GUIDELINES AND AUDIT
IMPLEMENTATION NETWORK

Guidelines for the Rehabilitation of Patients with Metastatic Spinal Cord Compression (MSCC)

Assessment and Care Provision by Occupational Therapists and Physiotherapists in the Acute Sector

January 2014

Contents

Purpose of the Guideline

This clinical guideline has been developed using research evidence, expert opinion and professional consensus to provide best available evidence based practice for physiotherapists and occupational therapists in the assessment and treatment of patients with Metastatic Spinal Cord Compression (MSCC) in the acute sector. It should be used in conjunction with other regional and local policies relating to skin care, manual handling, anti-embolism, seating and wheelchair provision.

Guidance is provided on *physiotherapy and occupational therapy referral, assessment and supportive care and rehabilitation for the unstable and stable MSCC patient.* This guideline is not prescriptive and should take into account individual variations and needs.

This guideline was developed by GAIN and the Northern Ireland Cancer Network (NICaN) MSCC Allied Health Professional (AHP) sub group and was part of a wider multidisciplinary review of the regional management of MSCC in Northern Ireland (NICaN), in keeping with the national NICE (National Institute for Health and Care Excellence) guidelines for MSCC (2008) [80.]

Scope of the Guideline

The guideline is aimed at all physiotherapists and occupational therapists involved in the management of patients with MSCC in the acute sector. It may also be of value to those in clinical governance roles in primary and secondary care, to ensure appropriate care delivery for patients with MSCC.

This document provides guidance on physiotherapy and occupational therapy referral, assessment and supportive care and rehabilitation for patients with unstable and stable MSCC under the following subsections:

1. Referral
2. Assessment
3. Supportive care and rehabilitation for those with an UNSTABLE MSCC
4. Supportive care and rehabilitation for those with a STABLE MSCC
5. End of Life Considerations

Objectives

1. ***To ensure early and prompt referral, diagnosis and treatment of MSCC:***
   Significant delays in presentation, referral and diagnosis of MSCC exist [61.] There is a need for prompt referral, diagnosis and treatment to optimise neurological and functional outcomes, quality of life (QOL) and survival. Early diagnosis when the patient is still ambulant is significantly linked to overall survival [45, 88.]

2. ***To educate patients at high risk of MSCC and/or carers on the key features and the importance of early reporting and detection, and later in the management of MSCC.***

3. ***To provide clearer guidance on spinal stability and safe mobility/rehabilitation.***
   There is a lack of clear guidance and mixed expert opinion on spinal stabilisation and mobilisation [55, 60.]

4. ***To ensure early physiotherapy/occupational therapy and other allied health professional (AHP) involvement from admission with early discharge planning***

5. ***To provide physiotherapists and occupational therapists with clear guidance on safe assessment and treatment of patients with MSCC.***
   Often these patients are encountered in small numbers or infrequently. Clearer guidance and education are required to equip staff in the assessment and treatment of MSCC patients [55, 60.]

6. ***To ensure regular reassessment and improved clinical vigilance by physiotherapists and occupational therapists caring for patients with MSCC***

7. ***To provide evidence based guidance or best practice guidance (in the absence of evidence) on the physiotherapy and occupational therapy assessment and treatment of patients with MSCC.***
   While the NICE guideline (2008) [80] on "Supportive Care and Rehabilitation", states the need for early access, focus on goals and outcomes and availability of specialist rehabilitation services, it lacks details on specific physiotherapy and occupational therapy assessments and treatments.

8. ***To educate the wider multidisciplinary team in referral, diagnosis, assessment, treatment, clinical vigilance and rehabilitation of patients with MSCC.***

9. ***To minimise disability and optimise QOL and survival in MSCC patients who have a limited prognosis.***
   Most patients die from their underlying cancer within a year of diagnosis of MSCC [23, 91.] Patients with more favourable prognostic indicators may survive beyond 2 years [91.] Early referral, diagnosis and treatment are crucial in minimising disability and optimising QOL and survival in this life-limiting condition.

10. ***To ensure consistent and improved standardised care in the assessment and treatment of patients with MSCC across the region of Northern Ireland, in keeping with national NICE recommendations (2008)*** [80.]

Currently there are no guidelines in Northern Ireland for MSCC.

11. To ensure there is clear guidance as the incidence of MSCC increases.

The number of patients with MSCC is set to rise as the median age of the population increases and cancer survival is extended with more effective treatments. It is therefore necessary to have clear guidelines for MSCC to improve care.

Roles and Responsibilities

It is the responsibility of all those physiotherapists and occupational therapists involved in the management of patients with MSCC to familiarise themselves with the content of these guidelines.

Policy Statements

1. The MSCC physiotherapy and occupational therapy subgroup is committed to promoting safe and best evidence based practice in the assessment and treatment of patients with MSCC.

2. This guideline is compliant with:

    - NICE guidance CG75 Metastatic Spinal Cord Compression: Diagnosis and Management of Patients at Risk of or with Metastatic Spinal Cord Compression (2008) [80.]

    - National Cancer Action Team: National Cancer Peer Review Programme, Manual for Cancer Services: Acute Oncology - Including Metastatic Spinal Cord Compression Measures (2013) [74.]

Background

Metastatic Spinal Cord Compression (MSCC) is defined as spinal cord or cauda equina compression by direct pressure and/or induction of vertebral collapse or instability by metastatic spread or direct extension of malignancy that threatens or causes neurological disability [80.] The minimum radiological evidence for a diagnosis of spinal cord compression is indentation of the theca corresponding to the level of the clinical features [63.]

MSCC is a major cause of morbidity and occurs in 5-10% of all patients with cancer [17, 88, 119.] In approximately 85% of cases, MSCC results as a consequence of metastases from a primary tumour [56, 119.] Cancers of the lung, prostate and breast are at most risk of causing MSCC, accounting for 50% of cases [17, 56, 64, 119.] Other cancers frequently associated with MSCC include lymphoma, renal cancer, multiple myeloma, melanoma and sarcoma [80, 119.] 10% [17] to 20% [1] of MSCC patients will however have no prior malignant diagnosis and MSCC will be their first manifestation of cancer.

The spinal column is the most common site of bony metastases with the thoracic spine most frequently affected (70%), followed by the lumbosacral (20%) and cervical (10%) spine [17, 50, 54, 119.] MSCC is an oncological emergency requiring urgent investigation and immediate treatment as neurological outcome is largely determined by neurological function at the time of starting treatment [88.]

Red flags including the 4 cardinal signs and symptoms of MSCC

History of cancer especially high risk cancers e.g. lung, breast and prostate cancer or bone metastases

4 cardinal signs and symptoms of MSCC are:

1. Pain
2. Motor Dysfunction
3. Sensory Dysfunction
4. Bladder and Bowel Dysfunction [17, 72, 80, 88, 119.]

1. Pain

- Pain is the earliest symptom of MSCC which is often present a number of weeks (median 6-8 weeks) before MSCC is diagnosed, in the absence of other symptoms [54, 90.] It may be a new pain or pain changed in character in patients with chronic pain [72, 119.]

- It can be local neck or back pain or radicular pain, radiating to the limbs (arms or legs) or as a tight band around the chest or abdomen (the site of pain will depend on the level of compression) [17.]

- It has a mechanical element and is often made worse e.g. by movement, coughing, sneezing and straining [17.]

- It is often unremitting and associated with anguish and despair. Typically it escalates and is difficult to control despite increasing opioids [119.]

- It can be worse at night interfering with sleep [80, 90.]

Later Symptoms

2. Motor Dysfunction

MSCC can cause:

- Muscle weakness or paralysis
- Ataxia and loss of coordination
- Unsteadiness, difficulty walking and legs giving way [17, 72, 80, 88, 119.]

3. Sensory Dysfunction

MSCC can cause:

- Paraesthesia (pins and needles or tingling)
- Anaesthesia (numbness or diminished/loss of sensation) to touch, pain and temperature
- Hypersensitivity
- Proprioceptive impairment [17, 72, 80, 88, 119.]

In some cases, sensation may be left intact [61.]

4. Bladder and Bowel Dysfunction[, 72, 80, 88, 119]

MSCC can cause:

- Constipation
- Urinary Retention
- Incontinence [72, 80, 119.]

Guideline Methodology

Search Methods for Identification of Studies

Evidence Questions and tables pertaining to physiotherapy and occupational therapy assessment, rehabilitation and management of MSCC have not been included within this document, but are available at http://www.gain-ni.org/index.php/audits/evidencetables.

Search Strategy

Electronic Searches

The following electronic databases were searched: CINAHL, The Cochrane Collaboration; Spinal Cord Injury Rehabilitation Evidence (SCIRE), AMED, MEDLINE (Ovid), EMBASE, PEDro and OT Seeker. Search terms used can be viewed in Appendix 1.

Limitations were applied for English language, Humans, Year of publication from 2000 to September 2013 (except if limited evidence was available and the year of the search had to be extended).

Reference List Searches

The references and citations of identified studies were searched for other potentially relevant studies.

