National Cancer Rehabilitation Advisory Board

Cancer and Palliative Care Rehabilitation
A Review of the Evidence Update

January 2012
Disclaimer

In keeping with our values of integrity and excellence, the IHM has taken reasonable professional care in the preparation of this report within the resources and time available to do the work. Although the IHM has made reasonable efforts to obtain information from a broad spectrum of sources, we cannot guarantee absolute accuracy or completeness of information/data submitted, nor do we accept responsibility for recommendations that may have been omitted due to particular or exceptional conditions and circumstances.
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1.0 Executive summary

This review is designed to bring together and synthesise the available evidence relating to the effectiveness of cancer and cancer-related palliative care interventions delivered by Allied Health Professionals (AHPs: dietitians, lymphoedema practitioners, occupational therapists, physiotherapists, and speech and language therapists), or interventions relevant to AHPs’ practice for haematological and skin cancers and sarcoma (from 1996-2011).

This review is also an update (2008-2011) on the previous work undertaken to support the existing tumour sites and symptom care pathways (Cancer and Palliative Care Workforce Project: A Review of the Evidence, 2009). For the purposes of this report, palliative care relates only to cancer-related palliative care.

The report does not supersede the previous review; rather it is designed to be read in conjunction with it.

For this review a Rapid Evidence Assessment-type methodology based on systematic principles was employed in which studies were located through searches on databases (listed in Appendix A). These references were screened for relevance using a PICO framework (see Appendix B) and a study design criterion: only studies that used a randomised controlled trial methodology and systematic reviews including primary studies were analysed.

In total, 72 studies were included in the synthesis. This included a total of 10 studies for haematological cancers, 6 for sarcoma and 2 for skin cancer. Research in rehabilitation is more often focused on symptom management which is reflective of the referral route to rehabilitation.

Data were extracted from the included studies on study design, demographic and clinical information about the study participants, details of the intervention and the findings of the study. The findings were presented identifying effective interventions by individual and multiple cancer sites followed by interventions where the evidence was inconclusive, again by individual and multiple cancer sites.

The total timeframe for this piece of work was 4 months. Table 1 shows the activity undertaken and timescales of this work.

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<td>Mid October 2011 – end November</td>
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For the 3 new tumour areas, rehabilitation interventions for haematological cancers are comparatively substantial in number compared to the other two cancer sites. Although there were some useful papers on sarcoma, the focus of applicable research was on the rehabilitation of amputations.

The picture is different for skin cancers where no relevant applicable studies were identified even though the search went back to 1996. Based on the information gathered there appears to be evidence for the effectiveness of the following interventions: physical activity, behavioural techniques, fatigue management, shoulder physiotherapy, prevention and management of lymphoedema, nutritional advice and support, acupuncture, swallowing exercises, heat and moisture exchangers, neuromuscular stimulation and breathing training.

Table 1 Activity and timescale of the review
2.0 Summary of Findings

Table 2 provides an overview of the evidence located for the review presented by tumour site. A tick indicates a positive effect of the intervention concerned whereas a cross indicates evidence was inconclusive and a blank indicates no relevant RCT or systematic review was found.

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<td>Neuromuscular stimulation</td>
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<td>Dysphagia</td>
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3.0 Background

Since the last review was written, more evidence has been published highlighting the effectiveness of various rehabilitation interventions in cancer care.

In addition, a recent document Improving Outcomes: A Strategy for Cancer (DH 2011) has identified that there are now 1.8 million people in England who have had a diagnosis of cancer and this is expected to increase to 3 million by 2030. This indicates that the need for cancer rehabilitation will increase and reflects the continued importance of effective interventions delivered by Allied Health Professionals in improving cancer survivorship.

The aim of this review, commissioned by the National Cancer Rehabilitation Advisory Board (NCRAB) on behalf of the National Cancer Action Team (NCAT), and presented in this report, is to consider the evidence for rehabilitation interventions relevant to AHPs for haematological and skin cancers and sarcoma, which were not within the scope of the initial report.

This report also presents an update on the evidence-base in relation to the effectiveness of rehabilitation interventions in connection with eight specified tumour sites: brain & CNS; breast; colorectal; gynaecology; head & neck; lung; upper GI and urinary tract, as well as the interventions and treatment approaches that relate to symptoms known to occur commonly among cancer patients including anorexia, breathlessness, fatigue, pain and lymphoedema. Appendix C lists which Allied Health Professionals have a key role in providing interventions with each cancer site.

Rehabilitation is relevant at all stages of the care pathway from diagnosis and treatment through to survivorship, palliative care and end of life care. The focus of the rehabilitation changes depending on the patients’ prognosis and ability.

The range of AHPs covered in this review include, but are not exclusive to, dietitians, lymphoedema practitioners, physiotherapists, occupational therapists and speech and language therapists. The description of the role of these AHPs is in Appendix D.

This document provides an update on the previous review, however it does not supersede the 2008 report, rather, it is designed to be read in conjunction with it.
4.0 Methods

The review was conducted in four stages: searching, screening, data extraction and synthesis

4.1 Searching

Searches of electronic databases were conducted from mid September to end of October 2011. Searches combined terms relating to cancer, terms relating to the symptoms and interventions of interest and terms relating to effectiveness and outcomes.
For haematological and skin cancer and sarcoma the searches included references from 1996 to 2011 whereas the searches for the remaining eight tumour groups included papers from 2008 to 2011.
A full list of databases searched, sources of other information and the search strategies used can be found in Appendix A.
In addition, allied health professionals (AHPs) were contacted to identify unpublished research reports (‘grey literature’). The list of reports submitted to the review can be found in Appendix E.

4.2 Screening

The assessment and data extraction were conducted from mid October to end of November 2011. Inclusion criteria for this review followed the PICO (population, intervention, context, outcome) framework.
A summary version of the criteria is presented below. The complete inclusion criteria can be found in Appendix B.

4.2.1 Population

Age: adult patients only (≥18 years).
(Children and teenage and young adults for sarcoma and haematological tumours only)
Tumour site: Brain and central nervous system; breast; colorectal; gynaecological; head and neck; lung; upper gastrointestinal; urinary tract; skin, haematological and sarcoma

Symptoms: anorexia, cachexia, breathlessness (dyspnoea), fatigue (including cancer related fatigue), weight loss, asthenia, pain (including pain as a result of spinal cord compression), altered body image, lymphoedema, loss of mobility and function as a result of cancer, communication difficulties, cognitive problems, swallowing difficulties (dysphagia), voice disorders (dysphonia), anxiety

Physical disorder: respiratory function, metastatic spinal cord compression, radiotherapy induced fibrosis, amputation (relating to sarcoma)

4.2.2 Intervention

- Interventions delivered by the following professions: Dietitians, Lymphoedema Practitioners, Occupational Therapists, Physiotherapists, Speech and Language Therapists.
- Interventions: positioning, movement, loss of mobility and function, functional ability (including as a result of cancer) communication difficulties mechanical therapies, electrophysical agents, TENS (transcutaneous electrical nerve stimulation), respiratory care (management of dyspnoea, removal of secretions, nebulised drugs and oxygen management, pre and post-operative breathing exercises), neurological rehabilitation techniques to counter motor and sensory change, massage, complex massage and bandaging to control / relieve lymphoedema, (lymphedema) manual lymphatic drainage, education of patients in energy conservation strategies, education of carers in appropriate
handling skills, exercise, exercise therapy, education of patients in adaptive strategies following muscle deterioration, relaxation techniques, acupuncture, and fatigue management. Connective tissue mobilisation, gait re-education, including prosthetics and endoprosthetic replacement, functional exercises, CPM machine, hydrotherapy. Amputee rehabilitation, scar tissue management, vocational rehabilitation, pressure relief, seating, mobility (including wheelchair mobility), anxiety management, provision of and/or arranging provision of aids /equipment and adaptations, cognitive and language rehabilitation, postural management. Oromotor therapy (including a range of motor exercises, strength and endurance exercises), articulation therapy, advice on oral health care, swallowing therapy, swallowing disorders, (dysphagia), videofluoroscopy, voice therapy, voice disorders (dysphonia) cognitive and language rehabilitation, teaching compulsory substitution strategies, laryngeal voice therapy (including oesophageal and tracheo-oesophageal voice therapy, and artificial larynx training), choice of humidification/filter systems, surgical voice restoration with laryngectomy). Restoring optimum nutritional status, advice on appropriate nutritional support, monitoring of patient progress and changing needs according to weight changes, working with GPs to arrange nutritional support in the community, educating families and carers about managing enteral feeding at home, dysphagia management, nutritional management of cancer, cachexia, appetite loss. Self-management, patient education

- Rehabilitation interventions provided during, after or related to surgery, chemotherapy, radiotherapy. Rehabilitation during survivorship, palliative care, End of Life. Hormonal treatments for cancer and monoclonal antibody cancer treatments rehabilitation/exercise therapy pre, during and post stem cell transplant (late effects interventions). Patients admitted for intensive physiotherapy after previous surgery for soft tissue sarcoma and bone sarcoma. In particular patients who have had, proximal femoral replacement, distal femoral replacement, total femoral replacement, proximal tibial replacement, proximal humeral replacement, diaphyseal replacement surgery, scapulectomy and upper and lower limb amputations, quality of life, amputations, endo-prosthetic replacement, prosthetics, orthotics, pathological fracture, radiotherapy induced fibrosis.

- Nurses/nursing: lymphoedema, breathlessness, fatigue

4.2.3 Context

Interventions delivered in any context were included, in particular: hospital, hospice, community, cancer centre, cancer unit, GP practice, palliative care unit, nursing home, patients’ own homes. Studies conducted in any country were included.

4.2.4 Outcomes

- The management and/or improvement of anorexia, breathlessness, fatigue (including cancer related fatigue), weight loss, asthenia, pain, metastatic/spinal cord compression, lymphoedema (lymphedema), loss of mobility and function as a result of cancer, communication difficulties, swallowing difficulties, weakness

- Reduced hospital stays, prevention of admission/re-admission, enhanced recovery

- Independent breathing and assisted weaning from artificial ventilation

- Anxiety and other measures of mental health, quality of life, and
well-being

- Increased strength and exercise
tolerance/capacity

4.2.5 Study design
Initially all research reports were included, regardless of study design. However, at a subsequent stage of screening, studies not utilising a controlled trial or randomised controlled trial (RCT), or which were not systematic reviews including prospective intervention studies, were excluded (a systematic review was defined as one which clearly reports how studies were located and assessed for inclusion in the review). Most of the studies excluded on the grounds of methodology were non-systematic reviews, non RCT studies or overviews of clinical practice.

The exception to this was a widening of the search to include case studies and retrospective designs due to the paucity of evidence available for skin cancer and sarcoma.

4.2.6 Language
Only studies published in English were included.

4.3 Data extraction
The data were extracted from the included studies on study design, demographic and clinical information about the study participants, details of the intervention and a summary of the main findings of the study. Data extraction forms can be found in Appendix F. It should be noted that apart from describing study methodology, no quality assessment was carried out on any of the included studies.

4.4 Synthesis of findings
The studies included in the findings are randomised controlled trials and systematic reviews / meta-analyses. The findings are presented by effective interventions by individual and multiple cancer sites and by interventions where the evidence was inconclusive, again by individual and multiple cancer sites.
5.0 Results

5.1 Flow of literature through the review

The searches of the electronic databases located a total of 486 references, of which 13 had no abstracts and were excluded on these grounds.

This left a total of 473 which entered the screening process. Of these, 55 were excluded as they were pre-2008 papers (except for references to haematological and skin cancers and sarcoma).

A further 253 were excluded according to the criteria relating to the PICO framework or because they did not employ prospective intervention designs and an extra 62 references relating to haematological and skin cancers and sarcoma were excluded for the same reason.

A final 31 papers were excluded and listed separately in the complete reference list under the heading of ‘tools and assessment processes’. These were not analysed as this was not included in the remit of this review. The full list can be found in Appendix G.

This left a total of 72 references to be included in the final stages of the review of which 23 were systematic reviews or meta-analyses and 44 were randomised control trials and the remaining 5 papers were other study designs (case studies and retrospective trials), for skin cancer and sarcoma.

A total of 10 studies were included in the review for haematological cancers, 6 for sarcoma and 2 for skin cancer.

Grey literature was also sought from the Allied Health Professionals Specialist Interest Groups (see Appendix E). However, time and resource constraints did not permit analysis of these references.

The results of the screening process are summarised in Figure 1.
Figure 1. Flow of literature through the review

Total References  
N=486

Excluded references  
No Abstract  
N=13

References Screened  
N=473

Excluded references  
Pre-2008 papers  
(except for haematology, skin and sarcoma)  
N= 55

Excluded references  
PIGO/study design  
N= 253

Excluded references  
Haematology, skin and sarcoma  
N= 62

Excluded references  
Tools/assessment processes  
N=31

Included references  
N=72  
(including haem = 10, skin = 2, Sarcoma = 3)
5.2 General characteristics of the literature

The searches for the evidence revealed a substantial increase in the numbers of papers examining the effectiveness of cancer-related palliative care interventions delivered by AHPs or interventions relevant to AHPs’ practices over the recent four years compared to a similar timescale in the previous report. Some references which fulfilled the requirements of the review arrived outside the timeframe for assessment and excluded from the review. These included references for nutrition interventions for head and neck cancer.

