

REHABILITATION IN ADVANCED CANCER

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Abstract

Rehabilitation has much to offer cancer patients with physical functioning issues related to nervous and musculoskeletal problems, as well as the general debility that may be a feature of advanced cancer. Individual members of the rehabilitation team bring their skills to bear to improve the ability of patients to live their daily lives as independently as possible. Rehabilitation outcomes can be measured with standardised assessments, including the Barthel Index and the Functional Independence Measure, which may form part of casemix algorithms. There are no randomised control studies of rehabilitation in advanced cancer. However, there are observational studies that provide level III evidence for the efficacy of rehabilitation programs for residual physical disability that may be present in patients after acute treatment of brain tumours, spinal tumours, bony metastases with fractures, and in patients with debility. Patients with brain tumours and spinal tumours can expect a response to therapy that is entirely comparable with that seen in 'benign' lesions, such as strokes, brain trauma or spinal trauma in similar anatomical locations. Rehabilitation also has a useful role to play in the debility that may be a feature of advanced cancer. Particular attention must be paid to rehabilitation for return to safe driving of motor vehicles after treatment of brain tumours, and the program generally involves medical and psychological review, as well as occupational therapy assessment of the patient in off-road and on-road settings. There is no place for therapeutic nihilism in the presence of physical disability in cancer patients, any more than there is in the presence of disability due to 'benign' illnesses.

Serious problems with physical function are fortunately not a universal feature of most cancer journeys. Such problems do however, occur relatively commonly with advanced primary and secondary tumours involving the nervous and musculoskeletal systems. This review will focus on the evidence for the place of rehabilitation programs in patients with significant functional disability associated with brain and spinal tumours, tumours in bone and patients with general debility associated with sepsis or other sequelae of cancer treatment.

In all these settings, deficits may include: various combinations of weakness and sensory loss; cognitive, visual and perceptual deficits; and problems with bladder and bowel dysfunction. While much attention in cancer care is focused on direct tumour related matters such as the pathology and staging of a tumour, imaging, laboratory test data and side-effects from drug and radiation treatment, rehabilitation clinicians have a primary focus on the impact of cancer and its treatment on the patient's ordinary daily living function and social participation.

A patient with physical and functional problems present in the post-acute stage of cancer care will, in general, respond to rehabilitation therapies as well as a patient with similar problems due to a more 'benign' cause, provided there is adequate ongoing control of the underlying cancer.

Rehabilitation environment

As with many other services for cancer patients, care in the rehabilitation environment is multi-disciplinary, with an appropriate range of nursing, allied health and medical staff available, with the team's care supervised

and coordinated by a medical specialist in rehabilitation medicine. Expert rehabilitation nurses support patients and carers by integrating individualised nursing programs with continuing reinforcement of the skills learnt in formal allied health therapy sessions at other times.

While the core roles of individual allied health therapists are defined, there are often considerable areas of co-operative overlap. Physiotherapists have a primary focus on impairments of motor function, coordination and strength, together with problems of balance and mobility. In contrast, occupational therapists focus on problems in self-care function, including daily personal care and feeding, with assessment of both the individual and their home environment. Speech pathologists focus on therapy for swallowing problems and issues with communication and verbal interaction, and memory problems, with support from psychologists. Social workers counsel and support patients as they resume family and social relationships, and particularly address concerns around housing and financial matters.

Critically, all of this team activity is aimed at restoring the individual patient's sense that they are regaining some control of their lives. As each patient sets and achieves goals in a rehabilitation program, they progress towards greater independence in life, even if it is not the same life as was the case before.

Rehabilitation approach

Weakness is a very common deficit,¹ especially in brain and spinal tumour patients where it may be quite focal and associated with other neurological signs, but is often a prominent part of the general deconditioning that may accompany sepsis or weight loss in other cancers.

Clearly, this can affect transferring from laying or sitting to standing, ambulation and dressing, toileting and bathing. All of these problems can be addressed by and benefit from rehabilitation, that is entirely analogous in scope with programs developed for use with benign diagnoses.² Frequent reassessment and flexibility in program delivery are required however, if there is a possibility of reappearance or progression of the underlying cancer.³ As described in detail later, studies have shown that brain and spinal tumour patients with physical disability can achieve functional gains and discharge outcomes that are comparable with stroke, brain and spinal trauma patients, and often with a shorter length of hospital stay.