Website Searches

Numerous websites were searched for relevant clinical guidelines. Searches were conducted for:

- Local, regional, national and international guidelines on SCI (See attached reference list and Evidence Tables document as part of the full Guidelines for the Rehabilitation of Patients with MSCC)
- Local and regional guidelines for MSCC from Cancer Centres (See attached reference list and Evidence Tables document as part of the full Guidelines for the Rehabilitation of Patients with MSCC)
- Spinal Cord Injury Rehabilitation Evidence (SCIRE) (www.scireproject.com)
- National Institute for Health and Care Excellence (NICE) (www.nice.org.uk)
- Scottish Intercollegiate Guidelines Network (SIGN) (www.sign.ac.uk)
- National Cancer Action Team (NCAT) (http://ncat.nhs.uk/)
- National Comprehensive Cancer Network (http://www.nccn.org/index.asp)
- Northern Ireland Cancer Network (NICaN) (http://www.cancerni.net/)
- Guidelines and Audit Implementation Network – Northern Ireland (GAIN) (www.gain-ni.org)

Study Selection Process

The two lead authors independently examined titles and abstracts to identify potentially relevant studies. Disagreements over inclusion were to be resolved by discussion with the Guideline Development Group (GDG) or involvement of a 3rd review author however, no such disagreement arose.

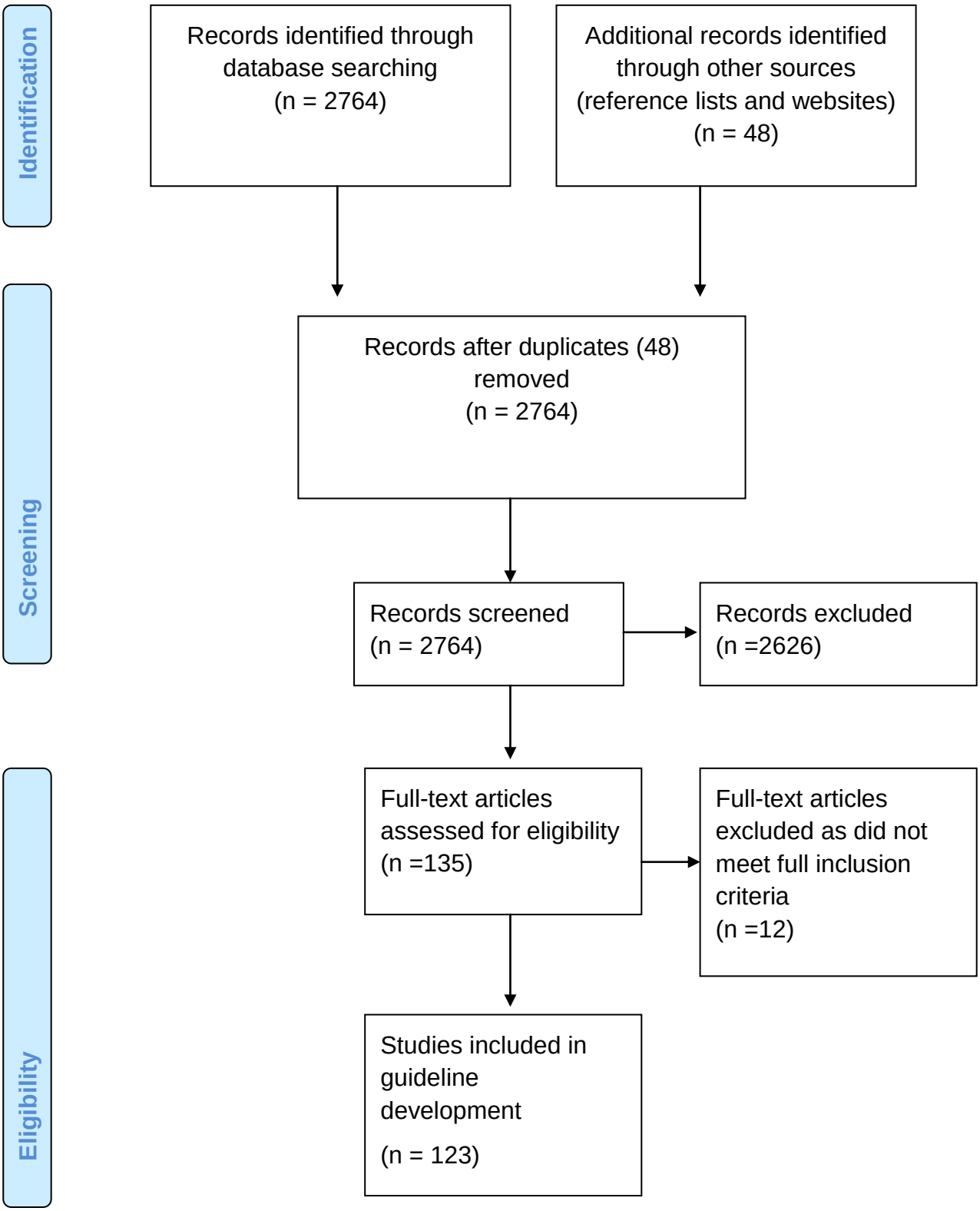
Studies included were relevant to SCI, cancer or MSCC or specific physiotherapy and occupational therapy interventions or treatments.

The full text of all relevant studies was then obtained and independently assessed for inclusion and reviewed all relevant articles.

Data Extraction

Evidence tables were created through the extraction of selected articles. The quality of the included studies was assessed according to both the SIGN and Sackett scales [100, 97].

Figure 1: Study inclusion process - PRISMA flow diagram



Referral

Admission to Cancer Centre

1. Referral

Suspected and confirmed MSCC patients should be referred to physiotherapy and occupational therapy on admission [17, 80, 113] and to other members of the multidisciplinary team as appropriate e.g. social worker, specialist nurse, specialist palliative care team, clinical psychologist, dietitian, speech and language therapist, hospital chaplain etc. [72.]

ASSESSMENT

2. Assessment

Physiotherapy and occupational therapy assessments should be carried out within 24-48 hours of admission [72, 113, 119.]

Assessment should include history of the current medical condition; results of investigations; past medical history; pre-admission mobility, function and rehabilitation history; social history and drug history.

It should also include thorough examination of the 4 cardinal and clinical diagnostic features of MSCC:

- pain
- motor dysfunction
- sensory dysfunction
- bladder and bowel dysfunction [17, 72, 80, 88, 119.]

It will not be possible to complete the full assessment when the MSCC is managed as unstable. Only when the MSCC is deemed stable or more active rehabilitation is permitted, can the full assessment be completed.

A wide range of useful assessments and outcome measures can be obtained from http://www.rehabmeasures.org/default.aspx [96.]

If the patient is in severe pain, medically unstable, fatigued, distressed or at a terminal stage of care, the therapists should consider the appropriateness of completing assessments.

A comprehensive assessment should be made of:

2.1 Pain

Pain assessment should be carried out on admission and re-assessed daily or more frequently depending on the severity of pain. All members of the multidisciplinary team involved with the patient should contribute to this assessment.

A formalised pain assessment tool should be used to make a comprehensive assessment of each individual site of pain identified. This should take account of the following: [39, 61, 119.]

- Location and type of pain (body chart)
- Onset of the pain
- Duration of pain
- Character of the pain: Is it constant or intermittent?
- Description of pain (e.g. “burning,” “shooting,” “a tight band”)
- Severity / intensity (Visual Analogue Scale - VAS)
- Aggravating factors (e.g. movement, position, coughing, sneezing, straining)
- Relieving factors (e.g. rest, position, medication)
- Functional effects (i.e. interference with activities of daily living)

- Nocturnal pain
- Psychosocial factors
- Current medication and any toxicity

2.2 Neurology

Examine both sensory and motor function.

2.2.1 Assess Sensation and Proprioception (See Dermatome chart [40], Appendix 3):

- Light touch sensation (Anterior spinothalamic tract)
- Sharp / blunt or pin-prick sensation (Lateral spinothalamic tract)
- Joint proprioception.

2.2.2 Assess Motor function

- **Muscle power:** See Myotome chart [40] and Oxford classification [20], Appendices 4a &b)
- **Muscle tone**: flaccidity or spasticity (See Modified Ashworth Score of Spasticity [96], Appendix 5)

Consideration may be given to the use of the American Spinal Injury Association (ASIA) Scale as a Multi-Disciplinary assessment tool [105].

2.3 Spinal stability and mobility recommendations

The spinal stability and mobility recommendations proforma (Appendix 6) should be completed by the Consultant / Registrar on admission to ensure safe handling and protection of the spine.

2.4 Clinical Observations

Heart rate (HR), blood pressure (BP), respiratory rate (RR), temperature and pulse oximetry (SaO2) measurements should be included in the initial assessment and routinely monitored in all patients with MSCC [40,80, 99.]

2.5 Respiratory function

Patients with MSCC, especially above T6, are at risk of chest complications due to respiratory muscle paralysis and immobility, confounded in some patients by underlying lung disease.

