perspective after prostatectomy or radiation therapy. *Cancer* 1997;79:1977-1986. [PubMed].