Given the increase in the number of papers using a robust methodology over the previous four years compared to when the last review was undertaken, the analysis of the findings in this review has focused on studies based on randomised controlled trials and systematic reviews/ meta-analyses.

Whilst the review concentrated on randomised controlled trials and systematic reviews/ meta-analyses there is a wealth of evidence available in prospective and case studies. These are included in the reference list in at the end of the document in Appendix K.

In addition, although there is a lack of evidence in some areas, the reader needs to look beyond tumour site to symptoms relevant to each tumour site. Research into rehabilitation is more often focused on symptom management which is reflective of the traditional referral route to rehabilitation services i.e. a referral for fatigue management or to improve mobility or to manage lymphoedema as opposed to a referral for a specific cancer site.

5.2.1 Date of publication

Table 3 shows the date of publication of the studies that are included in the review. Studies that were published earlier than 2008 include haematological and skin cancers and sarcoma.

Table 3. Date of publication of the studies (N= 72)

<table>
<thead>
<tr>
<th>Date of publication</th>
<th>Studies (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2006</td>
<td>7</td>
</tr>
<tr>
<td>2008</td>
<td>10</td>
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<tr>
<td>2009</td>
<td>14</td>
</tr>
<tr>
<td>2010</td>
<td>17</td>
</tr>
<tr>
<td>2011</td>
<td>24</td>
</tr>
</tbody>
</table>

5.2.2 Cancer site

Studies in the review were coded according to the primary cancer site of the patients participating in the study. Table 4 shows the number of systematic reviews/ meta-analyses and randomised controlled trials broken down by tumour site.
Table 4. Primary tumour sites included in the review (systematic reviews and randomised controlled trials)

<table>
<thead>
<tr>
<th>Tumour site</th>
<th>Systematic review/meta-analysis (number)</th>
<th>Randomised controlled trials (number)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematological</td>
<td>1</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Sarcoma</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Skin</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brain/CNS</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Breast</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Colorectal</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Gynaecological</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Head and neck</td>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Lung</td>
<td>2</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Upper GI</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Urinary Tract</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>Multiple/not specified</td>
<td>7</td>
<td>9</td>
<td>16</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>23</strong></td>
<td><strong>44</strong></td>
<td><strong>67</strong></td>
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5.3 Study findings

In this section a brief narrative summary is presented of the findings included in the review. In the synthesis presented in this section findings from comparative studies (RCTs) and from systematic reviews / meta-analyses are highlighted. The studies are presented identifying effective interventions by individual and multiple cancer sites followed by interventions where the evidence was inconclusive by individual and multiple cancer sites. Brief summaries of the relevant papers are presented in each section.

The first section presents the summaries of the findings relating to haematological and skin cancer and sarcoma and the second, summaries of the findings relating to the original eight tumour sites.
The details of the studies (systematic reviews/meta-analyses and randomised controlled trials) included in the review are in Appendix H.

Effective interventions by cancer site (Haematological and skin cancer and sarcoma)

5.3.1 Haematological Cancers

The search for haematological cancer and rehabilitation interventions yielded 1 systematic review and 9 RCTs. Most of the papers studied the effect of exercise on outcomes including fatigue, mood, sleep, immune responses, physical functioning, body weight and the number of blood cell transfusions and attempts at stem cell collection. The 2 remaining papers examined the impact of aromatherapy or massage on stress levels and enteral and parenteral nutrition supplemented with glutamine on long-term survival.

Systematic reviews

- Strong et al (2006) identified 20 studies examining the effect of a range of exercise interventions, including aerobic, resistance and combination exercises, on cancer related fatigue and skeletal muscle wasting in patients with multiple myeloma (plus other cancers) and concluded that a positive effect could be demonstrated

Randomised Controlled Trials

- Coleman et al (2008) in their RCT, compared the outcome of an individualised exercise prescription programme with usual care (recommendations to exercise as regularly as possible) on patients with multiple myeloma. This intervention was carried out during stem cell mobilisation and following stem cell collection during which patients also received Epoetin alfa. An increase in lean body mass may be effective in reducing fatigue, improving mood and sleep quality.

- Chamorro-Vina et al (2010) demonstrated an improvement in immune and anthropometric measures on a small group of children undergoing a stem cell transplant following a 3 week exercise intervention programme in hospital

- Knols et al (2011) evaluated the effects of a 12 week outpatient physical exercise programme on haematopoietic stem cell transplantation recipients and found a positive outcome on physical performance measures such as physical functioning and walking activity both at post treatment and follow up

- Courneya et al (2009) carried out a similar exercise intervention on lymphoma patients and found a positive effect on physical functioning which lasted 6 months

- Bird et al (2010) in their study, randomly allocated patients who had had a stem cell transplant to either a health care professional-led rehabilitation programme or a self-managed rehabilitation programme. Findings revealed improvements were achieved in physical functioning in both groups with little difference between the outcomes of both interventions. It should be noted that the self-managed rehabilitation programme used the information from the health care professional-led programme

- Shelton et al (2009) compared the effectiveness of supervised exercise training with self-directed exercise on
fatigue and physical performance in stem cell transplant patients and showed positive benefits can be achieved regardless of how the training programme is supervised. However the patient’s preference to the style of supervision programme offered may influence intervention outcomes.

- Schloerb et al (1999) compared the effect of enteral and parenteral nutrition supplemented with glutamine to a glycine control in patients undergoing bone marrow transplantation and found a marginal reduction in the need for total parenteral nutrition and a suggestion of improved long-term survival with the intervention.

- Stringer et al (2008) in their study, tested whether massage and/or aromatherapy were effective in reducing stress levels of haematological oncology patients nursed in isolation. Reductions in serum prolactin and cortisol were demonstrated for both aromatherapy and massage, with massage having a significantly greater reduction in prolactin levels. The quality of life questionnaire revealed a significant reduction in ‘need for rest’ for patients in both intervention arms compared with the control arm and semi-structured interviews identified universal feeling of relaxation.

5.3.2 Sarcoma

The search yielded only 3 references to sarcoma, one was a case study of 4 patients with Kaposi’s sarcoma and their rehabilitation considerations (Heim et al (2000)), the second a prospective cross-sectional study examining the functional outcomes in long-term survivors of paediatric sarcomas (Gerber et al (2006)) and the third, a description highlighting the lack of evidence on the outcome of rehabilitation in patients with extremity soft tissue sarcoma (Parsons et al (2004)). Widening the search criteria to include amputations resulted in 2 systematic reviews and 1 RCT on rehabilitation post amputation.

Systematic reviews

- Mazari et al (2010) compared the effect on quality of life and clinical outcomes (10 meter walking velocity and number and duration of physiotherapy treatments) of articulated and non-articulated early walking aids in transtibial amputees. Median 10 metre walking velocity was significantly faster in patients using the nonarticulated walking aid at the first assessment visit but this effect was reduced at subsequent assessment visits. The nonarticulated walking aid group required fewer physiotherapy treatments.
treatments compared to the other group. No differences were observed between the groups on duration of physiotherapy or quality of life scores but both groups showed significant improvement in 10 metre walking velocity. The conclusion was that there was no clinical difference in clinical and quality of life outcomes between the two types of early walking aids in the rehabilitation of transtibial amputees.

5.3.3 Skin Cancer

An extensive search for skin cancer references yielded 2 papers, the first of which examined axillary web syndrome in patients with breast cancer or melanoma (Severeid et al 2007). However no abstract was available and thus it was excluded. The second, Carmeli et al (2011) interviewed 12 melanoma survivors who had had complete decongestive physical therapy for lower extremity secondary lymphoedema. They found that this intervention resulted in an improvement in quality of life and reduction in limb circumference even after 1 year post discharge.

Effective interventions by cancer site (other cancers)

5.3.4 Brain/CNS

One systematic review was identified for patients with a central nervous system neoplasm demonstrating the effect of physical rehabilitation on physical function. Although the RCT below does not mention central nervous system neoplasms specifically, it has been included as it examines the effect of exercise and/ or an educational booklet on improving the outcome of spinal operations.

Systematic reviews

- Formica et al (2010), in a meta-analysis, identified papers in which physical rehabilitation was carried out on 994 cancer patients with central nervous system involvement. The conclusion showed an improvement in the Functional Independence Measure and Barthel Index.

Randomised Controlled Trials

- McGregor et al (2011) investigated whether the outcome of two common spinal operations (discectomy and spinal nerve decompression) could be enhanced by a programme of physical exercise only, educational booklet only, rehabilitation plus booklet or usual surgeon's advice. Significant improvement from baseline was reported in all 4 groups with a reduction in the severity of back and leg pain in the rehabilitation group. There was no evidence of one intervention being better than the others but it must be noted that rehabilitation did not commence until 6 weeks post surgery, whereas early intervention is known to be more successful.

5.3.5 Breast cancer

Five systematic reviews and 11 RCTs relating to breast cancer care were identified. Most of the studies examine the effect of physical exercise on fatigue, anxiety, quality of life and physical functioning and lymphoedema reduction advice and management. The remainder of the studies explore the impact of behavioural techniques and diet and acupuncture on fatigue, anxiety and body weight.

Systematic reviews

- Duijts et al (2011) undertook a meta-analysis of 56 RCTs to evaluate the
effect of behavioural techniques and physical exercise on psychosocial functioning and quality of life in breast cancer patients and survivors. The behavioural techniques included interventions such as problem solving training, stress management, relaxation therapy, insomnia treatment and cognitive behavioural therapy and the physical exercise interventions included aerobic, resistance exercise training, weight training, home-based exercise and dance. The review found that behavioural techniques were effective in improving fatigue and reducing depression, anxiety and stress and there was a statistically significant effect of physical exercise on fatigue, depression, body image and quality of life.

McNeely et al (2010) examined the effect of exercise on arm and shoulder movement difficulties following breast cancer as part of a Cochrane review of 24 RCTs. 10 studies compared the effect of early versus delayed implementation of post-operative exercise. Early exercise following surgery was more effective than delaying exercise to recover shoulder flexion range of movement however this also resulted in significant increase in wound drainage volume and duration. 14 studies compared the effect of structured exercise versus usual care. It was found that structured exercise programmes implemented post-operatively significantly improved shoulder flexion range of movement and this effect continued six months afterwards. No risk of lymphoedema resulting from exercise was detected.

Nielsen et al (2008) reviewed the evidence-base for breast cancer related lymphoedema risk reduction advice and found this to be scant and contradictory supported by studies of poor methodological quality. However they concluded that it was reasonable to continue to advise patients about their risk of lymphoedema, to avoid trauma and weight gain, to try to prevent infection, treat skin breaks immediately and monitor their upper limb for changes. Current advice has the capacity to profoundly alter quality of life and health professionals should ensure the advice they provide reflects current understanding, aetiology and the associated risk factors. The authors also commented on the poor methodological quality of the included studies.

- Whilst this is not strictly a systematic review, Schmitz (2009) examined 4 key papers that focussed on exercise and lymphoedema in breast cancer survivors and concluded that such an intervention is safe for this group of patients

- Fors et al (2011) reviewed 18 RCTs to determine the effectiveness of psychoeducation, cognitive behaviour therapy and social support interventions used in the management of breast cancer patients. Short term improvement in fatigue with psychoeducation was found, with positive results for QoL, anxiety and depression with CBT.

**Randomised Controlled Trials**

- Winters-Stone et al (2011) compared the effect of a 12 month resistance plus impact exercise training programme with a control programme of progressive low-intensity stretching on bone, lean and fat mass of postmenopausal breast cancer survivors. The combined exercise programme was found to reduce the risk of fracture due to the preservation of lean body mass which is associated with fewer falls.

- Ah Lee et al (2010) studied the effects of a scapula –oriented shoulder exercise programme on upper limb dysfunction in breast cancer survivors. The group was compared to a general exercise (body conditioning) group as well as an historical control group which had not undertaken any exercise. The researchers found that the group that
received the scapula-oriented exercise demonstrated improvements in pain, physical and social function and Quality of Life measures whereas the general exercise group showed improvements in fatigue and range of motion. Significantly greater changes were demonstrated by the scapula-oriented exercise group in Quality of Life and strength of external rotation compared to the other two groups.

- Eyigor et al (2010) reported significant improvements in physical performance, flexibility, fatigue, depression and quality of life in breast cancer patients who participated in Pilates exercises. They also established that this form of exercise was safe to use in rehabilitation.

- Yang et al (2011) studied the effect of a home-based walking programme on perceived symptoms and mood status in women who had had surgery for breast cancer and were undergoing chemotherapy and demonstrated significantly lower symptom severity scores and mood disturbance after 12 weeks.

- Todd et al (2008) compared the incidence of lymphoedema and other treatment-related complications in post-surgical breast cancer patients who underwent different programmes of shoulder mobilisation. They found higher incidence of lymphoedema in women who underwent early mobilisation and recommend delaying full shoulder mobilisation for 1 week post surgery to reduce the incidence of lymphoedema.

- Lau et al (2009), conducted a single blinded controlled trial, which investigated the use of low-level laser therapy in the management of post-mastectomy lymphoedema. After 4 weeks of treatment a reduction in arm volume and an increase in tissue softening was detected in the laser group compared to the control group. Subjective symptoms also were improved in the intervention group

- Kozanoglu et al (2009) compared the efficacy of pneumatic compression and low-level laser therapies in the management of post-mastectomy lymphoedema. Limb circumference and pain were reduced and in both intervention groups, with the effect lasting longer in the laser group. There was little difference in the improvement of grip strength between the groups. Although both groups improved after the interventions, longer lasting effects were detected in the laser group.