Muscles of Respiration

- Accessory muscles (C1-C8): role in inspiration
- Diaphragm (C3, C4*,C5): major inspiratory muscle, responsible for 65% of vital capacity (VC)

- Intercostals (T1-T11): role in inspiration and expiration
- Abdominals (T6-L1): involved in forced expiration and cough**Potential Effects of MSCC on Respiration**
- Reduced lung volumes and vital capacity and atelectasis
- Increased work of breathing
- Poor cough and ineffective clearance of secretions causing retention of secretions and risk of infection

Assessment of the following should be considered

- Lung volumes e.g. vital capacity (VC) or FEV1 [99]. VC is considered the simplest and most appropriate measure of ventilatory status after spinal cord injury: [40]

Table 1: Predicted Vital Capacity for Spinal Injured Patients:

Level of Lesion	VC during Acute Bed rest	VC after Rehabilitation
C1-C2	5-10% of normal (500-600ml)	Ventilator dependent
C3-C6	20% of normal (1000ml)	Usually ventilator free C4-C6 or ventilator part time. 50% of normal
C7-T4	30-50% of normal (1380-2300ml)	60-70% of normal
T5-T10	75-100% of normal (3450-4600ml)	Nearly normal
T11-S5	Normal	Normal

- Auscultation: air entry, added sounds (e.g. crackles / wheeze)
- Shortness of breath (SOB)
- Breathing pattern
- Cough mechanism
- Retained secretions and sputum
- SaO2 and oxygen (O2) needs
- Arterial blood gases (ABGs)
- Chest X-ray
- Inhaler / nebuliser needs
- Smoking history
- Chronic obstructive airways disease (COPD) history
- Clinical observations
- Exercise tolerance
- Positioning / positional influences on respiration [40, 80, 108, 110.]

2.6 Mobility and Activities of Daily Living [119]

This assessment should be guided by clarification of spinal stability and mobility recommendations (See Appendix 6) and limb strength. This should include assessment of:

- Joint range of movement (ROM) (active / passive) and muscle length
- Balance (sitting / standing if appropriate)
- Posture and alignment
- Risk for moving and handling [72.] A risk assessment for moving and handling should be carried out for each patient per trust policies.
- Functional mobility e.g. bed mobility; sitting balance; standing balance; transfers; walking; wheelchair mobility; stairs; steps; kerbs; indoor and outdoor mobility as appropriate.
- Activities of Daily Living (ADLs):
    - Personal Activities of Daily Living (PADL): feeding, hygiene, toileting, bathing and dressing.
    - Instrumental Activities of Daily Living (IADL): cooking, housekeeping, laundry, use of transport, managing money, shopping and managing medication.

- Fatigue / Exercise Tolerance

  Patients should be screened for the presence, severity and impact of fatigue.

  A 0-10 numeric rating scale can be used for screening (a score of 1-3 indicating mild fatigue; 4-6 indicating moderate fatigue and 7-10 indicating severe fatigue).

  When fatigue is rated as moderate to severe, a more focused history and physical examination should be conducted. This will require input from the wider multidisciplinary team [76.]

2.7 Seating

This assessment should be guided by clarification of spinal stability and mobility recommendations. See section 4.2.

2.8 Wheelchairs

This assessment should be guided by clarification of spinal stability and mobility recommendations. See section 4.4.

2.9 Pressure ulcer risk and skin integrity

On admission, a structured pressure ulcer risk assessment should be conducted that includes a comprehensive skin assessment and assessment of activity and mobility. Any areas of poor skin integrity, pressure ulcers, impaired sensation and post-surgical wounds should be documented in the assessment [79, 82, 99].

Consider the impact of the following factors on an individual's risk of pressure ulcer development:

- Nutritional indicators e.g. anaemia, low haemoglobin and serum albumin levels, poor nutritional intake and weight.
- Factors affecting perfusion and oxygenation e.g. diabetes, cardiovascular instability, low blood pressure, ankle brachial index and hypoxia (low SaO2).
- Skin moisture
- Advanced age
- Friction and shear
- Reduced mobility: Those individuals who are bedfast and / or chair fast are to be considered at risk of pressure ulcer development [30]
- Impaired or loss of sensation
- Skin Changes at Life's End (SCALE): At the end of life, failure of the homeostatic mechanisms that support the skin can occur, resulting in a diminished reserve to handle insults such as minimal pressure [104]

The pressure ulcer risk assessment should be repeated regularly and as frequently as is required by the individual's condition [30.] The skin should be inspected frequently for signs of redness in individuals identified as being at risk of pressure ulceration [30.] Areas of special concern include the sacrum, coccyx, ischial tuberosities, trochanters, scapulae, occiput, heels, digits, nose and ears [104].

Repositioning

The need for and frequency of repositioning should be assessed in all at-risk individuals, taking into consideration the individual's tissue tolerance, spinal stability, level of activity and mobility, general medical condition, overall treatment objectives, assessment of the individual's skin condition, general comfort and the support surface in use [30.] See section 3.1.

2.10 Swelling / DVT / DVT risk / Lymphoedema

Baseline skin observations and girth and length measurements should be recorded [99.] Risk factors for DVT have been identified as history of venous thromboembolism; thrombophilias; cancer; chemotherapy; combined oral contraceptives; hormone replacement therapy; varicose veins with phlebitis; obesity; immobility (> 3 days bed rest); prolonged travel (>3 hours); trauma; before and after surgery and > 60 years and should be assessed [81, 101.]

A swollen limb will only be apparent approximately 10 days after the clot has formed [40.] A sudden, unexpected pyrexia may be a diagnostic indicator of early DVT formation [40.]

Any contraindications to Graduated Compression Stockings (GCS) should be assessed [81.] GCS should be avoided in peripheral vascular disease (PVD) [81] and in patients with pressure ulcers and dermatological conditions [38.] Consult the anti-embolism trust policy or NICE Venous Thromboembolism Guidelines (2012) [81] or SIGN Venous Thromboembolism Guidelines (2010) [101.]

2.11 Bladder & bowel function

Any urinary or faecal incontinence, constipation, urinary retention, associated pain, infection issues, fluid restrictions or catheterisation should be clarified and documented [80.]

2.12 Social and occupational factors

Within 24-48 hours of referral, the occupational therapist and physiotherapist will conduct an interview to establish pre admission functional levels, life roles (work, caring for others, social participation), leisure interests, values, support and relationships, services in place, environmental factors and the expectations and understanding of the patient and their family.

If the patient is in severe pain, fatigued, distressed or at a terminal stage of care, the therapist should consider the appropriateness of obtaining these details, deferring, completing an interview over several sessions or speaking with another source with consent of the patient.

2.13 Psychological well-being

Consideration should be given to the patients' and families' concerns, emotions, distressing issues, mood and interests, anxiety, adjustment to illness and treatment, strengths and existing support.

Screening should be conducted to identify the level and nature of the distress [77, 78.]

The Distress Thermometer has been identified as a simple and effective screening instrument for detecting distress in cancer patients as it provides information on the level of distress experienced and the types of problems associated with that distress [36, 77, 96.] The types of problems that cause the most distress can indicate which type of professional referral should be made or which type of intervention may be most beneficial [115.]

Other frequently used instruments include the Hospital Anxiety and Depression Scale (HADS), the Psychological Distress Inventory (PDI) and the Brief Symptom Inventory (BSI) [12.]

Tuinman (2008) [115] states: "immediate referral for additional care may not always be necessary. High levels of distress are expected and normal during certain periods of illness." Repeated screening is recommended as patients' needs may change over time [115.] Patients may also not want to be referred and consent should be sought.

2.14 Cognitive processing

The causes for alteration in cognitive functioning in cancer patients are varied. Potential causes can include:

- Primary or secondary cancers of the brain
- Side effects of therapeutic interventions for malignancy
- Metabolic, haematological or infectious processes
- Nutritional deficiencies
- Side effects of medications
- Co-morbidities, age, psychiatric disorders, depression, dementia, fatigue, sleep disturbances and the distress associated with a diagnosis of cancer [8]

Due to the many factors associated with cognitive dysfunction in cancer patients, it is essential that a detailed investigation be conducted to determine the cause [14.]

The occupational therapist may use a combination of standardised and non-standardised instruments, combined with observations and clinical judgement, to assess cognitive function [47, 96,123.]

2.15 Signs of Autonomic Dysreflexia[40]

MSCC patients should be monitored for signs of autonomic dysreflexia. Autonomic dysreflexia is the autonomic response to painful (noxious) stimuli perceived below the level of the lesion and is a potential complication for all patients with spinal cord lesions above the level of T6. The most common stimulus is a blocked catheter. This problem manifests as acute hypertension. Systolic blood pressure can easily exceed 200 mm/Hg. Unresolved, it can

cause fatal cerebral haemorrhage. This reflex response is usually suppressed during the period of spinal shock for an initial, acute admission. However, it is a potential complication for individuals with established spinal cord injury (SCI) who are readmitted to acute care environments. Monitor and manage appropriately in lesions at T6 and above.