Towards the end of a rehabilitation admission, the team assesses whether it is safe to discharge a patient, or whether supervised care is indicated. For many patients going home, especially those with brain and spinal tumours, the ability to resume driving a car is a central icon of adult social independence, and it is mandatory that this is addressed and managed as a specific issue.

Measurement of rehabilitation outcomes

There are two common overview measures of overall rehabilitation functional outcomes. The Barthel Index is the simpler and older of the two,⁴ focusing on basic mobility function and personal activities of daily living. Each of the 10 task items is rated at three levels of patient function – independent, need for assistance and dependent – and the patient's task scores are added to produce a total between 0 and 100. The higher the score, the better the patient's ability to function independently. The scale has been shown to have excellent internal consistency,⁵ and good inter-rater and test-retest reliability.⁶ While making good sense intuitively, the Barthel scale does however, assume all rated tasks have equal impact on a person's ability or inability to live independently, which is not necessarily the case.

The Functional Independence Measure (FIM)* is the present standard outcome measure for rehabilitation therapy.⁷ It has 18 items, each one being rated from one (complete dependence) to seven (independence), with full-scale scores ranging from 18 to 126. Items are grouped by motor function (transfers, walking, stairs, bladder and bowel control), activities of daily living (eating, grooming, bathing, dressing and toileting) and cognition-communication (speech ability, social interaction, problem solving and memory function). Where assessors are correctly trained, the scale has excellent internal consistency,⁸ inter-rater and test-retest reliability.⁹ In its raw ordinal form, statistical manipulation of the FIM can be somewhat complex, and Rasch transformation of the FIM to a continuously variable metric has been employed to circumvent this particular difficulty.¹⁰

Where cost weighted funding of individual episodes of rehabilitation care has been introduced in inpatient settings, FIM measurements are a fundamental component of the funding algorithm. Although many other scales can be used to measure multiple different

aspects of physical functioning in the cancer survivor,¹¹ the pragmatic approach taken here is to focus on evidence coming from the use of the FIM, both because of its global scope and its use in such funding algorithms.

Rehabilitation outcomes for brain tumour patients

There are no randomised control trials of outcomes of rehabilitation therapy for individuals with brain tumours. Seven observational studies describe rehabilitation of individuals with significant brain tumour associated disability. Four of these are non-comparative,¹²⁻¹⁵ and three compare brain tumour patients with stroke or brain trauma patients.¹⁶⁻¹⁸ All seven studies use the FIM to show improvement in patients' functional status with rehabilitation therapy. One study separated out patients by the grade and type of the underlying brain tumour, and found no difference in average improvement in functional outcome or length of stay between the groups studied.¹⁴

There is level III evidence that participation in a rehabilitation program is associated with improved mobility function in brain tumours,^{12,14,15} at a rate comparable to that seen with therapy of benign neurological diagnoses.¹⁶⁻¹⁸ Likewise, there is level III evidence for improvement in personal activities of daily living, with appropriate therapy.¹⁵ There is level III evidence that cognitive-communication function improves with rehabilitation therapy, with efficiency rates similar between a group of patients who have had a high-grade glioma, compared with other brain tumour groups.¹⁴

There is currently no evidence for the efficacy of speech therapy in managing swallowing disorders in brain tumour patients, however the advice of a speech pathologist should be sought to assist in managing residual problems related to swallowing function. Similarly, there is no evidence relating neuropsychological interventions to improved outcomes in therapy programs in this setting. Observational evidence however, clearly supports the importance of neuropsychological evaluation of cognitive impairment after brain tumour treatment.¹⁹⁻²¹

Rehabilitation outcomes for patients with spinal tumours

As with brain tumours, there are no randomised control trials of outcomes of rehabilitation therapy for individuals with spinal tumours. Five observational studies, all using the FIM to assess changes in patients' ability to function, describe rehabilitation of individuals with significant disability related to spinal tumours. Three of these are non-comparative²²⁻²⁴ while two compare spinal tumour patients with spinal trauma patients.^{25,26}

There is level III evidence that participation in a rehabilitation program is associated with improved mobility function in spinal tumours comparable to that achieved in rehabilitation of benign disorders.^{25,26} There is level III evidence that rehabilitation therapy improves function in ordinary activities of daily living in spinal tumour patients.²²

*FIM is a trademark of the Uniform Data System for Medical Rehabilitation, a division of UB Foundation Activities, Inc.