- Omar et al (2011) examined the effect of low-level laser therapy in established lymphoedema in post-mastectomy patients and detected a reduction in limb circumference for both the intervention and placebo groups, with significant improvement in the intervention group. Shoulder range of movement and grip strength had also improved in the intervention group.

- Thomson et al (2010) evaluated the impact of diet counselling on body weight and other metabolic indices in overweight breast cancer survivors using either low-fat or low-carbohydrate regimes. Both groups showed weight loss and loss of lean body mass as well as improvements in total/HDL cholesterol ratio and significant reductions in HbA1c, insulin and glucose levels after six months. The low carbohydrate group also showed reduction in triglyceride levels.

- Johnston et al (2011) studied the effect of patient education integrated with acupuncture for the relief of cancer-related fatigue in breast cancer survivors and found a significant reduction in the level of fatigue.

- Devoogdt et al (2011) compared the difference between a group of post-surgical breast cancer patients who performed exercises and had manual lymphatic drainage to prevent the development of lymphoedema with a group of similar patients who performed the exercises alone. They found little
difference between the two groups with both benefiting from the interventions

5.3.6. Colorectal cancer

One systematic review and 2 RCTs were identified investigating the effect of Body Mass Index, physical exercise and nutrition with colorectal cancer recurrence, fatigue, exercise tolerance and post surgery complications.

Systematic reviews

- Vreiling et al (2010) investigated 31 studies linking Body Mass Index, physical activity and nutrition with colorectal cancer recurrence. The results were inconclusive, though a high BMI may be associated with mortality and recurrence, and advice to follow healthy eating guidelines for cancer prevention should be offered.

Randomised Controlled Trials

- Bourke et al (2011) conducted a study to investigate the impact of a combined exercise and dietary advice programme in patients who had recently had surgery and chemotherapy for colon cancer. There was a significant effect on dietary behaviour (increased consumption of dietary fibre), fatigue, aerobic exercise tolerance, functional capacity and waist-to-hip ratio.

- Burden et al (2011) examined the effect of pre-operative oral nutritional supplements in colorectal cancer patients undergoing surgery and found a benefit in reducing surgical site infections for patients who lose weight pre-operatively though there was no evidence that such supplementation reduces the number of complications.

5.3.7 Head and neck cancer

Two systematic reviews and 7 RCTs were identified. The systematic reviews reported on the effect of swallowing therapy on outcomes such as prevention of aspiration, trismus, quality of life and nutrition on oral intake. The RCTs cover a range of interventions including the use of a heat and moisture exchanger, swallowing exercises, neuromuscular electrical stimulation, preoperative enteral diet enriched with arginine, ribonucleic acid and omega-3 fatty acids, dietary counseling and physiotherapy following neck dissection on voice production, dysphagia, weight loss and physical wellbeing.

Systematic reviews

- van der Molen et al (2009) conducted a search reviewing functional outcomes and rehabilitation strategies in patients with head and neck cancer treated with chemoradiotherapy. The 15 identified articles focused on the following outcomes: swallowing, quality of life and nutrition. Only 2 papers mentioned rehabilitation options although specific information was lacking. 2 studies reported in the effectiveness of swallowing therapy in the prevention of aspiration, however, none of the papers reported any outcome relating to trismus (spasm of the muscles of mastication) or limited mouth opening. However, the studies looked at the effects of swallowing therapy and did not focus on rehabilitation options. The 7 papers reporting on chemoradiotherapy and nutrition showed that some patients experienced changes in their diet prior to treatment (e.g. soft foods, liquid intake or non-oral intake) a decrease in oral intake during treatment and an improvement in oral intake 12-18 months post-treatment.

- McCabe et al (2009) found 6 papers in their review observing the effects of swallowing manoeuvres and the chin tuck posture on patients with dysphagia post cancer treatment and identified some evidence of the positive impact of behavioural swallowing interventions for this group.
Randomised Controlled Trials

- Dassonville et al (2011) tested the effectiveness of the heat and moisture exchanger (Provox HME ®) and demonstrated an improvement in cough and bronchorrhoea and in the prosthetic (trachea-oesophageal) voice.

- van der Molen et al (2011) assessed the outcome of preventative rehabilitation on swallowing and mouth opening after concomitant chemoradiotherapy and found that pre-treatment exercises could reduce the extent and severity of these functional problems.

- Ryu et al (2009) evaluated the effect of neuromuscular electrical stimulation in patients with dysphagia following treatment for head and neck cancer and concluded that this intervention combined with traditional swallowing training improved dysphagia better than the swallowing training alone.

- Felekis et al (2010) studied the impact of a pre-operative enteral diet enriched with arginine, ribonucleic acid and omega-3 fatty acids on the outcomes of patients undergoing major surgery for head and neck cancer. They found that the rate of complications was considerably reduced in the intervention group, though no significant difference was observed with immunological markers post surgery.

- Buijs et al (2010) assessed the long-term effects of peri operative arginine in severely malnourished head and neck cancer patients and detected a significant improvement in overall survival and disease-specific survival, plus an improved recurrence free survival period in the intervention group.

- Van den Burg et al (2010) compared the effectiveness of individually tailored dietary counselling to standard nutritional counselling on weight loss in head and neck cancer patients undergoing radiotherapy and found a significant decrease in weight loss and malnutrition in patient receiving the individualised advice. Malnutrition decreased in the intervention group and increased in the control group.

- Lauchlan et al (2010) evaluated the impact of physiotherapy immediately following neck dissection and found no statistical significant difference in outcomes (shoulder function / QOL) at one year following surgery. This may be due to the attrition rate encountered. However, the patients receiving the course of physiotherapy reported a better physical wellbeing compared to controls.

5.3.8 Lung cancer

Two Cochrane reviews were identified which examined non-invasive interventions for improving quality of life, wellbeing and breathlessness in patient with lung cancer.

Systematic review

- Rueda et al (2011) in their updated Cochrane review of non-invasive interventions for improving the wellbeing and quality of life in lung cancer patients, identified 6 trials that assessed the effects of different interventions ranging from counselling, nursing intervention to manage breathlessness, reflexology, sensory self monitoring, telephone based coping skills training or education and support. Possible beneficial effects were found for nurse follow-up interventions to manage breathlessness; counselling for emotional symptoms and reflexology for short term improvement but no long-term benefit of exercise programmes and nutritional interventions on quality of life.

- Bausewein et al (2008) in another Cochrane review attempted to determine which non-drug interventions relieve breathlessness in 5 of the most...
common conditions causing breathlessness, including participants suffering with cancer. The reviews found 47 studies predominantly in COPD which revealed that breathing training, use of walking aids, neuro-electrical muscle stimulation and chest wall vibration appeared to be effective in improving shortness of breath. These results may be transferable to other conditions.

5.3.9 Upper GI Cancer

One RCT was identified which studied the effect of an immunostimulating diet in gastrointestinal cancer patients.

Randomised Controlled Trials

- Klek et al (2008) found no benefit of an immunostimulating enteral diet compared to a standard (oligopeptic) diet following surgery for pancreatic and gastric cancer

5.3.10. Urinary Tract

Both the systematic review and RCT identified focussed on dietary interventions and their impact on the progression of prostate cancer

Systematic reviews

- Ma et al (2009) undertook a review of the various dietary interventions and their impact on prostate cancer. Five studies were identified in which diet (high fruit, vegetable and fibre) was combined with exercise or stress reduction techniques. From these studies it was concluded that there was a possible beneficial effect of such an intervention on the progression of prostate cancer.

Randomised Controlled Trials

- Frattaroli et al (2008) followed up patients with early-stage prostate cancer for two years in which individuals in the intervention arm of the trial were encouraged to adopt a low-fat, plant-based diet, to exercise, practice stress management and attend group support session. This resulted in only 5% (compared with 27% of the control group) undergoing prostate cancer treatment. This indicates that changes in diet and lifestyle may delay prostate cancer treatment for at least two years.

Effective interventions (more than one cancer site)

5.3.11. Nutrition

This RCT, a phase III trial, reports on the interim results of 5 different dietary interventions for the management of cancer-related anorexia/cachexia syndrome.

Randomised Controlled Trials

- Mantovani et al (2008) wanted to establish the most effective treatment for cancer-related anorexia/cachexia syndrome and oxidative stress. After providing patients with polyphenols plus antioxidant agents they were then randomised into one of five arms: i) medroxyprogesterone acetate/megestrol acetate ii) pharmacological nutritional support containing eicoapentaenoic acid iii) L-carnitine iv) thalidomide or v) medroxyprogesterone acetate/megestrol acetate plus pharmacological nutritional support containing eicoapentaenoic acid plus L-carnitine plus thalidomide. The interim results suggest that the most effective treatment for cancer-related anorexia/cachexia syndrome and oxidative stress should be a
combination regimen of diet, supplements and pharmacological intervention.

- Mazzotta et al (2009) conducted a systematic review of 7 studies assessing the effect of anti-inflammatory polyunsaturated fatty acids in anorexia-cachexia syndrome (ACS) and found mixed results for survival outcomes and profound effects in well nourished patients who received the PUFAa. None of the trials appeared to show a significant effect on weight, lean muscle mass, survival or quality of life, though the authors report that the many variables (dosage, health status, type of PUFA etc) make comparison difficult. Overall recommendations are to adopt a multidimensional approach to the treatment of ACS.

5.3.12. Exercise

Two systematic reviews and 4 RCTs were identified which studied the effects of exercise on fatigue, physical functioning and performance, haemoglobin response and quality of sleep in patients with breast, prostate, bowel and haematological cancers.

Systematic reviews

- de Backer et al (2009) reviewed studies that used resistance and aerobic training in patients who had undergone treatment for their breast or prostate cancer and found a positive effect on cardiopulmonary and muscle function shown by significant increases in peak oxygen uptake and in the one-repetition maximum.
- Beaton et al (2009) reviewed the results of 6 studies that addressed the effect of exercise on people with metastatic disease and found a possible benefit from this intervention.

Randomised Controlled Trials

- Morey et al (2009) found that telephone counselling and mailed materials promoting exercise, dietary improvements and weight loss on cancer survivors who previously diagnosed with colorectal, breast or prostate cancer had a positive effect on physical activity, dietary behaviour and quality of life.
- Adamsen et al (2009), in a non-blinded randomised controlled trial, investigated the impact of high and low intensity physical training on fatigue in patients with cancers including breast, bowel and haematological malignancies. The programme, which included high intensity physical training, relaxation, body awareness training and massage, was found to have a positive effect on fatigue, aerobic capacity, muscle strength, physical and functional activity, emotional wellbeing but not quality of life.
- Courneya et al (2008) assessed the effect of aerobic exercise plus darbepoetin alfa versus dabepoetin alone in non-myeloid cancer patients with anaemia and found that cardiorespiratory fitness was increased, together with a marginal improvement on haemoglobin response and lower dosing of the medication in the intervention group.
- Tang et al (2010) studied the effect of a home-based walking exercise intervention on sleep quality and quality of life (mental health aspect) in cancer patients and found significant improvements in both those outcomes. The enhanced sleep quality also corresponded with reduced bodily pain.

5.3.13 Fatigue

The 1 multicentre RCT identified examined the effect of physical training and cognitive behaviour therapy on fatigue in patients.
with breast, gynaecological and haematological cancers.

Randomised Controlled Trials

- van Weert et al (2010) conducted a multicentre randomised control trial comparing the effect on cancer-related fatigue of physical training and cognitive behaviour therapy with physical training alone on patients with breast, haematological, gynaecological or other cancers. There was a significant effect on fatigue in both intervention groups compared to a control group. In addition, physical training was as effective or more so than the combined therapy, suggesting the cognitive behaviour therapy did not provide further benefit above exercise alone.

5.3.14. Multidisciplinary Rehabilitation

The search identified 1 RCT which focused on the effects of a physical and cognitive-behavioural training programme on problem solving, anxiety and depression in cancer survivors.

Randomised Controlled Trials

- Korstjens et al (2011) studied the effects on problem solving, anxiety and depression of a 12 week comprehensive physical training and cognitive-behavioural problem solving training programme compared to physical training programme alone in cancer survivors. A usual care group was also studied for comparison. Compared to the usual care group both sets of interventions demonstrated an improvement in anxiety, with cognitive behaviour therapy not appearing to add any additional benefit.

5.3.15 Vocational Rehabilitation

Systematic Reviews

This systematic review assessed the effectiveness of return-to-work interventions in cancer patients

- de Boer et al (2011) evaluated 14 RCTs and 4 controlled before and after trials, which measured the effectiveness of interventions aimed at enhancing return-to-work in cancer patients compared to alternative programmes including usual care or no intervention. There was moderate quality evidence showing that multidisciplinary interventions involving physical, psychological and vocational components led to higher return-to-work rates than care as usual.

Interventions where the evidence is inconclusive by cancer site

5.3.16. Breast cancer

One systematic review evaluated ‘return to work’ interventions, and 1 RCT assessed the effect of massage on immunity, stress hormones, anxiety and quality of life.

Systematic Reviews

- Hoving et al (2009) in their review, identified 4 papers where the outcome following breast cancer treatment was ‘return to work’. The interventions focussed on achieving physical, psychological and social recovery. Between 75% and 85% of patients in these studies were able to return to work. However, as 3 of the studies did not have a comparison group it was not clear whether the outcome would have been lower for patients who did not receive counselling or exercise. Furthermore, some old studies were included in the review (pre 1990) when work patterns were rather different than they are today.