The most common presenting symptoms of autonomic dysreflexia are:

- Severe hypertension
- Bradycardia
- 'Pounding' headache
- Flushed or blotchy appearance of skin above the level of lesion
- Profuse sweating above the level of lesion
- Pallor below the level of lesion
- Nasal congestion
- Non-drainage of urine (urinary obstruction being the most common cause).

This is a medical emergency and requires immediate medical input [40.]

Supportive care and rehabilitation for patients with UNSTABLE MSCC

3. Supportive care and rehabilitation for patients with UNSTABLE MSCC

Spinal instability refers to the on-going or potential for neurological damage as a result of movements of the diseased, unstable spine. *In metastatic spine disease, it can be difficult to decide whether the spine is stable or unstable.* Furthermore patients judged to have a stable spine may develop instability e.g. following minor trauma, further tumour growth along the spinal column or new metastatic spread.

Refer to the spinal stability and mobility recommendations within the medical notes (Appendix 6).

Care of the threatened spine:
Patients with severe mechanical pain suggestive of spinal instability or any neurological signs or symptoms suggestive of MSCC should be treated as an unstable MSCC until MRI results are obtained and clarification is provided by the medical team [80.]

Clinical vigilance must be exercised. Any worsening of pain and neurological symptoms (power and sensation) should be recorded, reported and medical advice sought.

Supportive care and rehabilitation for patients with UNSTABLE MSCC may include:

3.1. Positioning / bed rest

3.2. Moving & handling

3.3. Bracing

3.4. Physiotherapy bed exercises

3.5. Pain control

3.6. Respiratory care

3.7. Prevention of contractures and / or spasticity control

3.8. Swelling / DVT management and prevention

3.9. Pressure ulcer prevention and skin care

3.10. Self-care in bed
3.10.1. Washing and dressing
3.10.2. Feeding

3.11 Leisure in bed

3.12 Communication assistance

3.13 Cognitive care

3.14 Psychological care

3.15 Involvement and education – patient, family, carer

3.16 Discharge planning and onward referral

3.1 Positioning / bed rest

Patients should be nursed in flat supine with neutral spine alignment [15, 38, 40, 72, 80, 106, 113, 119].

Suspected or unstable cervical spine MSCC patients should be fitted in an appropriately sized rigid collar (e.g. Aspen / Miami J) by suitably trained physiotherapists in consultation with medical staff, orthopaedics and / or specialist spinal team [15, 17, 38, 40, 72, 80, 108, 113, 119]. If problems exist with collar fit and comfort, orthotics should be contacted for specialist assessment and collar

provision. Sandbags may be used in addition to collars to increase immobilisation and should be placed either side of the neck [38, 40, 113.]

One or no pillows should be used with suspected or unstable cervical spine MSCC patients [119.]

Immobilisation is a risk factor for the development of pressure ulcers [30, 34.] Normally, higher-specification foam mattresses rather than standard hospital foam mattresses are recommended for individuals at risk of pressure ulcers on bed rest [30] and with a grade 1-2 pressure ulcer [79.] **The use of dynamic and alternating mattresses are however contraindicated for those with a suspected or unstable MSCC** [40, 82, 83, 87.]

A pillow under the calves to elevate the heels may be considered so that the heels are free of the surface of the bed [30.] Foot drop and tendo achilles shortening should be prevented by propping up the feet to at least 90° with pillows or using soft supportive foot splint boots [15, 30, 82, 106, 108.]

Repositioning should be considered for all those deemed to be at risk of pressure ulceration unless medically contraindicated. **Repositioning by logrolling** is necessary for relieving pressure on the skin for the suspected or unstable MSCC patient [106.] See section 3.2 for advice on logrolling. See section 3.9 for advice on repositioning.

A risk assessment should be completed on the use of bed rails.

3.2 Moving and handling

Implement Care Pathway for the Moving and Handling of Patients.

Cervical and high thoracic patients (T6 above) should be log rolled with manual stabilisation of the cervical spine with 5 staff. A 5th member of staff is needed when patients require e.g. a collar change, repositioning and skin checks, upper limb support, positioning of pillows or positioning for radiotherapy treatment / investigations [15, 17, 38, 40, 80, 82, 106, 113, 119.]

Paraplegic patients (below T6) should be log rolled with 4 staff and do not require manual stabilisation of the cervical spine. A 4th member of staff is needed when patients require e.g. repositioning and skin checks, upper limb support, positioning of pillows or positioning for radiotherapy treatment / investigations [15, 17, 38, 40, 80, 82, 106, 113, 119.] See Spinal Injuries Association (SIA) Academy et al (undated) [106] for techniques.
http://www.spinal.co.uk/userfiles/images/uploaded/pdf/288-709666.pdf

Sliding sheets can be used to assist with movement in bed [30.]

Spinal boards or scoop stretchers should be used for the transfer of patients between beds e.g. for radiotherapy; ambulance transportation and investigations [38, 40, 82, 106.]

No hoisting is permitted.

During transfers, there can be increased risk of friction, shearing and injury due to the inadvertent bumping or striking of body surfaces on equipment. There is also the risk of paralysed limbs falling from beds and trolleys or becoming trapped in cot sides [40.] Care should be taken to prevent skin trauma and injury through safe handling.

3.3 Bracing

Cervical spine collars and spinal bracing significantly reduce spinal motion, stabilising the spine and protecting the spinal cord [33, 57, 69] and may reduce spinal pain.

Suspected or unstable cervical spine MSCC patients should be fitted in an appropriately sized rigid collar (e.g. Aspen / Miami J) while on bed rest by suitably trained physiotherapists in consultation with medical staff [15, 17, 38, 40, 72, 80, 108, 113, 119.] A small stock of cervical collars should be kept locally for ease of accessibility in the emergency situation. If problems exist with collar fit and comfort, orthotics should be contacted for specialist assessment and collar provision.

Patients in collars are at risk of skin breakdown. This may occur at the shoulders, occiput, chin and back, generally from plastic edges not being entirely covered by foam. Changing of the pads every 24 hours and inspecting and cleaning skin every 12 hours are recommended [89.] Radiotherapy skin markings may however limit cleaning of the skin during active radiotherapy treatment.

In thoracic / lumbar MSCC patients, spinal bracing may be required when mobility is allowed (See Section 4.1). This will involve consultation between medical staff and physiotherapy staff and may require specialist orthotic assessment and fitting [72, 80.] Owing to an extensive range of thoracic and lumbar spinal bracing, it may be impractical to maintain an adequate range of braces and measuring and ordering should be done on an individual basis.

Table 2: Considerations for collars and spinal bracing:

Patients with suspected or unstable MSCC or awaiting surgery [15, 17, 38, 40, 72, 80, 108, 113, 119]
Patients with unstable MSCC but not suitable for surgery
Patients with unstable MSCC but not suitable for surgery, with significant preservation of power and sensation, for protection of neurology
Patients with significant mechanical pain to reduce pain [72]
Post-operative spinal surgery patients as per consultant recommendation

3.4 Physiotherapy bed exercises

Physiotherapy exercises are advocated for the suspected or unstable MSCC patient on bed rest, primarily to stretch muscles and joints and maintain ROM, strengthen muscle, promote circulation and improve psychological well-being and QOL. Exercises may be performed on the hips, knees, ankles and toes, shoulders, elbows, forearms, wrists and fingers.

Exercises may include static, passive, active assisted or active rhythmic, controlled movements and stretching techniques, depending on the patient's muscle activity, spinal stability and pain [15, 40, 108.] Care should be taken to preserve ankle dorsiflexion range of movement and to prevent drop foot contractures [15, 82, 108.]

Physiotherapy bed exercises should be performed at least 1-2 daily within strict pain limits and with monitoring of pain, power and sensation, considering precautions in Table 3 and any other contraindicating pathology. Movement worsening pain or neurology should be stopped and medical advice sought.

Table 3: Key safety precautions on exercise / movement for suspected or unstable MSCC: based on expert opinion and best practice guidelines [15, 37, 38, 40, 95, 108, 119]

Thoracolumbar MSCC patients	< 30˚ hip flexion in T10 and below lesions
	< 45˚hip abduction in T10 and below lesions.
	No straight leg raise / long sitting in T10 and below lesions.
	No back movements in thoracic, lumbar or sacral lesions. No pelvic movements in T10 and below lesions.
Cervical MSCC patients	<90˚ shoulder flexion and abduction if creating pain
	No resisted arm movements
	Bilateral arm movements with 2 staff to < 90˚ may be considered if unilateral arm movements are creating pain.
	Avoid overstretching of the wrist and finger flexors in C6/7 tetraplegics who require a tenodesis grip
	No neck exercises / movements

3.5 Pain control

For those patients who experience and / or anticipate pain on movement, administration of pain relief prior to movement should be considered and break through analgesia provided as appropriate [80.]