Rehabilitation outcomes for patients with tumours in bone

As with brain and spinal tumours, there are no randomised control trials of rehabilitation therapy in this setting. Two observational studies, neither of them comparing cancer patients with patients with benign orthopaedic lesions, describe rehabilitation outcomes for patients who have had bony metastatic disease with pathological fracture.^{12,27} There is level III evidence that patients who have had a pathological fracture fixed, improve their mobility function with rehabilitation, as measured by the FIM scale.¹²

Rehabilitation outcomes for patients with cancer related debility

Again, there are no randomised control trials of rehabilitation therapy in this setting. A single retrospective non-comparative study examines the effects of rehabilitation therapy in individuals with late stage disease, where asthenia is the diagnostic category accounting for hospital admission of individuals with advanced cancer.¹² This study provides level III evidence for improvements in the motor and cognitive components of the FIM with rehabilitation therapy.

A parallel paper discusses the value of such rehabilitation therapy in assisting the transition of these patients from curative to palliative care,²⁸ mapping from the functional improvements gained in these patients to an estimate of the reduced number of hours of hands-on care needed to support these patients in home care settings.

Driving after onset of cancer related disability

The ability to drive a motor vehicle is a central icon of social independence. It is a particular issue in one area of cancer rehabilitation, namely brain tumour patient care, where the individual may not have the insight to appreciate the extent to which their possible cognitive and motor problems interfere with the very complex task of safe driving.

Return to driving a motor vehicle after treatment for a brain tumour is covered by a set of national guidelines with regulatory force in all Australian jurisdictions.²⁹ If there is any evidence for the presence of residual malignant brain tumour (eg. on a brain scan), or presence of neurological signs such as hemianopia, quadrantanopia or impaired judgment, the individual does not satisfy the criteria for holding an unrestricted driver's licence.

The best way to manage potential risks in a brain tumour patient who expects to return to driving as part of a rehabilitation program, is to undertake a full assessment that should include medical, ophthalmological, psychological and occupational therapy assessments, initially in an off-road setting and then in a controlled on-road setting.

The outcome may be that the person is not safe to drive at all, or is safe to drive with some restrictions, or is safe to drive an adapted vehicle, or may drive without restriction. These recommended outcomes are communicated to the driver licensing authority, for its determination and endorsement of the person's driving licence, and it is incumbent on the patient that they obey this outcome of the process.

In other areas of cancer related disability, where the difficulty with driving is more of a physical nature, the assessment process is much less complex, and a positive outcome that may involve some adaptation of the vehicle driven is more likely.

In any case, formal assessment of suitability for return to driving a car is recommended as the best way of managing the risk that an unsafe driver otherwise presents to those around them.

Conclusion

Despite the lack of randomised control studies of rehabilitation for cancer patients with significant physical disability, the evidence that is currently available clearly shows the benefit of providing rehabilitation therapy for these patients. With adequate control of the underlying cancer, there is no ground for rehabilitation therapeutic nihilism in these patients, any more than there is in other individuals disabled as a result of their experience with comparable 'benign' diseases.