Randomised Controlled Trials

- Billhult et al (2008) studied the effect of massage on arms/hands or legs/feet on breast cancer patients receiving...
radiotherapy. No significant change was demonstrated on cellular immunity, cortisol, oxytocin, anxiety, depression or quality of life.

5.3.17. Urinary Tract

This RCT examines the relationship between prostate cancer and isoflavine supplements

Randomised Controlled Trials

- deVere et al (2011) investigated the effect of consuming high-dose isoflavine supplements as a way of mediating levels of prostate specific antigen (PSA) in men with low volume prostate cancer. Results show PSA was not affected.

5.3.18. Acupuncture

Two systematic reviews (one Cochrane and the other, a meta-analysis) were identified which assessed the effectiveness of acupuncture on pain in cancer patients.

Systematic reviews

- Paley et al (2011) in their Cochrane review assessed pain scores in 3 randomised controlled trials, 2 of which compared acupuncture with medication and the third, the outcome of auricular acupuncture versus acupuncture at ‘placebo’ points and non-invasive vaccaria ear seeds in patients with cancer. Results were unclear, with 2 trials comparing acupuncture with medication reporting opposite (either positive or negative) effects and the third trial had a positive effect. Inadequate blinding may have affected the outcomes.

5.3.19. Nutrition

This RCT identified below examined the effect of anti-inflammatory polyunsaturated fatty acids on anorexia-cachexia syndrome and dietary advice and/or oral nutritional supplements on weight loss in patients with gastrointestinal or lung cancer.

Randomised Controlled Trials

- Baldwin et al (2011) assessed the impact of dietary advice and/or oral nutritional supplements over 6 weeks on weight loss in patients receiving palliative chemotherapy for gastrointestinal and non-small cell lung cancer or mesothelioma, with survival as the primary outcome measure. The interventions were reported to have little effect on clinical or nutritional outcomes or quality of life. Reasons for these results are suggested as being the poor health status of the patients and their position in the treatment trajectory at the time of the study (undergoing chemotherapy with the associated morbidities).

5.3.20. Psychosocial Rehabilitation

This RCT studied the outcome of psychosocial rehabilitation on health behaviour and BMI in patients with breast, prostate or colorectal cancer.
Randomised Controlled Trials

- Ibfelt et al (2011) evaluated the effect of a 6 day residential psychosocial course on BMI, self related health and health behaviour. Results suggest small but not statistically significant improvements.

5.3.21. Vocational Rehabilitation

Vocational rehabilitation can be defined as whatever helps someone with a health problem to stay at, return to and remain in work. It is an idea and an approach as much as an intervention or a service.

A search for the effectiveness of vocational rehabilitation yielded much useful research but only one systematic review was located examining the effectiveness of return-to-work interventions for patients with cancer.

Systematic review

- Tamminga et al (2011) identified 19 interventions in 23 papers and found that 7 where integrated return to work interventions into cancer care. The most frequent strategies focused on encouragement, education and advice about work; vocational or occupational training or work place accommodation. 1 used the shared care model and 5 enhanced work ability or decreased physical workload. Rate of return to work ranged from 39% - 89% with one study significantly enhancing the return to work of those who participated. The authors also found that the majority of such interventions did not address work ability or physical workload. Furthermore, it was not possible to come to conclusions on return to work interventions generally as there were large differences between studies and outcomes were of poor methodological quality.
6.0 Discussion

6.1 Overview of included studies

In this review a total of Allied Health Professional relevant interventions for rehabilitation or improvement of symptoms in patients with cancer, a total of 72 references were located. 23 were systematic reviews or meta-analyses, 44 were randomised controlled trials and the remaining 5 papers were other study designs (case studies and retrospective trials for skin cancer and sarcoma).

This included a total of 10 studies for haematological cancers, 6 for sarcoma and 2 for skin cancer.

For the 3 new tumour areas, rehabilitation interventions for haematological cancers are comparatively substantial in number compared to the other 2 cancer sites. Although there were some useful papers on sarcoma, the focus of high quality applicable research was on the rehabilitation of amputations. The picture is different for skin cancers where no applicable studies were identified even though the search went back to 1996.

It is noticeable that most of the research which is cancer site specific appears to focus on interventions for breast and head and neck cancer.

Of the types of interventions identified, the majority of the studies examined the effect of various physical exercise and dietary programmes with very few addressing occupational therapy-related interventions. However, there were more studies on the management of swallowing problems and behavioural interventions compared to the previous review.

With regard to the prevention and treatment of lymphoedema it should be noted that a more extensive review of the evidence is being conducted by the British Lymphology Society. The key papers from that exercise are presented in this review.

Most papers had abstracts available for an initial analysis compared to the last review.

Economic evaluation is clearly important but was not part of the criteria for this review.

All of the information in this review came from electronic searches although information from the grey literature was also sought. There appears to have been an increase in activity with regard to conducting and publishing trials of robust methodology in recent years compared to previous years which may have been stimulated by the 2008 review. This strengthens the evidence base for interventions which are studied by these trials.

6.2 Implications and next steps

6.2.1 Recommendations for primary researchers

Although the quality of the research has improved greatly, there are still many areas where more needs to be done. For example, occupational therapy-based interventions such as return-to-work are under researched and although AHPs play a significant role in palliative care and End of Life, little research is available about the effectiveness of interventions. The review has also demonstrated the need for further higher quality work on skin cancer and sarcoma.

In general, there is a need to generate evidence for interventions that are known to work but for which there is currently a paucity of evidence. Knowledge of the research which is available should be improved through awareness and training. In addition, more research is required on cost-benefit analysis to assess the overall effectiveness of interventions to aid commissioners.

In order to improve the quality of research which is undertaken and published, research activity should be built into the work programme of AHPs at all levels.
Appendix A.

Sources of information and search strategies

The following databases were searched for the main review:

- Allied and Complementary Medicine Database (AMED)
- Cumulative Index to Nursing and Allied Health Literature (CINAHL)
- PubMed
- CancerLit
- Cochrane Collaboration
- Zetoc (a database that provides access to the British Library Electronic Table of Contents)
- Web of Knowledge
- Oxford References Online
- Queen Mary, University of London, Library Catalogue

All the databases were searched with combinations of terms related to cancer and the particular symptoms and/or interventions of interest. Outcomes and cost effectiveness search terms were also used.

Each database categorises the information in different ways and so the search strategies were modified in different combinations to capture the required search terms.

The search terms used are itemised below:

<table>
<thead>
<tr>
<th>Cancer</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer</td>
<td>Acupuncture</td>
</tr>
<tr>
<td>Leukaemia or lymphoma or myeloma</td>
<td>Aids or equipment or adaptations</td>
</tr>
<tr>
<td>Melanoma or basal cell carcinoma or squamous cell carcinoma</td>
<td>Amputation</td>
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<tr>
<td>Sarcoma</td>
<td>Cognitive or language rehabilitation</td>
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<td></td>
<td>Dietetics</td>
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<td></td>
<td>Electrophysical or Transcutaneous Electrical Nerve Stimulation</td>
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<td>Humidification or filter system</td>
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<td></td>
<td>Massage</td>
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<td></td>
<td>Occupational Therapy</td>
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<td></td>
<td>Oral or Parenteral</td>
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<td>Palliative care</td>
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<td></td>
<td>Physiotherapy</td>
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<tr>
<td>Symptoms</td>
<td>Outcomes</td>
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<tr>
<td>Pressure relief</td>
<td>Admission</td>
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<tr>
<td>Rehabilitation/ Cognitive Rehabilitation</td>
<td>Cost-effectiveness</td>
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<tr>
<td>Neurological Rehabilitation</td>
<td>Enhanced recovery</td>
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<tr>
<td>Respiratory care</td>
<td>Hospital stay</td>
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<tr>
<td>Restoration or laryngectomy</td>
<td>Length of stay</td>
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<tr>
<td>Secretion removal</td>
<td>Readmission</td>
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<tr>
<td>Speech and Language Therapy</td>
<td>Survivorship</td>
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<tr>
<td>Stress management</td>
<td>Return-to-work</td>
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<tr>
<td>Vocational rehabilitation</td>
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</table>

In addition to the databases searched above, information was also sought from the following sources:

- Grey literature
- Information from the Allied Health Professional Specialist Interest Groups
- The Macmillan Library
- National Institute for Health and Clinical Excellence
Appendix B. Complete inclusion criteria

This Appendix presents the complete inclusion criteria used in this review

B.1 Population

Included:
Adult patients with cancer in the following tumour sites and adult patients displaying the following symptoms with or without cancer, children and teenage/young adults for sarcoma and haematological cancers only:

Tumour sites:
- The brain and the central nervous system (CNS), specifically: glioma, meningioma, pituitary tumours, spinal tumours, (tumours of the spinal cord).
- Breast cancer
- Colorectal cancer, specifically: in the colon, rectum or anus.
- Gynaecological cancer, specifically: uterine cancer (endometrial cancer), ovarian and cervical cancer (neck of the womb).
- Cancer of the head and neck, specifically: cancer of the eye, cancer of the nasal and paranasal sinus, nasopharyngeal cancer, mouth and cancer of the pharynx, larynx or laryngeal cancer, and thyroid cancer.
- Upper gastrointestinal cancer, specifically: cancer of the oesophagus, stomach, liver, pancreas, gall bladder and bile duct.
- The urinary tract, specifically: cancer of the prostate and bladder, testicular and renal cancer.
- Sarcoma, specifically: soft tissue sarcoma (liposarcoma, synovial sarcoma, leiomyosarcoma, rhabdomyosarcoma, desmoids tumours, malignant peripheral nerve sheath tumour (MPNST), angiosarcoma, kaposi’s sarcoma, myxofibrosarcoma and fibrosarcoma); primary bone cancers (chondrosarcoma, chordoma, osteosarcoma, Ewings sarcoma, fibromatosis or Desmoid Tumours and Giant cell tumour (GCT); gastrointestinal stromal tumours (GIST)
- Haematological cancers, specifically: leukaemia, myeloma and lymphoma
- Skin cancer, specifically: melanoma, basal cell carcinoma and squamous cell carcinoma

Symptoms:
- anorexia
- cachexia
- breathlessness (dyspnoea)
- fatigue (including cancer related fatigue)
- weight loss
- asthenia
- pain
- altered body image
- respiratory function
- metastatic spinal cord compression
- lymphoedema, (lymphedema)
- loss of mobility and function as a result of cancer
- communication difficulties
- cognitive problems
- swallowing difficulties (dysphagia)
- voice disorders (dysphonia)
- radiotherapy induced fibrosis
- anxiety
- amputation (relating to sarcoma)

Other physical disorder
- respiratory function
- metastatic spinal cord compression
- radiotherapy induced fibrosis
- amputation (relating to sarcoma)

Excluded:
- non-adult patients (except for sarcoma and haematology)
- adult patients with cancer displaying the following symptoms: tumours of the spinal meninges, cranial nerves, pineal cancer, cancer of the vagina and fallopian tube.
(peritoneal cancer), cancer of the ear, cancer of the penis

- chronic fatigue syndrome

B.2 Intervention

Included:

- Interventions delivered by the following professions: Physiotherapists, Occupational Therapists, Speech and Language Therapists, Dietitians, Lymphoedema Practitioners

- Interventions: positioning, movement, loss of mobility and function, functional ability (including as a result of cancer) communication difficulties mechanical therapies, electrophysical agents, TENS (transcutaneous electrical nerve stimulation), respiratory care (management of dyspnoea, removal of secretions, nebulised drugs and oxygen management, pre and post-operative breathing exercises), neurological rehabilitation techniques to counter motor and sensory change, massage, complex massage and bandaging to control / relieve lymphoedema, (lymphedema) manual lymphatic drainage, education of patients in energy conservation strategies, education of carers in appropriate handling skills, exercise, exercise therapy, education of patients in adaptive strategies following muscle deterioration, relaxation techniques, acupuncture, and fatigue management. Connective tissue mobilisation, gait re-education, including prosthetics and endoprosthetic replacement, functional exercises, CPM machine, hydrotherapy. Amputee rehabilitation, scar tissue management, vocational rehabilitation, pressure relief, seating, mobility (including wheelchair mobility), anxiety management, provision of and/or arranging provision of aids / equipment and adaptations, cognitive and language rehabilitation, postural management. Oromotor therapy (including a range of motor exercises, strength and endurance exercises), articulation therapy, advice on oral health care, swallowing therapy, swallowing disorders, (dysphagia), videofluoroscopy, voice therapy, voice disorders (dysphonia) cognitive and language rehabilitation, teaching compulsory, substitution strategies, laryngeal voice therapy (including oesophageal and tracheo-oesophageal voice therapy, and artificial larynx training), choice of humidification/filter systems, surgical voice restoration with laryngectomy. Restoring optimum nutritional status, advice on appropriate nutritional support, monitoring of patient progress and changing needs according to weight changes, working with GPs to arrange nutritional support in the community, educating families and carers about managing enteral feeding at home, dysphagia management, nutritional management of cancer, cachexia, appetite loss. Self-management, patient education

- Rehabilitation interventions provided during, after or related to surgery, chemotherapy, radiotherapy and hormonal treatments for cancer and monoclonal antibody cancer treatments rehabilitation/exercise therapy pre, during and post stem cell transplant (late effects interventions). Patients admitted for intensive physiotherapy rehabilitation after previous surgery for soft tissue sarcoma and bone sarcoma. In particular patients who have had, proximal femoral replacement, distal femoral replacement, total femoral replacement, proximal tibial replacement, proximal humeral replacement, diaphyseal replacement surgery, scapulectomy and upper and lower limb amputations, quality of life, amputations, endo-prosthetic replacement, prosthetics, orthotics, pathological fracture, radiotherapy induced fibrosis. Rehabilitation during survivorship, palliative care, End of Life stages of care

- Nurses/nursing: lymphoedema, breathlessness, fatigue

Excluded:

- Surgery, chemotherapy, radiotherapy (including therapeutic radiotherapy), drug treatment, pharmacological
interventions, alternative medicine (including CAM), complementary therapy, interventions targeted at health care professionals, interventions targeted at health care organisations.