A range of non-pharmacological interventions [2] can be useful in managing pain:

- Gentle limb movement and exercise [112]
- Positioning [17]
- Massage [112]
- Collars [40]
- Relaxation [58, 112]
- Transcutaneous electrical nerve stimulation (TENS) [49, 112]
- Acupuncture [112]
- Heat (contraindicated over the site of cancer and pressure ulcers) [17, 112]
- Cognitive Behavioural Therapy (CBT) aimed at modifying dysfunctional pain cognitions and coping abilities [16, 44, 112]
- Motivational interviewing [114]

3.6 Respiratory care

Respiratory assessment and respiratory physiotherapy treatment should be provided as required [15, 40, 80.]

Table 4: Respiratory care: This may include:

• Respiratory examination and monitoring of clinical observations (See sections 2.5 and 2.4)
• Breathing exercises; exercise; inspiratory and respiratory muscle training; incentive spirometry; glossopharyngeal breathing; lung volume recruiting techniques / breath stacking and intermittent positive pressure breathing (IPPB) (unless contraindicated or jeopardising spinal stability): to increase lung volumes, reduce the work of breathing and aid clearance of secretions [97, 102, 117]
• Forced expiratory techniques and coughing, manual assisted coughing, suction, mechanical insufflation / exsufflation and cough assist machines, abdominal binders and abdominal muscle electrical stimulation: to aid clearance of secretions [97, 102, 103, 106]
• Expiratory flow resistive devices: to aid clearance of secretions [103]
• Positioning: Supine is advised for the unstable MSCC patient. N.B. Diaphragmatic excursion is improved in supine for the tetraplegic patient through elimination of gravity and abdominal displacement [38, 40, 82]. Patients experiencing breathing difficulties may however be unable to tolerate lying in a flat supine position. The recommendations for supine positioning may therefore need to be medically reviewed considering the degree of spinal instability and risk of neurological damage, breathlessness, pain, pressure, shear and if relevant, the patient's end of life goals.
• O2: for hypoxia, shortness of breath and to ensure adequate oxygenation of the spinal cord [40, 82]
• Inhalers / nebulisers e.g. bronchodilators should be considered in tetraplegics with an element of obstructive airway impairment [103]
• Non-invasive positive pressure ventilation (NIPPV) / Invasive positive pressure ventilation (IPPV) [82]

Care should be taken during the delivery of certain respiratory physiotherapy techniques e.g. assisted cough, to ensure that the stability of the spinal cord is not jeopardised by monitoring pain and neurological symptoms throughout treatment.

Any swallowing difficulties should be reported to medical staff and referral to the speech and language therapist should be made as appropriate. Medical staff should also be informed of any significant deterioration in respiratory function.

Relaxation techniques may also be beneficial in the management of breathlessness [110.]

3.7 Prevention of contractures and/or spasticity control

Prevention of contractures and/or spasticity control may include:

- **Corrective positioning and splinting**

  Corrective positioning and regular change of limb position are critical in maintaining joint ROM, preventing contractures and controlling spasticity [10.]

  Patients with MSCC are at risk of developing upper and lower limb muscle contractures due to muscle weakness or occasionally spasticity.

  Splints and serial casting may be considered for the elbows, wrists, hands, knees, ankles or feet to prevent or reduce contractures, prevent deformity, stabilize joints, maintain functional position and prevent overstretching of ligaments [105.] Regular skin checks for pressure areas with splints and serial casting are necessary and modifications to the splint should be anticipated and provided as required [105.]

  Soft supportive foot splints or alternatively propping the feet to at least 90° in bed should be implemented to prevent a drop foot contracture in MSCC patients in bed [15, 30, 82, 108.]

  Consideration should be given to positioning limbs out of spastic patterns where spasticity is evident, to reduce spasticity and prevent contractures of muscles and joints [11, 40, 108, 119.]

- **Physiotherapy stretching and exercises** (see section 3.4)

  Bobath techniques, massage, rhythmic passive movements, active exercises and stretching techniques may be beneficial for reducing spasticity and preventing contractures however supportive research evidence is limited and often of low quality [11, 15, 40, 48, 108.]

Mixed and limited research evidence exists for physiotherapy stretching in spinal cord injury (SCI) to increase ROM and prevent contractures with both positive evidence [25, 42, 65, 68] and negative evidence [41, 52.] There is a need for more good quality, large, randomised controlled trials to establish the effectiveness of physiotherapeutic techniques for increasing ROM, preventing contractures and reducing spasticity.

Expert opinion and best practice guidelines recommend certain positions for stretching and prevention of contractures in SCI provided there are no contraindications:

- Tetraplegic physiotherapy arm positioning stretches may be considered: See Appendix 7 [40, 82, 108]
- Frog leg positioning stretches may also be considered [108]
- Feet should be propped up to at least 90° to maintain ankle dorsiflexion and tendo achilles length [82, 108]

- **Muscle relaxants** e.g. baclofen / botulinum toxin may be considered for spasticity control [40, 48, 108, 119]

3.8 Swelling/DVT management and prevention

Risk factors for DVT have been identified as history of venous thromboembolism; thrombophilias; cancer; chemotherapy; combined oral contraceptives; hormone replacement therapy; varicose veins with phlebitis; obesity; immobility (> 3 days bed rest); prolonged travel (>3 hours); trauma; before and after surgery and > 60 years [81, 101.]

DVT is a potential complication after spinal cord injury and with cancer and chemotherapy owing to haemostasis and / or increased blood viscosity but incidence can be reduced with prophylactic management [40, 81, 101.]

Strong evidence exists to support the use of GCS alone [9] and combined with low molecular weight heparin (LMWH) [4, 51, 81, 111] to reduce the incidence of DVT.

According to research and best practice, prophylactic GCS should be fitted and LMWH administered while MSCC patients are on bed rest and if / until mobility is resumed, unless contraindicated [15, 38, 40, 80, 81, 82, 101, 113, 119.] Contraindications to GCS include PVD, pressure ulcers and dermatological conditions [82.]

GCS should be sized and fitted by appropriately trained nursing and / or physiotherapy staff. Patients and carers should be educated in their use with monitoring and assistance as required (consult anti-embolism trust policy). Knee length stockings may be considered in patients with faecal or urinary

incontinence or bleeding (to avoid frequent soiling and skin irritation). Benko et al (2001) [9] found all lengths of GCS to significantly increase venous outflow.

Exercises, passive movements at least once daily, change of position, elevation and specialist lymphoedema input may also be provided to increase circulation and to reduce swelling and DVT incidence [40, 81, 82, 108, 113, 119.]

3.9 Pressure ulcer prevention and skin care

The patient will be commenced on the local Trust pressure ulcer prevention and management pathway.

Immobilisation is a risk factor for the development of pressure ulcers [30, 34.] Normally, higher-specification foam mattresses rather than standard hospital foam mattresses are recommended for individuals at risk of pressure ulcers on bed rest [30] and with a grade 1-2 pressure ulcer [79.] **The use of dynamic and alternating mattresses are however contraindicated for those with a suspected or unstable MSCC** [40, 82, 83, 87.]

The skin should be checked regularly for signs of redness. Areas of special concern include the sacrum, coccyx, ischial tuberosities, trochanters, scapulae, occiput, heels, digits, nose and ears [104.]

The skin beneath GCS, bracing (e.g. cervical collar) or splints should be checked at least once daily or more frequently if necessary [82.]

A pillow under the calves to elevate the heels may be considered so that the heels are free from the surface of the bed [30.] Heel-protection devices may also be considered.

Repositioning should be considered for all those deemed to be at risk of pressure ulceration unless medically contraindicated. **Repositioning by logrolling** is necessary for relieving pressure on the skin for the suspected or unstable MSCC patient [106.] See section 3.2. http://www.spinal.co.uk/userfiles/images/uploaded/pdf/288-709666.pdf

Repositioning frequency will be determined by the individual's tissue tolerance, degree of spinal instability, level of safe limb activity and mobility in bed, general medical condition, the overall treatment objectives, assessment of the individual's skin condition, general comfort and pressure-redistributing qualities of the support surface [30, 121.] An effective repositioning regime will be indicated by the absence of persistent erythema over bony prominences. If persistent erythema occurs, this may indicate that more frequent repositioning is required and that the current support surface is perhaps not optimal for the patient [121.]

Following logrolling, there is a tendency for undue pressure to be placed on bony surfaces and weight bearing areas. The patient's limbs should therefore be gently moved away from the support surface to help adjust skin loading after logrolling [106, 121.] See SIA Academy et al (undated)[106.] http://www.spinal.co.uk/userfiles/images/uploaded/pdf/288-709666.pdf

During transfers, there can be increased risk of friction, shearing and injury due to the inadvertent bumping or striking of body surfaces on equipment. There is also the risk of paralysed limbs falling from beds and trolleys or becoming trapped in cot sides [40.] Care should be taken to prevent skin trauma and injury through safe handling.

Care should be taken to minimise time spent on spinal boards to ≤ 30 minutes [38, 82.]

Attention should be paid to good skin hygiene and moisturising, and adequate nutrition and hydration [40.]

Skin emollients should be used to hydrate dry skin in order to reduce the risk of skin damage [121.]