References

- Davies E, Hall S, Clarke C. Two year survival after malignant cerebral glioma: patient and relative reports of handicap, psychiatric symptoms and rehabilitation. *Disabil Rehabil.* 2003; 25(6):259-266.
- Guo Y, Shin KY. Rehabilitation Needs of Cancer Patients. *Crit Rev Phys Rehabil Med.* 2005; 17(2):83-99.
- Kirschblum S, O'Dell MW, Ho C, Barr K. Rehabilitation of persons with central nervous system tumors. *Cancer.* 2001; 92(4 Suppl):1029-1038.
- Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. *Md State Med J.* 1965; 14:61-65.
- Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. *J Clin Epidemiol.* 1989;42(8):703-709.
- Loewen SC, Anderson BA. Reliability of the Modified Motor Assessment Scale and the Barthel Index. *Phys Ther.* 1988;68(7):1077-1081.
- Keith RA, Granger CV, Hamilton BB, Sherwin FS. The Functional Independence Measure: a new tool for rehabilitation. *Adv Clin Rehabil.* 1987;1:6-18.
- Dodds TA, Martin DP, Stolov WC, Deyo RA. A validation of the Functional Independence Measure and its performance among rehabilitation inpatients. *Arch Phys Med Rehabil.* 1993;74(5):531-536.
- Ottbacher KJ, Mann WC, Granger CV, Tomita M, Hurren D, Charvat B. Interrater agreement and stability of functional assessment in the community-based elderly. *Arch Phys Med Rehabil.* 1994;75(12):1297-1301.
- Heinemann AW, Linacre JM, Wright BD, Hamilton BB, Granger CV. Measurement characteristics of the Functional Independence Measure. *Top Stroke Rehabil.* 1994;1(1):1-15.
- Gilchrist LS, Galantino ML, Wampler M, Marchese VG. A Framework for Assessment in Oncology Rehabilitation. *Phys Ther.* 2009;89(3):286-306.
- Cole RP, Scialla SJ, Bednarz L. Functional recovery in cancer rehabilitation. *Arch Phys Med Rehabil.* 2000;81(5):623-627.
- Mukand JA, Blackinton DD, Crincoli MG, Lee JJ, Santos BB. Incidence of neurologic deficits and rehabilitation of patients with brain tumors. *Am J Phys Med Rehabil.* 2001;80(5):346-350.
- Marciniak CM, Sliwa JA, Heineman AW, Semik PE. Functional outcomes of persons with brain tumors after rehabilitation. *Arch Phys Med Rehabil.* 2001;82(4):457-463.
- Garrard P, Farnham C, Thompson AJ, Playford ED. Rehabilitation of the cancer patient: experience in a neurological unit. *Neurorehabil Neural Repair.* 2004;18(2):76-79.
- Huang ME, Cifu DX, Keyser-Marcus L. Functional outcome after brain tumor and acute stroke: a comparative analysis. *Arch Phys Med Rehabil.* 1998;79(11):1386-1390.
- O'Dell MW, Barr K, Spanier D, Warnick RE. Functional outcome of inpatient rehabilitation in persons with brain tumors. *Arch Phys Med Rehabil.* 1998;79(12):1530-1534.
- Huang ME, Cifu DX, Keyser-Marcus L. Functional outcomes in patients with brain tumor after inpatient rehabilitation: comparison with traumatic brain injury. *Am J Phys Med Rehabil.* 2000;79(4):327-335.
- Choucair AK, Scott C, Urtasun R, Nelson D, Mousas B, Curran W. Quality of life and neuropsychological evaluation for patients with malignant astrocytomas: RTOG 91-14. *Int J Rad Onc Biol Phys.* 1997;38(1):9-20.
- Brown PD, Buckner JC, O'Fallon JR, Iturria NL, Brown CA, O'Neill BP et al.

- Effects of Radiotherapy on Cognitive Function in Patients with Low-Grade Glioma Measured by the Folstein Mini-Mental State Examination. *J Clin Oncol.* 2003;21(13):2519-2524.
21. Costello A, Shallice T, Gullan R, Beaney R. The early effects of radiotherapy on intellectual and cognitive functioning in patients with frontal brain tumours: the use of a new neuropsychological methodology. *J Neuro-Oncol.* 2004; 67(3):351-359.
 22. McKinley WO, Conti-Wyneken AR, Vokac CW, Cifu DX. Rehabilitation functional outcome of patients with neoplastic spinal cord compressions. *Arch Phys Med Rehabil.* 1996;77(9):892-895.
 23. Parsch D, Mikut R, Abel R. Postacute management of patients with spinal cord injury due to metastatic tumour disease: survival and efficacy of rehabilitation. *Spinal Cord.* 2003;41(3):205-210.
 24. Tay SS, Ng YS, Lim PAC. Functional Outcomes of Cancer Patients in an Inpatient Rehabilitation Setting. *Ann Acad Med Singapore.* 2009;38(3):197-201.
 25. McKinley WO, Huang ME, Brunsvold KT. Neoplastic versus traumatic spinal cord injury: an outcome comparison after inpatient rehabilitation. *Arch Phys Med Rehabil.* 1999;80(10):1253-1257.
 26. McKinley WO, Huang ME, Tewkesbury MA. Neoplastic versus Traumatic Spinal Cord Injury. *Am J Phys Med Rehabil.* 2000;79(2):138-144.
 27. Bunting RW, Boublik M, Blevins FT, Dame CC, Ford LA, Lavine LS. Functional Outcome of Pathologic Fracture Secondary to Malignant Disease in a Rehabilitation Hospital. *Cancer.* 1992;69(1):98-102.
 28. Scialla S, Cole R, Scialla T, Bednarz L, Scheerer J. Rehabilitation for elderly patients with cancer asthenia: making a transition to palliative care. *Pall Med.* 2000;14(2):121-127.
 29. Australian Transport Council. Assessing fitness to drive for commercial and private vehicle drivers, and clinical management guidelines. 3rd ed. Sydney, Australia:Austrroads Inc;2003.