B.3 Context

Included: Hospital, hospice, community, domiciliary, cancer centre, cancer unit, GP practice, palliative care unit, nursing home, patients’ own homes

Excluded: None

B.4 Outcomes

Included:
- The management and/or improvement of anorexia, breathlessness, fatigue (including cancer related fatigue), weight loss, asthenia, pain, metastatic/spinal cord compression, lymphoedema (lymphedema), loss of mobility and function as a result of cancer, communication difficulties, swallowing difficulties, weakness
- Reduced hospital stays, prevention of admission/re-admission, enhanced recovery
- Independent breathing and assisted weaning from artificial ventilation
- Anxiety and other measures of mental health, quality of life, and well-being
- Increased strength and exercise tolerance/capacity

Excluded: Cancer prevention, the prevalence and incidence of cancer

B.5 Study design

Initially to include all research reports regardless of study design. However, at a subsequent stage of screening, to adopt the following criteria:

Included: studies using a prospective intervention design (one-group pre-post, controlled trial, or randomised controlled trial (RCT)), or systematic reviews including prospective intervention studies (a systematic review is one which clearly reports how studies were located and assessed for inclusion in the review).

Excluded: non-systemic reviews cross sectional and retrospective studies, clinical guidance (unless accompanied by a systemic review), process evaluations.

B.6 Language

Included: English language papers only

B.7 Timeframe

Included: 1996 – 2011 (for haematological and skin cancers and sarcoma)
2008 – 2011 (for all other cancers and symptoms)
### Appendix C.

**Allied Health Professionals with a key role by cancer site and interventions**

<table>
<thead>
<tr>
<th>Main Professional involvement</th>
<th>Haematology</th>
<th>Sarcoma</th>
<th>Skin</th>
<th>Breast</th>
<th>Brain</th>
<th>Colorectal</th>
<th>Gynaecology</th>
<th>Head &amp; Neck</th>
<th>Lung</th>
<th>Upper Gl</th>
<th>Urology</th>
</tr>
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<tbody>
<tr>
<td>Altered Body Image</td>
<td>Occupational Therapist</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Amputation of limb</td>
<td>Physiotherapist/Occupational Therapist</td>
<td>✓</td>
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<td>Anorexia/cachexia</td>
<td>Dietitian</td>
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<td>Breathlessness</td>
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<td>Communication difficulties/disorders</td>
<td>Speech and Language Therapist</td>
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<th>Colorectal</th>
<th>Gynaecology</th>
<th>Head &amp; Neck</th>
<th>Lung</th>
<th>Upper GI</th>
<th>Urology</th>
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<tbody>
<tr>
<td>Continence</td>
<td>Physiotherapist/ Occupational Therapist</td>
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<td>✔️</td>
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<td>Dysphagia</td>
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<tr>
<td>Exercise and physical well being</td>
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<td>Fatigue and Energy Management</td>
<td>Physiotherapist/ Occupational Therapist/ Dietitian</td>
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<tr>
<td>Lymphoedema</td>
<td>Lymphoedema Practitioners</td>
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<td>Main Professional involvement</td>
<td>Haematology</td>
<td>Sarcoma</td>
<td>Skin</td>
<td>Breast</td>
<td>Brain</td>
<td>Colorectal</td>
<td>Gynaecology</td>
<td>Head &amp; Neck</td>
<td>Lung</td>
<td>Upper GI</td>
<td>Urology</td>
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<tr>
<td>Metastatic Spinal Cord Compression</td>
<td>Physiotherapist/Occupational Therapist</td>
<td>✔️</td>
<td></td>
<td>✔️</td>
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<td>✔️</td>
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</tr>
<tr>
<td>Mobility and Loss of Function</td>
<td>Physiotherapist/Occupational Therapist</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Nutritional status/dietary advice/malnourishment</td>
<td>Dietitian</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Pain</td>
<td>Physiotherapist/Occupational Therapist</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Respiratory function</td>
<td>Physiotherapist</td>
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</table>


## Appendix D
### Descriptor of Professions

<table>
<thead>
<tr>
<th>AHP</th>
<th>Description</th>
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</table>
| Dietitians              | A dietitian uses the science of nutrition to devise eating plans for patients to treat medical conditions. They also work to promote good health by helping to facilitate a positive change in food choice.  
Their role is important, as malnutrition is the single most common secondary diagnosis in patients with cancer. Dietitians intervene to restore optimum nutritional status of the patient, improve through nutrition the effectiveness of therapy, minimise side effects, maintain quality of life, and minimise discomfort through appropriate nutritional support |
| Occupational Therapists | An occupational therapist uses specific activities to limit the effects of disability and promote independence in all aspects of daily life.  
They assist cancer patient and their carers to maintain their maximum level of function and independence.                                                                 |
| Physiotherapists        | Physiotherapists deal with human function and movement and help people to achieve their full physical potential. They use physical approaches to promote, maintain and restore wellbeing.  
Physiotherapists assist cancer patients by helping minimise some of the effects which the disease or its treatment has on them, helping them to achieve their maximum potential of functional ability and independence or gain relief from distressing symptoms. |
| Speech and Language Therapists | A speech and language therapist assesses, treats and helps to prevent speech, language and swallowing difficulties.  
Speech and swallowing problems are common as a result of some cancers. This can involve speech and language therapists in teaching alternative or augmentative methods of communication. |
| Lymphoedema Practitioners | A health professional (usually a physiotherapist, nurse or occupational therapist) who has specialist post-graduate training in the prevention and management of lymphoedema.                                               |

*Based on Health Professions Council list of regulated professions (2011)*
Appendix E.

Grey Literature


28. Patterson J, Drinnan M, The impact of swallowing function pre and post head and neck cancer treatment, *5th International Health Related Quality of Life – Head & Neck Cancer Workshop (02/11/06)*
29. Patterson J, Head and neck cancer and dysphagia; caring for the carers
33. Rankin J, Breast cancer rehab scheme across 2 trusts in Northern Ireland, *(Unpublished feasibility study)*
43. Warnock et al, Audit and review of the care of patients admitted to a cancer centre with Malignant Spinal cord compression
45. Wilson JA, Carding PN, Patterson J, Dysphagia after non-surgical head and neck cancer treatment; the patients' perspective, Journal Otolaryngology - in press
### Appendix F.

#### Data extraction forms

<table>
<thead>
<tr>
<th>Table C.1 Data extraction form for primary studies for the review</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Are two groups compared (receiving different interventions, or</strong></td>
</tr>
<tr>
<td><strong>intervention and no intervention)? Y/N</strong></td>
</tr>
<tr>
<td><strong>Is allocation to the groups random? Y/N</strong></td>
</tr>
<tr>
<td>Only answer if previous answer is Y</td>
</tr>
<tr>
<td><strong>Primary cancer site</strong></td>
</tr>
<tr>
<td><strong>Other clinical information about the participants</strong></td>
</tr>
<tr>
<td>e.g. stage of cancer, what treatments already undergone</td>
</tr>
<tr>
<td><strong>Participants: total number</strong></td>
</tr>
<tr>
<td><strong>Participants: age</strong></td>
</tr>
<tr>
<td><strong>Participants: sex</strong></td>
</tr>
<tr>
<td><strong>Details of intervention</strong></td>
</tr>
<tr>
<td><strong>Aims of intervention, in authors’ own words if possible</strong></td>
</tr>
<tr>
<td><strong>Length of intervention</strong></td>
</tr>
<tr>
<td><strong>How much time did providers spend delivering the intervention?</strong></td>
</tr>
<tr>
<td><strong>Outcome measures List all reported on Length of follow-up</strong></td>
</tr>
<tr>
<td><strong>How long after the intervention was the last outcome measure made?</strong></td>
</tr>
<tr>
<td><strong>Summary of findings, main findings as identified by authors</strong></td>
</tr>
<tr>
<td><strong>Was the intervention effective? Y/N/mixed/unclear</strong></td>
</tr>
<tr>
<td><strong>Did the intervention produce a significant improvement? Break down by outcome if necessary. Use ’unclear’ only if relevant data is not reported</strong></td>
</tr>
<tr>
<td><strong>Cost or cost-benefit data reported?</strong></td>
</tr>
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</table>
Table C.2 Data extraction form for systematic reviews for the review

<table>
<thead>
<tr>
<th>What study designs are included?</th>
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<tr>
<td>Primary cancer site</td>
</tr>
<tr>
<td>How many studies were included?</td>
</tr>
<tr>
<td>Details of intervention</td>
</tr>
<tr>
<td>Outcome measures</td>
</tr>
<tr>
<td>Summary of findings, main findings as identified by authors</td>
</tr>
<tr>
<td>Was the intervention effective? Y/N/mixed/unclear</td>
</tr>
<tr>
<td>Did the intervention produce a significant improvement?</td>
</tr>
<tr>
<td>Breakdown by outcome, if necessary</td>
</tr>
<tr>
<td>Cost or cost-benefit data reported?</td>
</tr>
</tbody>
</table>
Appendix G.

References: Tools and assessment processes

Appendix H. Details of the studies included in the review

H 1. Effective interventions by cancer site

H 1.1 Haematological cancers

Table H 1.1.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong et al 2006</td>
<td>RCT Prospective Pretest – posttest Experimental group Qualitative study</td>
<td>20</td>
<td>Aerobic exercise (home-based, treadmill walking or cycling) Resistance exercise Combination of aerobic and resistance exercises</td>
<td>Fatigue (profile of mood states, Piper fatigue scale, visual analogue scale for fatigue) BMI Various physiological measures including (VO₂ max, Canadian curl up test, grip strength, maximum heart rate, functional mobility)</td>
<td>Positive effect on fatigue and muscle wasting demonstrated</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
<td>Follow up period</td>
</tr>
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</tr>
<tr>
<td>Coleman et al 2003</td>
<td>24</td>
<td>55</td>
<td>M/F</td>
<td>Aerobic exercise (walking, running or cycling) and strength resistance training using exercise stretch bands</td>
<td>6 months (on average)</td>
<td>6 months</td>
</tr>
<tr>
<td>Coleman et al 2008</td>
<td>120</td>
<td>55</td>
<td>M/F</td>
<td>Individualised exercise prescription (stretching, aerobics and strength resistance training)</td>
<td>During chemotherapy and stem cell transplantation (15 weeks)</td>
<td>After stem cell transplantation</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
<td>Follow up period</td>
</tr>
<tr>
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</tr>
<tr>
<td>Chamoro-Vina et al 2010</td>
<td>20</td>
<td>7.5</td>
<td>M/F</td>
<td>exercise</td>
<td>3 weeks</td>
<td>30 days after stem cell transplantation</td>
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<tr>
<td>Knols et al 2011</td>
<td>131</td>
<td>NK</td>
<td>M/F</td>
<td>Aerobic and strength exercises</td>
<td>12 weeks</td>
<td>3 months</td>
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<tr>
<td>Courneya et al 2009</td>
<td>122</td>
<td>NK</td>
<td>M/F</td>
<td>Supervised aerobic exercise training</td>
<td>12 weeks</td>
<td>6 months</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
<td>Follow up period</td>
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</tr>
<tr>
<td>Bird et al 2010</td>
<td>58</td>
<td>55</td>
<td>M/F</td>
<td>Healthcare professional-led exercise programme (exercise, relaxation and information) Control group (information leaflet and home-based exercise programme)</td>
<td>10 weeks</td>
<td>6 months</td>
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<tr>
<td>Shelton et al 2009</td>
<td>61</td>
<td>43</td>
<td>M/F</td>
<td>Supervised training programme consisting of aerobic and resistance exercises Or self-directed exercises</td>
<td>Three times a week</td>
<td>4 weeks</td>
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<tr>
<td>Schloerb et al 1999</td>
<td>66</td>
<td>NK</td>
<td>M/F</td>
<td>Oral glutamine (parenterally when necessary) 10g three times daily</td>
<td>Variable depending on patient</td>
<td>Not stated</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
<td>Follow up period</td>
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</tr>
<tr>
<td>Stringer et al 2008</td>
<td>39</td>
<td>51</td>
<td>M/F</td>
<td>Massage or Aromatherapy on one arm and the control (rest arm)</td>
<td>Single 20 minute massage session</td>
<td>Immediately after completion</td>
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### Table H1.2.1. Systematic Reviews