The skin should be protected from exposure to excessive moisture e.g. perspiration, urinary or faecal incontinence, wound or fistula drainage or vomit. Barrier creams and sprays can be useful in protecting moist skin from damage, especially from urine. However it is best to manage incontinence so that the skin does not come into contact with urine e.g. through catheterisation. Care is required to ensure that the use of pads does not interfere with the pressure redistribution properties of any support surface [30, 121.]

Individuals with nutritional risks and pressure ulcer risk should be referred to a registered dietician [30, 53] and a tissue viability nurse for assessment and intervention as necessary [82.]

Clothing should be loose, soft and free from buttons, metal studs and thick seams [108.] Alternatively the patient may be nursed in a theatre gown, making skin checks easier [40.]

With regards to pressure ulcer risk, comfort may be the overriding and acceptable goal, even though it may be in conflict with best skin care practice [104.]

3.10 Self-care in bed

3.10.1 Washing and dressing

Those patients considered to be unstable will remain in bed and should be log rolled during this activity maintaining neutral spine alignment.

The need to complete numerous dressing and undressing procedures can be reduced by requesting patients to wear a theatre gown while on bed rest.

See Table 3 for key safety precautions on movement for suspected or unstable MSCC.

3.10.2 Feeding

Patients with lesions at T1 and above can experience difficulties with upper limb function. The occupational therapist will assess feeding and drinking ability and promote independence through the provision of splints and adapted cutlery and cups as appropriate [105.]

As patients will be flat in bed, assistance to drink, cut up food and eat may be required.

If there are signs of aspiration and choking during feeding and drinking, stop and inform medical staff. The speech and language therapist may be required to carry out a swallow assessment and make safe feeding recommendations as appropriate. The physiotherapist may be required to carry out a respiratory assessment and provide respiratory physiotherapy.

3.11 Leisure

Possible leisure activities that the patient can partake in when on bed rest should be considered and introduced by the occupational therapist [105.]

3.12 Communication assistance

It may be necessary to position the patient's bed within easy call of the nurses' station.

Environmental control units for a patient who cannot use an alert call button should be considered.

The use of prism glasses should be considered to allow greater range of vision while on bed rest.

3.13 Cognitive care

An acute episode of confusion may occur due to a number of factors (see section 2.14). This can impact on cognitive functions such as memory, judgement, problem-solving and safety awareness.

The occupational therapist may use various approaches including:

- Reinforcing, strengthening or re-establishing previously learned patterns of behaviour
- Establishing new patterns of cognitive activity through compensatory cognitive mechanisms for impaired neurological systems
- Establishing new patterns of activity through external compensatory mechanisms such as environmental structuring and support
- Enabling persons to adapt to their cognitive disability, even though it may not be possible to directly modify or compensate for cognitive impairment, in order to improve their overall level of functioning and QOL [14, 18, 19.]

3.14 Psychological care

Patients and their families should be provided with the opportunity to discuss their concerns, emotions, distressing issues, mood and interests, anxiety, adjustment to illness and treatment, strengths and existing support [13, 62.]

Screening and the identification of the types of problems that cause the most distress can indicate which type of professional referral should be made or which type of intervention may be most beneficial [115.] Patients should be informed about the range of support services available and how to access these [40, 78, 80.] A local directory of organisations and community resources that provide support and information can be found at: http://survivorship.cancerni.net/ [84.] Onward referral will be dependent on patient consent.

Cognitive Behavioural Therapy which can include cognitive restructuring, increasing the person's access and willingness to engage in rewarding activities, various forms of relaxation training, problem solving strategies, as well as assertiveness and coping skills training, is moderately effective in improving symptoms of depression, coping and adjustment [86.]

3.15 Involvement and education – patient, family, carer

Patients, families and carers should be educated early from admission [80.] The clinical reasoning for supine bed rest with neutral spine alignment and / or a cervical collar and the importance of reporting pain and neurological symptoms should be explained to patients, families and carers [17, 72.]

The role of physiotherapy and occupational therapy, proper skin care, management of GCS, bed exercises, assisted coughing, management of ADLs and relaxation techniques as appropriate should be discussed.

3.16 Discharge planning and onward referral (See section 4.20 for full details)

All patients with MSCC admitted to hospital should have appropriate early multidisciplinary discharge planning started from admission involving: [26, 27, 80, 99, 119]

- The patient, their family and carers
- Relevant members of the primary care multidisciplinary team
- Direct contact with the community care team (e.g. community physiotherapist and occupational therapist, general practitioner (GP), district nurse, other AHPs, specialist palliative care team and care providers) before discharge [72.] Community staff involved with the patient pre-admission may be contacted for background information on admission [119.]

Patients with MSCC will have advanced cancer. When planning future care, the discussion should focus on what is important to the patient, in the context of what may be realistically hoped for. The patient's preferred and most appropriate place of care needs to be considered and discussed with the patient, family and carers [27.]

Components of the post discharge plan should address: [72, 80, 99, 119]

- Likely residence following discharge, its suitability and accessibility
- Expected functional outcomes
- Patient's care needs
- Availability of family members and friends who can provide assistance outside that provided by core care services
- Availability of follow-up services such as care providers, palliative care services and community rehabilitation services

- Equipment needs and recommended changes to the home / care environment as appropriate
- Provision of discharge and future transport needs as required

Full reports from all professionals involved in the patient's care with advice on spinal stability and mobility permitted should be provided [99.] See section 4.20 for details of information to be included.

Supportive care and rehabilitation for patients with STABLE MSCC

4. Supportive care and rehabilitation for patients with STABLE MSCC

Care of the threatened spine:

Stability of the spine and the level of **mobility allowed** should be agreed by the multi-disciplinary team [37, 72, 113.] This may involve the oncologist, radiologist, orthopaedic surgeon, physiotherapist and occupational therapist and should be clearly documented in the patient's medical notes. The spinal stability and mobility recommendations should be referred to within the medical notes (Appendix 6).

Clinical vigilance should be exercised throughout rehabilitation with regular assessment and documentation of pain and neurology in the patient's medical, physiotherapy and occupational therapy notes.

If pain or neurological symptoms worsen during rehabilitation, the activity should be stopped and the patient returned to a position where these changes reverse [80.] Medical advice should be sought again regarding spinal stability and if mobilisation is allowed.

It is accepted that some patients will be assessed as being unstable. **Owing to short life expectancy and QOL issues, they may however be managed as stable.** This decision will be made in discussion with the patient, family and consultant or registrar and should be documented, with advice given regarding the level of mobility allowed.

Red Flags

Signs of spinal instability or increasing spinal cord compression:

1. Worsening pain
2. Worsening sensation
3. Increasing muscle weakness
4. Worsening mobility and balance
5. Worsening bladder and bowel function

Clinical vigilance and thorough monitoring of these signs are required during rehabilitation [17, 72, 80, 88, 119].

Some additional considerations/ precautions/ contra-indications in the rehabilitation of MSCC patients:

- Other sites of spinal metastases and pending sites of MSCC
- Other sites of bony disease and pathological fracture risk or existing pathological fractures
- Impaired cardiac function
- Unstable HR (abnormally high or low)
- Unstable BP (abnormally high or low), dizziness or postural hypotension
- Motion sickness
- Visual disturbance or loss
- Signs of DVT or pulmonary embolus
- Signs of autonomic dysreflexia (characterised by raised BP, decreased HR, headache, blotchy flushed skin, sweating above the level of the lesion, pallor below the level of the lesion). (See section 2.15)
- Confusion
- Drowsiness
- Pressure ulcer / skin breakdown
- Chronic history of poor or absent sensation
- History of falls or recent falls and any possible injuries sustained
- Increased bleeding risk / low platelets
- Low haemoglobin
- SOB / hypoxia
- Arthritic joints / restrictions in ROM
- Recent surgery
- Poor preadmission mobility / prolonged immobility
- Chronic history of muscle weakness

4. Supportive care and rehabilitation for patients STABLE MSCC may include:

4.1 Graduated / controlled mobilisation (commencing with verticalisation / sitting up in bed through 60° over 3-4hours with monitoring of pain, power and sensation)
- 4.1.1 Bracing
- 4.1.2 Verticalisation

4.2 Seating assessment

4.3 Retraining function
- 4.3.1 Bed mobility
- 4.3.2 Functional transfers
- 4.3.3 Advanced transfers
- 4.3.4 Balance, gait and mobility re-education

4.4 Wheelchair use and mobility

4.5 Re-educating Activities of Daily Living
- 4.5.1 Self-care - washing, dressing, grooming
- 4.5.2 Bathing / showering
- 4.5.3 Feeding

4.6 Meal preparation and home management

4.7 Leisure

4.8 Physiotherapy exercises

4.9 Pain control

4.10 Respiratory care

4.11 Prevention of contractures and / or spasticity control

4.12 Swelling / DVT management and prevention

4.13 Pressure ulcer prevention and skin care

4.14 Fatigue management / increasing exercise tolerance

4.15 Sensory / proprioceptive re-education

4.16 Cognitive care

4.17 Psychological care

4.18 Adjustment to disability

4.19 Involvement and education- patient, family, carer

4.20 Discharge planning and onward referral

4.1 Graduated /controlled mobilisation

Best practice guidelines advocate graduated mobilisation of MSCC patients based on MRI results and formal medical advice to mobilise, with strict pain, neurological assessment and clinical vigilance [37, 38, 72, 80, 88, 95, 113, 116, 119.]
Graduated mobilisation should be commenced by appropriately skilled physiotherapy / professional staff, capable of assessing pain and neurological symptoms.