<table>
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<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
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<tbody>
<tr>
<td>Bragaru et al 2011</td>
<td>Mixture</td>
<td>47</td>
<td>Participation in sports or regular physical activity in individuals with limb amputation</td>
<td>Participation in sports Use of sport prosthetic devices</td>
<td>Sports were generally associated with a beneficial effect on the cardiopulmonary system, psychological wellbeing, social integration and physical functioning. Younger individuals with unilateral transtibial amputations participating in sport achieve better athletic performance compared with older individuals with bilateral transfemoral amputations.</td>
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<tr>
<td>Prinsen et al 2011</td>
<td>Mixture</td>
<td>13</td>
<td>Assessment of adaptation strategies in terms of the lower extremities of patients with transtibial or transfemoral amputation during level walking</td>
<td>Joint power or work in amputated and intact legs</td>
<td>Adaptations seen in both amputated and intact legs. Similar adaptation strategies are used at the hip to compensate for loss of planter flexion power and facilitate forward progression in both transtibial and transfemoral amputees Adaptations differed between the two types of amputations</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
<td>Follow up period</td>
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<tr>
<td>Mazari et al 2010</td>
<td>272</td>
<td>56</td>
<td>M/F</td>
<td>Articulated amputee mobility aid (AMA) or non-articulated pneumatic post-amputation mobility aid (PPAMA)</td>
<td>5 standardized assessment visits</td>
<td>5 standardized assessment visits</td>
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</table>
**H 2. Effective interventions by cancer site (other cancers)**

**H 2.1 Central Nervous System (brain and spinal cord)**

### Table H2.1.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formica et al 2011</td>
<td>Retrospective trials</td>
<td>Meta-analysis (994 patients in total)</td>
<td>Inpatient physical rehabilitation</td>
<td>Functional Independence Measure (FIM) Barthel Index (BI)</td>
<td>Improvement in both Functional Independence Measure and Barthel Index</td>
<td>Yes</td>
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</table>

### Table H 2.1.2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
</table>
| McGregor et al 2011 | 338                            | 55               | M/F | 6 week programme of post-operative rehabilitation  
An educational booklet | Exercise intervention – 12 x 1 hour classes run twice weekly  
Educational booklet given on discharge | 1 year           | Oswestry Disability Index  
Average back and leg pain (visual analog scales)  
Fear Avoidance Beliefs Questionnaire  
Hospital anxiety and depression score  
Quality of life | Significant improvement from baseline in all groups and on secondary outcomes  
No significant effect of either treatment intervention  
Only significant reduction in severity of back and leg pain in rehabilitation group | Yes – except for reduction in pain in rehabilitation group |
### Table H 2.2.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duijts et al 2011</td>
<td>RCT</td>
<td>56</td>
<td>Behavioural techniques: Problem solving training, Stress management, Telephone counselling, Yoga, Therapist-led support, Relaxation and imagery, Body-mind, social support, self-help, Psychology-based education, Cognitive behavioural therapy, Group therapy, Psycho-education and exercise, Psycho-social therapy, Comprehensive coping strategy, Comprehensive health enhancement, Cognitive G therapy, Autogenic training, Nurse self-efficacy, Health education, emotional expression, Insomnia treatment, Web-based support, Physical exercise: Self-management exercise protocol, Lifestyle physical activity, Supervised exercise programme, Comprehensive G rehabilitation, Aerobic resistance, exercise training</td>
<td>Quality of Life, Fatigue, Depression, Anxiety, Body-image, ABS (Affects balance scale), BAI (Beck anxiety inventory), BDI (Beck depression inventory), CARES (Cancer rehabilitation evaluation system), CES-D (Centre for epidemiologic studies-depression scale), CSEI (Coopersmith self-esteem inventory), DMI (Distressed mood index), EORTC QLQ-C30 (European organization for research and treatment of cancer quality of life questionnaire), FACT-B (The functional assessment of cancer therapy – breast cancer), FACT-F (The functional assessment of cancer therapy – fatigue), FACT-G (The functional assessment of cancer therapy – general), FLIC (Functional living index for cancer), GHQ – General health questionnaire, HADS (Hospital anxiety and depression scale), HDRS (Hamilton depression rating scale), HRS-A (Hamilton rating scale for anxiety), ICS (Index of clinical stress), IES (Impact of events scale), IFS-C (Inventory of functional status – cancer), ISSL (Inventory of stress symptoms lipp for)</td>
<td>Behavioural techniques were effective in improving fatigue and reducing depression, anxiety and stress. Physical exercise was effective on fatigue, depression, body image and Quality of Life</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Study designs included</td>
<td>No. of included studies</td>
<td>Included interventions</td>
<td>Outcome measures</td>
<td>Outcomes</td>
<td>Effective?</td>
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</tr>
<tr>
<td>Duijts et al 2011 (cont)</td>
<td></td>
<td></td>
<td>Walking exercise, Weight training, Home-based exercise, Dance/movement, Self-directed, supervised exercise</td>
<td>adults) MAC (Mental adjustment to cancer), MFI (Multidimensional fatigue inventory), MHI-5 (Mental health inventory), Mini-Mac (Mini-mental adjustment to cancer scale), PCL-C (posttraumatic stress disorder checklist), POMS (Profile of mood states), POMS-LASA (Profile of mood states – linear analog self assessment), PSOM (Positive states of mind), PSS (Perceived stress scale), QoL-BC (Quality of life questionnaire – breast cancer), RSE (Rosenberg self-esteem scale), SDS (Symptom distress scale), SES (Symptom experience scale), SF-36 (Medical outcomes study–short form), SAI (Spielberger state anxiety inventory), STAI (Spielberger’s state trait anxiety inventory), VAS (Visual analog scale), VAS-F (Visual analog scale-fatigue), BES (Body esteem scale), FACT-An (The functional assessment of cancer therapy – anemia scale), FS-Fatigue scale, LAS-F (linear analog scale for fatigue), PFS (The revised piper fatigue scale), PSPP (The physical self-perception profile), SCFS (Schwartz cancer fatigue scale), SPAS-7 (Social physique anxiety scale)</td>
<td>Upper limb exercise early post surgery improves recovery of shoulder movement</td>
<td>Yes</td>
</tr>
<tr>
<td>McNeely et al 2010</td>
<td>RCT</td>
<td>24</td>
<td>Upper – limb exercise (e.g. shoulder range of motion and stretching) between day1 to day 3 following surgery, during and after adjuvant cancer treatment</td>
<td>Shoulder range of motion, Wound drainage volume and duration, Development of lymphoedema</td>
<td>Upper limb exercise early post surgery improves recovery of shoulder movement</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Study designs included</td>
<td>No. of included studies</td>
<td>Included interventions</td>
<td>Outcome measures</td>
<td>Outcomes</td>
<td>Effective?</td>
</tr>
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<tr>
<td>Schmitz 2009</td>
<td>RCT</td>
<td>4</td>
<td>Upper body resistance training and aerobic exercise</td>
<td>Limb circumference Quality of life Bioelectrical impedance spectroscopy</td>
<td>Safety of upper body exercise in breast cancer survivors with and at risk for lymphoedema</td>
<td>Yes</td>
</tr>
<tr>
<td>Fors et al 2011</td>
<td>RCT</td>
<td>18</td>
<td>Psychoeducation Cognitive behaviour therapy Social support</td>
<td>Quality of life Fatigue Mood Health behaviour Social function</td>
<td>Possible positive effect of cognitive behaviour therapy on quality of life</td>
<td>Yes</td>
</tr>
<tr>
<td>Nielsen et al 2008</td>
<td>All types of studies</td>
<td>30</td>
<td>Exercise Compression wearing Venepuncture</td>
<td>Infections Obesity Physical activity</td>
<td>Advise patients about their risk of lymphoedema, avoid trauma and weight gain, try to prevent infection, treat skin breaks immediately and monitor their upper limb for changes</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
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<td>Sex</td>
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</table>
| Winters-Stone et al 2011 | 106                            | ≥ 50             | F   | Progressive moderate intensity resistance and impact training                         | Exercise sessions three times a week over 12 months | Immediately after completion | Bone mineral density of hip and spine  
Whole body bone-free lean and fat mass | Reduced risk factors for fracture  
Preserved bone mineral density | Yes |
| Ah Lee et al 2010    | 32                             | 47               | F   | Scapulothoracic exercises                                                             | One session a week for 8 weeks | Immediately after completion | Pain  
Physical function (strength of external rotation)  
Social function  
Global quality of life | Scapula-oriented exercise has beneficial effects on pain, quality of life and aspects of strength | Yes |
| Todd et al 2008      | 116                            | 57               | F   | Arm exercises and shoulder movement restricted to below shoulder level for first 7 days after surgery. Controls commenced exercises that did not limit the range of shoulder movement within 48 hours after surgery | 1 year                      | Incidence of lymphoedema  
Volume differences between the two limbs  
Wound-drainage volumes  
Range of shoulder movement  
Grip strength  
Shoulder Disability Questionnaire  
Functional assessment of cancer therapy – Breast | Significantly more women with lymphoedema in the early full shoulder mobilization group compared with the delayed full shoulder mobilisation group | Yes – although delay full shoulder mobilisation exercises for 1 week post surgery |
<table>
<thead>
<tr>
<th>Author(s)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Eyigor et al 2010</td>
<td>52</td>
<td></td>
<td>F</td>
<td>Pilates and home based exercises. Control group – home based exercises only</td>
<td>Three times a week for 8 weeks</td>
<td>Immediately after completion</td>
<td>6 minute walk test (6MWT) Modified sit and reach test Brief Fatigue Inventory Beck Depression Index (BDI) European Organisation for Research and Treatment of Cancer Quality of Life C30 (EORTC QLQ-C30 and EORTC QLQ-BR23)</td>
<td>Pilates group showed a significant improvement in 6MWT, BDI, EORTC QLQ-C30 functional and EORTC QLQ BR23 functional scores</td>
<td>Yes</td>
</tr>
<tr>
<td>Yang et al 2011</td>
<td>40</td>
<td>51</td>
<td>F</td>
<td>Moderate- intensity, home-based walking programme during chemotherapy treatment</td>
<td>12 weeks</td>
<td>12 weeks</td>
<td>Symptoms Mood status Physical activity</td>
<td>Significantly lower symptom severity scores and mood disturbance</td>
<td>Yes</td>
</tr>
<tr>
<td>Lau et al 2009</td>
<td>21</td>
<td>51</td>
<td>F</td>
<td>A cycle of low-level laser therapy three times a week</td>
<td>4 weeks</td>
<td>4 weeks</td>
<td>Arm volume Tissue resistance Disabilities, Arm, Shoulder and Hand questionnaire (DASH)</td>
<td>Reduction in arm volume and increase in tissue softening plus improvement in DASH score in the intervention group</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
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<tr>
<td>Kozanglu et al 2009</td>
<td>47</td>
<td>48</td>
<td>F</td>
<td>Group 1 – 2 hours of compression therapy Group 2 – 20 minutes of laser therapy Both groups were advised to perform daily limb exercises</td>
<td>4 weeks</td>
<td>12 months</td>
<td>Limb circumference Pain with visual analogue scale Grip strength</td>
<td>Change in limb circumference decreased significantly in Group 2 and lasted until month 12 Pain reduced significantly at post-treatment evaluation in group 1 but lasted longer for group 2 Grip strength improved in both groups</td>
<td>Yes</td>
</tr>
<tr>
<td>Devoogdt et al 2011</td>
<td>160</td>
<td>79</td>
<td>F</td>
<td>Guidelines on the prevention of lymphoedema, exercise therapy and standardized manual lymphatic drainage</td>
<td>Soon after surgery Manual lymphatic drainage started 5 weeks after surgery and applied over 20 weeks</td>
<td>12 months</td>
<td>Cumulative incidence of arm lymphoedema Time to develop lymphoedema Quality of Life (SF - 36)</td>
<td>No difference between experimental and control group in reducing the incidence of lymphoedema</td>
<td>Yes</td>
</tr>
<tr>
<td>Omar et al 2011</td>
<td>50</td>
<td>54</td>
<td>F</td>
<td>Laser therapy 3 times a week</td>
<td>12 weeks</td>
<td>16 weeks</td>
<td>Limb circumference Shoulder mobility Grip strength</td>
<td>Reduction in limb volume in intervention and placebo group but more significantly pronounced in laser group at 12 weeks Shoulder mobility and grip improved significantly in laser group at 12 weeks</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
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<tr>
<td>Thomson et al 2010</td>
<td>40</td>
<td>56</td>
<td>F</td>
<td>Either low-fat or low-carbohydrate diet</td>
<td>45 minute counseling session at the beginning, then weekly meetings between patient and dietitian for 6 weeks Diet maintained for 6 months</td>
<td>24 weeks</td>
<td>Weight, Glucose, Insulin, HbA1c, Total cholesterol, High-density lipoprotein (HDL), Low-density lipoprotein (LDL), High sensitivity C-reactive protein</td>
<td>In both diet groups weight loss and loss of lean mass, improvements in total/HDL ratio, significant reductions in HbA1c, insulin and glucose. In low-carbohydrate group significant reduction in triglyceride levels</td>
<td>Yes</td>
</tr>
<tr>
<td>Johnston et al 2011</td>
<td>13</td>
<td>54</td>
<td>F</td>
<td>Education and acupuncture</td>
<td>Self-care training (self-massage, exercise, nutrition and dietary advice and relaxation) on a weekly basis for first 4 weeks Acupuncture weekly for 8 weeks</td>
<td>Immediately after completion</td>
<td>Brief Fatigue Inventory FACT-COG (The functional assessment of cancer therapy – cognition)</td>
<td>Significant decline in fatigue but no effect on reducing cognitive complaints</td>
<td>Yes for reducing fatigue-</td>
</tr>
</tbody>
</table>
### H 2.3 Colorectal cancer

#### Table H 2.3.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vrieling et al 2010</td>
<td>Series Case Controlled Cohort</td>
<td>31</td>
<td>Physical activity Diet (high intake of fruit, vegetable poultry and fish) High energy or protein intake</td>
<td>Body Mass Index Levels of physical activity Plasma levels of antioxidants</td>
<td>High BMI may be associated with mortality and recurrence, and advice to follow healthy eating guidelines for cancer prevention should be offered</td>
<td>Yes, significant associations shown for single foods, nutrients and dietary patterns in single studies</td>
</tr>
</tbody>
</table>

#### Table H 2.3.2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
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<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
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</thead>
<tbody>
<tr>
<td>Bourke et al 2011</td>
<td>18</td>
<td>69</td>
<td>M/F</td>
<td>Combined programme of exercise and dietary advice</td>
<td>12 weeks</td>
<td>Immediately after completion</td>
<td>FACT-C FACT-F MVT (maximum voluntary torque) Quality of Life RPE (ratings of perceived exertion) sEMG (surface electromyography) Delta sEMG (change in rectified surface electromyography)</td>
<td>Improvements in exercise behavior, aerobic exercise tolerance, chair sit-to-stand performance and waist-to-hip ratio Positive change in dietary fibre intake No change in quality of life</td>
<td>Yes</td>
</tr>
<tr>
<td>Burden et al 2011</td>
<td>125</td>
<td></td>
<td></td>
<td>Oral supplement and dietary advice preoperatively versus dietary advice alone</td>
<td></td>
<td></td>
<td>Post surgical complications Infections (surgical site) and chest infections</td>
<td>Significant reduction in surgical site infections for weight-losing patients</td>
<td>Yes</td>
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</table>
## H 2.4 Head and neck cancer

### Table H 2.4.1. Systematic Reviews

<table>
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<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
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<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van der Molen 2009</td>
<td>Varied including prospective (randomised, matched control group and pre and post measurement)</td>
<td>15</td>
<td>Treatment Rehabilitation</td>
<td>Swallowing/dysphagia Quality of life Trismus/range of jaw Nutrition Diet Body weight Aspiration</td>
<td>Swallowing therapy is effective</td>
<td>Yes swallowing therapy effective in stopping aspiration Other interventions showed no effect</td>
</tr>
<tr>
<td>McCabe et al 2009</td>
<td>Case series reports Single subject case study</td>
<td>6</td>
<td>Super-supraglottic swallow manoeuvre Effortful swallow Mendelsohn maneouvre Chin-tuck posture</td>
<td>Oral and pharyngeal residue Aspiration Temporal, distance and pressure changes in measures of biomechanical events</td>
<td></td>
<td>Yes but limited evidence</td>
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### Table H 2.4.2. Randomised Controlled Trials

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<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
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<tbody>
<tr>
<td>Dassonville et al 2011</td>
<td>60</td>
<td>65</td>
<td>M/F</td>
<td>Use of Provox HME® (heat and moisture exchanger)</td>
<td>Not stated</td>
<td>4 months</td>
<td>Bronchopulmonary function (dyspnoea, on exertion or rest, cough and forced expectoration and frequency of pulmonary infection) Prosthetic voice Quality of life</td>
<td>Improvement in cough, bronchorrhoea and prosthetic voice</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
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<tr>
<td>Van der Molen 2011</td>
<td>55</td>
<td>57</td>
<td>M/F</td>
<td>Passive and slow opening of the mouth using the Thera-Bite device and swallowing with the tongue elevated to the palate while maintaining mouth opening at 50% of its maximum (training the suprahyoid muscles) (Experimental group) Range-of-motion exercises and three strengthening exercises (effortful swallow, Masako manoeuvre and supraglottic swallow)</td>
<td>2 weeks prior to onset and during concomitant chemo-radiotherapy treatment Exercises practiced three times daily</td>
<td>10 weeks after completing concomitant chemo-radiotherapy treatment</td>
<td>Laryngeal penetration Aspiration scale Presence of contrast residue Maximum interincisor mouth opening Weight changes, Body mass index Functional oral intake scale Quality of Life Visual analog scale for pain assessment</td>
<td>Significant decrease in mouth opening Positive effect of training on presence of post-swallow residue</td>
<td>Yes</td>
</tr>
<tr>
<td>Ryu et al 2009</td>
<td>26</td>
<td>61</td>
<td>M/F</td>
<td>Neuromuscular electrical stimulation and traditional swallowing exercises Control group – sham stimulation and traditional swallowing exercises</td>
<td>30 mins of stimulation and 30 mins of traditional swallowing training for 5 days a week for 2 weeks</td>
<td>2 weeks</td>
<td>Clinical dysphagia scale (CDS) Functional dysphagia scale (FDS) American speech-language-hearing association national outcome measurement system (ASHA NOMS) M.D. Anderson dysphagia inventory (MADI)</td>
<td>Changes in FDS score in both groups but the change was significantly greater in the intervention group Some change (not significant) in CDS, ASHA NOMS and MADI scores</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
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<tr>
<td>Felekis et al 2010</td>
<td>40</td>
<td>62</td>
<td>M/F</td>
<td>Enteral feed containing arginine, ribonucleic acid, omega-3 fatty acids</td>
<td>8 days post surgery</td>
<td>8 days</td>
<td>Albumin, Prealbumin, Fibrinogen, C-reactive protein, Tumour Necrosis Factor-α</td>
<td>No significant changes in the measurements but significant reduction in major complications (infections and wound complications)</td>
<td>Yes</td>
</tr>
<tr>
<td>Buijs et al 2010</td>
<td>32</td>
<td>60</td>
<td>M/F</td>
<td>Arginine-supplemented perioperative enteral nutrition</td>
<td>First postoperative day until an X-ray conducted to assess swallowing ability performed 10 days after surgery showed no leakage from anastomoses</td>
<td>≥ 10 years</td>
<td>Long-term survival (≥10 years), Long-term appearance of loco regional recurrence, distant metastases, second primary tumours</td>
<td>Significantly better overall and disease specific survival plus better loco regional recurrence-free survival in intervention group</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
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<tr>
<td>Van den Burg 2010</td>
<td>38</td>
<td>62</td>
<td>M/F</td>
<td>Individualised dietary counseling Control – standard nutritional care</td>
<td>During and after radiotherapy</td>
<td>3-4 months after treatment</td>
<td>Weight loss BMI Malnutrition</td>
<td>Significant decrease in weight loss 2 months after treatment in intervention group compared to standard nutritional care Malnutrition decreased in intervention group while this increased in standard care group</td>
<td>Yes</td>
</tr>
<tr>
<td>Lauchlan et al 2010</td>
<td>32</td>
<td>Not stated</td>
<td>Not stated</td>
<td>Physiotherapy Patient advice and instruction leaflet</td>
<td>3 months post surgery</td>
<td>1 year</td>
<td>Shoulder function (American Shoulder and Elbow Surgeons Shoulder Assessment Constant Shoulder Assessment) Medical Outcomes Score Short Form – 12 Questionnaire</td>
<td>Patients receiving physiotherapy rated their physical wellbeing higher than controls No difference in outcome measures compared to controls</td>
<td>Yes – increase in physical well being</td>
</tr>
</tbody>
</table>
## H 2.5 Lung cancer

### Table H2.5.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rueda et al 2011</td>
<td>RCT or quasi RCT</td>
<td>6</td>
<td>Nursing intervention to manage breathlessness, Counseling, Sensory self monitoring coaching, Telephone-based coping skills training or education/support, Exercise programme, Nutritional intervention, Reflexology</td>
<td>Pain outcome measures, Depression, Quality of life, Self efficacy, Quadriceps strength, Energy intake</td>
<td>Possibly positive effects except for exercise and nutritional interventions</td>
<td>Yes</td>
</tr>
<tr>
<td>Bausewein et al 2008</td>
<td>RCT and controlled trials</td>
<td>47</td>
<td>Walking aids, Distractive auditory stimuli (music), Chest wall vibration, Acupuncture/acupressure, Relaxation, Neuro-electrical muscle stimulation, Fan, Counseling and support. Breathing training, Counseling and support and breathing – relaxation training, Case management, Psychotherapy</td>
<td>FEV1 = Forced expiratory volume in 1 sec, VAS = Visual analogue scale, NRS = Numerical Rating Scale, UCDS-SOB = University of California St. Diego Shortness of Breath Questionnaire, SGRQ = St. George’s Respiratory Questionnaire, CRQ = Chronic Respiratory Questionnaire, HADS = Hospital Anxiety and Depression Scale, ALSFRS-RS = ALS Functional Rating Scale - Respiratory Subscale, BESC = Bronchitis Emphysema Symptom Checklist, PFSDQ-M = Pulmonary Functional Status and Dyspnoea Questionnaire - modified scale, MWT = Minutes Walking Test, DAS = Distractive auditory stimuli</td>
<td>Benefits of breathing training, walking aids, neuro-electrical muscle stimulation and chest wall vibration principally for COPD</td>
<td>Yes</td>
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</tbody>
</table>
## H 2.6 Upper GI

### Table H2.6.1. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
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<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klek et al 2008</td>
<td>183</td>
<td>61</td>
<td>M/F</td>
<td>Post-operative enteral nutrition with immunostimulating diet</td>
<td>NK</td>
<td>Immediately after completion</td>
<td>Number and type of complications Length of hospital stay Mortality Liver and kidney function Treatment tolerance</td>
<td>Post-operative nutritional intervention generates comparable results regardless of the route of feeding and the upmost importance is on pre-operative feeding per se. No differences in the outcome measures between the intervention and control group (oligopeptic diet)</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Table H2.7.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ma et al 2009</td>
<td>Cohort</td>
<td>5</td>
<td>Diet (high fruit, vegetable and fibre) and exercise or stress reduction techniques</td>
<td>Serum prostate specific antigen Serum tumour inhibitory</td>
<td>Possible beneficial effect of such an intervention on the progression of prostate cancer.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### Table H2.7.2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>deVere et al 2010</td>
<td>53</td>
<td>M</td>
<td>Genisten, diadzein and other isoflavines (daily)</td>
<td>6 months</td>
<td>12 months</td>
<td>Serum genisten, daidzein and equol Serum prostate-specific antigen (PSA)</td>
<td>High serum levels of genisten, daidzein and equol but no change in PSA</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Frattaroli et al 2008</td>
<td>93</td>
<td>NK M</td>
<td>Low-fat, plant based diet Exercise Practice stress management</td>
<td>2 years</td>
<td>2 years</td>
<td>Prostate cancer treatment (radical prostatectomy, radiotherapy or androgen deprivation</td>
<td>5% of intervention group had had prostate cancer treatment (compared to 27% of the control group)</td>
<td>Yes</td>
<td></td>
</tr>
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</table>
H. 3 Effective interventions (more than one cancer site)

H 3.1 Nutrition

Table H3.1.1. Randomised Controlled Trial

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mazzotta et al 2009</td>
<td>RCT</td>
<td>7</td>
<td>Anti-inflammatory polyunsaturated fatty acids (Eicosapentaenoic acid Docosahexaenoic acid)</td>
<td>Weight change, Lean muscle mass change, Survival, Quality of life</td>
<td>Profound effect on well nourished patients</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Table H3.1.2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
</table>
| Mantovani et al 2008 | 475                           | 62               | M/F | 5 arms in the trial  
  i) medroxyprogesterone acetate/megestrol acetate  
  ii) pharmacological nutritional support containing eicoapentaenoic acid  
  iii) L-carnitine  
  iv) thalidomide or  
  v) medroxyprogesterone acetate/megestrol acetate plus pharmacological nutritional support containing eicoapentaenoic acid plus L-carnitine plus thalidomide  
  All patients given polyphenols plus antioxidant agents | 3 years             | 3 years (interim results)  | Lean body mass  
  Resting energy expenditure (REE), Physical activity, Tumour necrosis factor – α Interleukin-6 Fatigue Multidimensional Fatigue Symptom inventory- Short Form (MFSI-SF) | Research arms iii), iv), and v) showed a significant improvement in one of the primary end points whereas arm ii) showed a significant worsening of lean body mass, REE and fatigue  
  Analysis of change of primary end points significant improvement of REE in favour of arm v versus arm ii and significant improvement of fatigue in favour of arms i), iii) and v) versus arm ii) | Yes - diet + eicoapentaenoic acid + Pharmacological treatment |
## H 3.2 Exercise

### Table H 3. 2. 1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Backer et al 2009</td>
<td>RCT (10) Controlled trials (4) Uncontrolled trials (10)</td>
<td>24</td>
<td>Resistance and aerobic training</td>
<td>Peak oxygen uptake One-repetition maximum Body composition Endocrine function Immune function Haematological variables</td>
<td>Positive effect on cardiopulmonary and muscle function, shown by significant increases in peak oxygen uptake and in the one-repetition maximum</td>
<td>Yes</td>
</tr>
<tr>
<td>Beaton et al 2009</td>
<td>RCT (1) Case studies (5)</td>
<td>6</td>
<td>A range of types of exercise (walking, arm exercises in a chair, marching, dancing, group-based circuit training, aerobic exercise, resistance exercises)</td>
<td>Various including lung capacity measures, assessment of fatigue, quality of life questionnaires and 6 minute walk test</td>
<td>Possible benefit of on the range of exercises used</td>
<td>Possible effect</td>
</tr>
</tbody>
</table>