4.1.1 Bracing:

Cervical spine collars and spinal bracing significantly reduce spinal motion, stabilising the spine and protecting the spinal cord [33, 57, 69] and may reduce spinal pain. Collars and spinal bracing may be prescribed or considered by the physiotherapist and medical team for mobilising. Appropriate referral should be made and specialist advice sought from orthotics if required. A small stock of cervical collars should be kept locally for ease of accessibility. Owing to an extensive range of thoracic and lumbar spinal bracing, it may be impractical to maintain an adequate range of braces and measuring and ordering should be done on an individual basis.

Table 5: **Possible indications for collars and spinal bracing for mobilising:**

Patients with unstable MSCC but not suitable for surgery [15, 17, 38, 40, 72, 80, 108, 113, 119]
Patients with unstable MSCC but not suitable for surgery, with significant preservation of power and sensation, for protection of neurology
Patients with significant mechanical pain to reduce pain [72]
Post-operative spinal surgery patients as per consultant recommendation

Patients in collars are at risk of skin breakdown. This may occur at the shoulders, occiput, chin and back, generally from plastic edges not being entirely covered by foam. Changing of the pads every 24 hours and inspecting and cleaning skin every 12 hours are recommended [89.] Radiotherapy skin markings may however limit cleaning of the skin during active radiotherapy treatment.

4.1.2 Verticalisation

Day 1

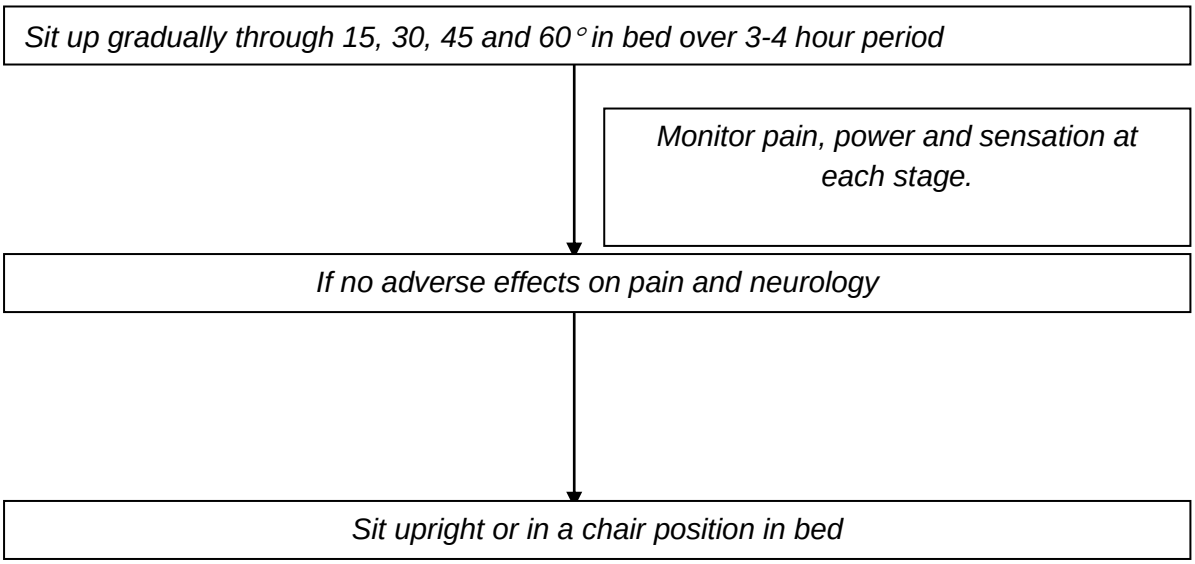
Verticalisation or graduated sitting up in bed through 60° over 3-4 hours: This procedure should be undertaken with strict clinical vigilance: Pain, power and sensation should be monitored at each stage of verticalisation in bed (See Figure 2). Stop the activity and lower the patient's position in bed if there is worsening pain or neurological symptoms and seek medical advice.

Blood pressure should be monitored especially if there are symptoms of dizziness.

Shear forces increase at the sacrum, heels and ischial tuberosities when sitting above 30° in bed. These forces can be reduced by bending the knees using the bed mechanism [30, 121.] The patient's knees should always be bent before the head of the bed is raised [70.] Regularly review the patient during this period as a slouched position should be avoided. Consider pillow support to the upper limbs / trunk on sitting up.

See section 4.2 for advice on repositioning.

Figure 2: Verticalisation or graduated sitting up in bed through 60° over 3-4 hours: Based on best practice guidelines [37, 38, 72, 80, 88, 95, 113, 116, 119.]



Gentle hip and knee flexion and knee rolling in bed may be assessed for their impact on pain and neurology as components of movement required for getting patients out of bed [17.] Prior to getting patients out of bed, blood pressure should be checked as postural hypotension may occur [17.]

<u>Day 1 / Day 2 onwards</u>: **Sitting up out of bed**

When the patient can comfortably sit upright in bed with no adverse effects on pain and neurology, unsupported sitting, transfers, sitting in the chair or wheelchair and more active mobility and rehabilitation out of bed can be commenced depending on the patient's symptoms [17, 80, 88, 95, 113.]

Patients may be sat up through side lying (modified log rolling) if they are experiencing pain or spinal stability is compromised.

Sitting balance should be assessed and re-educated with the patient sitting over the side of the bed or plinth.

The occupational therapist should be involved in the sitting balance assessment with the physiotherapist as the patient's balance will influence seating recommendations.

4.2 Seating assessment

The occupational therapist will be involved in the assessment for appropriate seating.

ROM for hip flexion, abduction and adduction and knee flexion / extension should be obtained when in supine.

On initial sitting up over the edge of bed, pain, balance, tonal changes, weight distribution, preferred sitting posture, spinal alignment, pelvic position, limitations in ROM, requirement for bracing, fatigue, tolerance for sitting, ability to maintain posture and reposition and respiratory function should be assessed. Body measurements to guide the prescription of seating should be carried out.

The patient's skin integrity and pressure ulcer risk will also influence the selection of seating and pressure-redistributing seat cushion.

Other factors that should be considered during the seating assessment include transfer ability and technique, level of function and independence, continence, overall comfort and cognition [22, 30, 107.]

Sitting time recommendations:

During initial sitting out, patients should be closely monitored for pain, changes in neurology, ability to maintain posture and skin changes. Time in sitting may have to be restricted to less than two hours per session e.g. where there is pressure risk, pain, diminished patient tolerance, fatigue, and decreased ability to maintain posture. Patients should not return to sitting again for at least one hour [79, 107, 122.] Sitting time may be gradually progressed provided there are no adverse effects and considering the factors above.

Individuals with pressure ulcers on sitting surfaces should limit time sitting up in the chair to three times / day for 60 minutes or less and cushions (gel or air) that redistribute pressure should be used [79, 122.]

Repositioning

Repositioning should be considered for all those deemed to be at risk of pressure ulceration.

The frequency of repositioning and conducting a skin assessment will be determined by the individual's tissue tolerance, ability to independently adjust position, level of activity and mobility, general medical condition, the overall treatment objectives, assessment of the individual's skin condition, general comfort and pressure-redistributing qualities of the support surface [30, 121.] An effective repositioning regime will be indicated by the absence of persistent erythema over bony prominences. If persistent erythema occurs, this may indicate that more frequent repositioning is required and that the current support surface is perhaps not optimal for the patient [121.]

The type and duration of pressure relief by position change must be assessed individually. Several techniques are suggested depending on the physical and cognitive abilities of the individual.

- Those who can safely walk should be encouraged to do so every few hours [80.]

- Those who can reposition themselves in sitting should be encouraged to do so every 15 to 30 minutes, with activities such as chair push-ups (contraindications would include extensive bone metastasis and poor balance), forward-leaning >45° or side to side leaning. These should be conducted for two to three minutes at a time, to be effective [38, 80, 92, 93, 95, 119, 122.]

- When a manual weight shift cannot be performed, the use of a mechanical reclining or powered tilt chair / wheelchair should be considered [92.] A posterior seat tilt of 20° or more reduces pressure under the pelvis [67.] Those who are incapable of performing position changes while sitting should be repositioned at least every hour by a caregiver [122.]