### Table H 3. 2. 2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morey et al 2011</td>
<td>641</td>
<td>73</td>
<td>M/F</td>
<td>Counselling Personally tailored workbook and series of quarterly newsletters letters</td>
<td>Weekly counselling sessions in the first three weeks, every other week for 1 month and then monthly Intervention lasted 12 months</td>
<td>Immediately after completion</td>
<td>Medical outcomes study Short-Form 36 (SF-36) Late life function and disability index Community health activities model program for seniors questionnaire Dietary intake Self-reported height and weight</td>
<td>Increase in physical activity, dietary behaviors, quality of life and weight loss</td>
<td>Yes</td>
</tr>
<tr>
<td>Author(s)</td>
<td>No. of participants (baseline)</td>
<td>Mean age (years)</td>
<td>Sex</td>
<td>Intervention content</td>
<td>Time to deliver intervention</td>
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<td>Effective?</td>
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<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Adamsen et al 2009</td>
<td>269</td>
<td>47</td>
<td>M/F</td>
<td>High intensity physical training (resistance and cardiovascular exercises) for 90 minutes followed by 30 minutes of relaxation – 3 times a week</td>
<td>6 weeks</td>
<td>Immediately after completion</td>
<td>European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-C30 Medical Outcomes Study Short Form (MOS SF-36) Leisure Time Physical Activity Questionnaire Muscular strength (kilograms – one repetition maximum) Maximum oxygen consumption (VO$_2$ max)</td>
<td>Improvement in fatigue, vitality, physical functioning, physical, mental and emotional wellbeing, maximum oxygen consumption and muscular strength</td>
<td>Yes – but not for global health status or quality of life</td>
</tr>
<tr>
<td>Courneya et al 2008</td>
<td>55</td>
<td>56</td>
<td>M/F</td>
<td>Three cycle ergometry sessions per week plus darbopoetin alfa</td>
<td>12 weeks</td>
<td>1 – 2 weeks after the end of the intervention</td>
<td>FACT-An (The functional assessment of cancer therapy – anemia scale) Maximum oxygen consumption (VO$_2$ max) Haemoglobin response</td>
<td>Exercise group had significantly greater VO$_2$ max and borderline positive effect for haemoglobin response and darbepoetin alfa dosing No significant difference in the other measures</td>
<td>Yes</td>
</tr>
<tr>
<td>Tang et al 2010</td>
<td>71</td>
<td></td>
<td></td>
<td>Home-based walking exercise programme</td>
<td>8 weeks</td>
<td></td>
<td>Pittsburgh Sleep Quality Index Medical Outcomes Study Short Form-36 Perceived Exertion Scale Walking exercise log</td>
<td>Significant improvements in sleep quality and mental health dimension of quality of life, plus reduced bodily pain</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## H 3.3 Fatigue

### Table H3.3.1. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
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<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Weert 2010</td>
<td>209</td>
<td>49</td>
<td>M/F</td>
<td>Physical training (individual and group sports and games) – 1 hour a week each Cognitive behavior therapy – 1 hour a week</td>
<td>12 weeks</td>
<td>Immediately after completion</td>
<td>Multi-dimensional Fatigue Inventory</td>
<td>When compared with the control group (no intervention): i. the physical therapy group had significantly greater decline in 4 domains of fatigue ii. both the physical therapy and combined therapy group reported significantly greater decline in physical fatigue only no significant differences in decline in fatigue between both intervention groups</td>
<td>Yes – physical therapy and combined therapy are both effective although cognitive behaviour therapy does not provide additional benefit</td>
</tr>
</tbody>
</table>
### H 3.4 Multidisciplinary Rehabilitation

#### Table H3.4.1. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korstjens et al 2011</td>
<td>147</td>
<td>48</td>
<td>M/F</td>
<td>Comprehensive physical training and cognitive-behavioural problem-solving training Physical training alone Usual care comparison group</td>
<td>12 weeks</td>
<td>9 months</td>
<td>Problem solving (negative problem orientation) Anxiety Depression</td>
<td>Improvement in anxiety demonstrated in both interventions groups compared to usual care group Cognitive behaviour therapy did not add to the effects of physical therapy</td>
<td>Yes</td>
</tr>
</tbody>
</table>
H 3.5 Vocational rehabilitation

Table H 3.5.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>de Boer et al 2011</td>
<td>RCTs and controlled trials</td>
<td>14 RCTs 4 controlled trials</td>
<td>Psychological Vocational Physical Medical or pharmacological Multidisciplinary</td>
<td><strong>Primary</strong>&lt;br&gt;Return-to-work measured as event data such as return-to-work rates or (change in) disability pension rates. Return-to-work measured as time to event data such as number of days between reporting sick and any work resumption or the number of days on sick leave during the follow-up period. <strong>Secondary</strong>&lt;br&gt;Quality of life (QoL) included overall quality of life, physical quality of life and emotional quality of life</td>
<td>Moderate quality evidence showed multidisciplinary interventions involving physical, psychological and vocational components led to higher return-to-work rates than care as usual</td>
<td>Yes – for multidisciplinary interventions</td>
</tr>
</tbody>
</table>
H. 4. Interventions where the evidence is inconclusive (by cancer site)

H.4.1. Breast cancer

Table H 4.1.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoving et al 2009</td>
<td>Controlled and non controlled trials</td>
<td>1 controlled trial 3 non controlled trials</td>
<td>Counselling Training of physical capacity and cognitive group discussions Counselling and exercises</td>
<td>Physical assessment including ADL, return to work and persistent problems, e.g. pain Mental state Quality of Life</td>
<td>75%-85% were able to return to work</td>
<td>Unclear because many studies were pre 1990 when working patterns were different. Also lack of control groups meant outcome impossible to assess.</td>
</tr>
</tbody>
</table>

Table H 4.1.2. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
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<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billhult et al (2008)</td>
<td>22</td>
<td>62</td>
<td>F</td>
<td>Effleurage (strokes using palms and fingers from both hands with light pressure) on either both feet/lower legs or both hands/lower arms</td>
<td>10 effleurage massage treatments lasting 20 minutes over 3-4 weeks</td>
<td>Immediately after completion</td>
<td>Peripheral blood natural killer (NK) cells T cells Oxytocin Saliva cortisol Hospital Anxiety and Depression Scale Life Satisfaction Questionnaire Spielbergers State Trait Anxiety Inventory</td>
<td>No effect on number, frequencies or activation state of NK cells or T cells; cortisol, oxytocin levels; anxiety, depression or quality of life</td>
<td>No</td>
</tr>
</tbody>
</table>
### H 5.1 Acupuncture

#### Table H 5.1.1. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paley et al 2011</td>
<td>RCT</td>
<td>3</td>
<td>Acupuncture versus medication auricular acupuncture versus acupuncture at 'placebo' points and non-invasive vaccaria ear seeds</td>
<td>Pain scores</td>
<td>Participants in the acupuncture group reported lower pain scores but overall poor study design and inadequate analysis prevented assessment of effectiveness</td>
<td>Unclear</td>
</tr>
<tr>
<td>Hollis 2010</td>
<td>RCT (5 including 1 meta-analysis) Case control (1) Cohort (1) Expert opinion (4)</td>
<td>11</td>
<td>Auricular acupuncture versus acupuncture at 'placebo' points and non-invasive vaccaria ear seeds (same study as for Paley et al 2011) Acupuncture versus placebo</td>
<td>Pain scores</td>
<td>Lack of evidence as an intervention for pain</td>
<td>Unclear</td>
</tr>
</tbody>
</table>
Table H 5.2.1. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
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<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldwin et al 2011</td>
<td>358</td>
<td>66</td>
<td>M/F</td>
<td>Dietary advice and/or oral nutritional supplements</td>
<td>Intervention provided prior to start of palliative chemotherapy</td>
<td>1 year</td>
<td>Survival Weight Quality of life</td>
<td>No differences in survival, weight or quality of life between groups</td>
<td>No effect on survival</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 groups: i. no intervention ii. dietary advice iii. a nutritional supplement iv. dietary advice plus supplement</td>
<td></td>
<td></td>
<td></td>
<td>Weight gain beyond 26 weeks was independent of nutritional intervention</td>
<td></td>
</tr>
</tbody>
</table>
## H 5.3 Psychosocial Rehabilitation

### Table H 5.3.1. Randomised Controlled Trials

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>No. of participants (baseline)</th>
<th>Mean age (years)</th>
<th>Sex</th>
<th>Intervention content</th>
<th>Time to deliver intervention</th>
<th>Follow up period</th>
<th>Outcome measures</th>
<th>Outcome</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibfelt et al 2011</td>
<td>452</td>
<td>60</td>
<td>M/F</td>
<td>Lectures, discussions and patient group work on the treatment of cancer, psychological reactions, spirituality, sexuality, working life and lifestyle Sessions on health behaviour</td>
<td>Six day retreat</td>
<td>1 month and 6 months</td>
<td>Health behaviour BMI Self-rated health</td>
<td>For individuals whose BMI decreased, this decrease was greater in the intervention group No significant differences in changes in health behavior, BMI and self-rated health between intervention group and controls A similar effect occurred for individuals who reduced their alcohol intake</td>
<td>Yes – but not statistically</td>
</tr>
</tbody>
</table>
### Table H.5.4. Systematic Reviews

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Study designs included</th>
<th>No. of included studies</th>
<th>Included interventions</th>
<th>Outcome measures</th>
<th>Outcomes</th>
<th>Effective?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamminga et al 2011</td>
<td>Controlled trial</td>
<td>7</td>
<td>‘Encouragement’ Monitoring progress on return to work Group sessions Problem solving/coping skills Educational leaflet</td>
<td>Semi-structured interview Hospital report questionnaire</td>
<td>1 study showed significant effect on return-to-work. 39-79% returned to work but comparison between studies due to problems with design and methodological quality</td>
<td>Unclear</td>
</tr>
</tbody>
</table>
Appendix I.

Glossary and abbreviations

M.1 Abbreviations used in the report

AHP: Allied Health Professional
BMI: Body Mass Index
CBT: Cognitive Behavioural Therapy
CDT: Complex Decongestive Therapy
CNS: Central Nervous System
QOL: Quality of Life
RCT: Randomised Controlled Trial
SR: Systematic Review

M.2 Glossary of terms

Adaptive strategies (mobility). The use of equipment such as seating aids, bathing and feeding equipment to help improve independent living

Anorexia. Loss of appetite

Asthenia. Lack or loss of strength

Anthropometrics. The measurement of a person's size, weight and proportion.

Cancer site/tumour site. Location in the body of a cancer or tumour. The terms are used interchangeably in this document

Complex decongestive therapy. The use of massage to move fluid away from areas where the lymph vessels are blocked, damaged or have been removed during surgery.

Cachexia. Physical wasting with loss of weight and muscle mass caused by cancer

Dysphagia. Impaired swallowing

Dyspnoea. Shortness of breath.

High polyphenol diet. A diet high in foods which contain anti-oxidants, such as fruit and vegetables.

Neoplasm. Cancerous growth

Resistance exercise programme / Strength resistance. Exercises where muscles contract against an external resistance with the objective of increasing strength, tone, mass, and/or muscular endurance.

Trismus. A spasm of the jaw muscle which makes it difficult to open the mouth.

Videofluoroscopy. The recording on videotape of the images appearing on a fluoroscopic screen. In cancer relates to swallowing function usually following head and neck cancer.
Appendix J.
Members of the Project Advisory Group

Jackie Turnpenney
Lead for Rehabilitation and Survivorship, National Cancer Action Team

Sue Acreman
Marie Curie Consultant Practitioner Cancer Rehabilitation, South Wales Cancer Network, Chair, National Cancer Rehabilitation Advisory Board

Sara Mathewson
Macmillan AHP Lead, 3 Counties Cancer Network

Sherry McKiniry
Macmillan AHP Lead, Humber and Yorkshire Coast Cancer Network and Yorkshire Cancer Network

Sally Donaghey
Macmillan AHP Lead, Anglia Cancer Network
Appendix K.
List of references

1.1 Included in the review


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treatment on individuals’ post-cancer treatments. Journal of Rehabilitation Research &
Development, 46 (2), 205-14
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neck cancer. Oral Oncology, 45, (8) 665-668
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transplantation: a randomized, double-blind study. JPEN Journal of Parenteral &
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54. Shelton ML, Lee JQ, Morris GS, Massey PR, Kendall DG, Munsell MF, Anderson KO,
a self-directed exercise program for allogeneic stem cell transplant patients, Psycho-
oncology, 18, 353–359
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31
decrease cancer-related fatigue and muscle wasting in patients with multiple myeloma:
an evidence-based systematic review. Topics in Geriatric Rehabilitation, 22 (2), 172-86
interventions integrated into cancer care: a systematic review. Occupational &
Environmental Medicine, 67 (9), 639-48


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1.2 Excluded from the review

1.2.1 Pre 2008 references


activity level in cancer patients undergoing chemotherapy: 1- and 3-month follow-up on the body & cancer project. Palliative & Supportive Care, 4 (1), 25-35

1.2.2 Exclusions: on PICO and study design


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109


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