4.3 Retraining function (Day 1 / 2 onwards)

When the patient can sit up in bed with no increase in pain or neurological symptoms, more active rehabilitation can proceed. The degree of functional independence achievable is dependent on the level and completeness of the spinal cord compression and resulting motor weakness, sensory dysfunction and pain. Age and other medical conditions can also impact on an individual's

functional performance. (See Appendix 3 & 4a for motor and sensory levels of innervation).

4.3.1 Bed mobility (bed / plinth)

Patients should practise and be taught bed mobility to maximise independence with monitoring of pain and neurology e.g. [17, 108, 113, 119].

- Rolling in bed
- Moving up, down and across bed
- Lying to sitting to lying
- Getting into and out of bed

The level of assistance required, moving and handling devices required and the need for a profiling bed should be assessed.

4.3.2 Functional transfers (e.g. bed to chair)

A moving and handling risk assessment should be carried out prior to transfers considering: assistance required, transfer technique, moving and handling devices required, weight, size, mobility, space, pressure relief and skin care, sitting balance, cognitive status and fatigue. See local trust care pathway for the moving and handling of patients.

Table 6: **Possible transfer methods in rehabilitation** (guidance only): [6, 119]

Activity Level	**Possible transfer method in rehabilitation: e.g. bed to chair, wheelchair, commode / toilet and shower chair transfers**
1. No sitting balance ± poor upper limb activity	Hoist + assistance of 2 minimum (If there is no improvement in sitting balance or board transfers over 1 week of rehabilitation, it is likely that a hoist will be required for transfers)
2. Some or independent sitting balance, reasonable upper limb strength but significant loss of leg power (<3) / unable to stand	Sliding board transfers (with side off chair) ± assistance Hoist will be required if equipment does not facilitate a sliding board transfer
3. Sitting balance / ≥ 3 leg power • Unable to step with assistance	Standing transfer aid ± assistance Standing transfer with side off chair ± assistance Sliding board transfers (with side off chair) ± assistance
• Able to step	With assistance, supervision or independently ± walking aid (e.g. pulpit, zimmer rollator (ZR), zimmer frame (ZF), delta rollator (ΔR), stick, crutch)

The physiotherapist and occupational therapist will be involved in the assessment and re-education of transfers and will make recommendations for safe transfers regarding equipment and assistance required. Training will be provided to staff, patients, families and carers on safe transfer techniques and use of equipment as required.

Patients with unilateral limb weakness should be assessed and treated on an individual basis.

Functional transfers to the bed, chair, commode, toilet, wheelchair, shower chair and bath should be considered [95, 108.]

4.3.3 Advanced transfers

As required, advanced transfers should be taught and practised e.g. [15, 38, 95, 108, 119]

- 180° transfers
- Chair to floor transfers
- Height difference transfers
- Car transfers

4.3.4 Balance, gait and mobility re-education

Re-education should be commenced to restore more independent mobility, whether by ambulation or wheelchair mobility [17, 72, 119.]

- In patients with Grade 3 or above bilateral leg power: sit to stand, standing balance and stepping activities, gait re-education and step/stair practise may be considered. Orthotics and walking aids should also be provided if required to aid safe gait, with instruction in their use to the patient, family, carers and staff [17, 37, 72, 119]. A wheelchair may also be required and should be assessed on an individual basis.

  Strong evidence exists to support conventional physiotherapy gait re-education, body weight support gait training (with both methods being equally effective) and functional electrical stimulation (FES) assisted walking. Improvements in walking ability, speed and distance, lower limb strength, balance and psychological well-being are widely reported with gait re-education [3, 29, 32, 59, 66.]

  For stairs: additional rails, assistance, use of a stick or crutch, altered technique or provision of a stair lift may be required for safety. When considering stair lift provision, referral to community occupational therapy and a feasibility assessment will be required. If stairs are too difficult, a downstairs arrangement or alternative accommodation may be required. On occasions, a permanent upstairs arrangement may be requested and considered if the patient no longer needs to leave the home. Additional ambulance crew assistance will be required on hospital discharge to lift the patient upstairs to stay permanently.

  For steps: additional rails, assistance, walking aids, altered technique or ramped access may be required for safety.

- In patients with below grade 3 bilateral leg power: wheelchair mobility is likely to be the safest method of mobilising.

- Patients with unilateral lower limb weakness should be assessed and treated on an individual basis.

Tilt tables and standing frames may also be used to stretch the lower limbs in tetraplegic and paraplegic patients as appropriate.

Blood pressure should be checked (particularly with symptoms of dizziness) as postural hypotension may occur especially in T6 and above MSCC patients in standing [15.]

4.4 Wheelchair use and mobility

The occupational therapist will be involved in the sensitive introduction, assessment, training and provision of wheelchairs for patients who are unable to walk.

A patient is required to be able to sit upright for > 1 hour or more before introducing a wheelchair. During initial sitting, patients should be closely monitored for pain, changes in neurology, ability to maintain posture and skin changes.

See section 4.2: Seating assessment, Sitting time recommendations and Repositioning for additional information.

The wheelchair prescription will consider the level and degree of neurological impairment, spinal/pelvic positioning, management of abnormal tone, accommodation or prevention of deformity, improvement/maintenance of functional skills, accommodation for impaired sensation, body weight, comfort and prevention of secondary complications such as pressure ulcers, spinal deformity and pain (upper limb and back) from the mechanical stress of pushing a wheelchair [22.]

When prescribing and requesting a wheelchair, an occupational therapist is required to apply the wheelchair services regional criteria:

"Wheelchairs will only be supplied to service users who need them for permanent use i.e. longer than six months. Commissioning Trusts have arrangements locally for short term wheelchair use through the British Red Cross [94.]"

Manual wheelchairs with adjustable axle position and a lightweight frame may be considered when trying to improve wheelchair propulsion efficiency and as a way of reducing the risk of upper extremity injury in those at risk [22.]

During inpatient rehabilitation, physical conditioning and strengthening of the upper extremity during rehabilitation is important to the development of wheelchair propulsion skills. Opportunities should be provided to master environmental barriers. The risk of increased loading on the users' upper arms and potential for overuse injuries needs to be considered when determining the appropriateness of completing slopes [22.]

Wheelchairs should be regularly maintained. Under inflated tyres cause an increase in energy expenditure [22.]

The occupational therapist will make arrangements for provision of a wheelchair where required. When considering more specialist wheelchairs further criteria need to be applied. It may be appropriate to link with the local wheelchair specialist service.

4.5 Re-educating Activities of Daily Living

4.5.1 Self-care – washing, dressing, grooming

Patients actual functioning can vary extensively as a result of the level and completeness of the MSCC and resulting motor weakness and sensory dysfunction. Fatigue and pain can impact on ability and management of these symptoms should be considered.

The occupational therapist will assess and make recommendations for body positioning, appropriate techniques, adaptive equipment, clothing, caregiver set up and need for assistance.

- Those with ≥ 3 bilateral leg power: may benefit from personal care practice incorporating standing.

- Those with < 3 leg power/unable to stand but good upper limb and trunk control: should be encouraged to participate in lower body washing and dressing when in bed. Then they can be transferred to a chair/wheelchair to complete their upper body washing and dressing, ideally independently. Set up may be required.

- Those with reduced trunk control and reasonable upper limb strength: may benefit from practice of personal care to develop unsupported sitting balance [43.]

- Those with reduced upper limb function and/or reduced trunk control: may benefit from the provision of splints and adaptive equipment (e.g. U-cuff, built up handles). The patient's position for participation can be critical to increasing independence [105.]

For those who require support to complete washing and dressing, discussion should occur as to how these needs will be met when discharged from hospital. A care package, placement in an environment where the required care can be provided or family/carer support may need to be arranged. If family/carers wish to take on this role, they should be supported to develop the skills to competently carry out the task [26.]

4.5.2 Bathing/showering

The occupational therapist will assess the quality of performance of bathing and showering activities as appropriate, identifying the need for adaptive equipment to facilitate independence as required. At ward level, those with poor trunk control may require assessment for tilt in space shower chairs. Those with diminished sensation will require the water temperature to be closely monitored.

The appropriateness of bathing and showering at home should take into consideration safe access, level of assistance required and equipment and adaptation needs.

4.5.3 Feeding

Patients with high MSCC can experience difficulties with upper limb function. The occupational therapist will assess feeding and drinking ability and recommend or provide a range of feeding and drinking aids and/or hand and wrist splints to facilitate independence [105.]

If there are signs of aspiration and choking during feeding and drinking, stop and inform medical staff. The physiotherapist may be required to carry out a respiratory assessment and provide respiratory physiotherapy. The speech and language therapist may be required to carry out a swallow assessment and make safe feeding recommendations.

4.6 Meal preparation and home management

The former and current roles of the individual in the home setting should be considered before home management activities are addressed. The ability to perform these activities will be dependent on the level and completeness of the MSCC. Fatigue and pain can also limit participation in these activities and management of these symptoms should be considered.

Occupational therapy can provide the opportunity to practice these skills and can provide advice on adapting the home environment and recommend equipment to enhance independence.

For those who require support for meal preparation and home management, discussion should occur as to how these needs will be met when discharged from hospital. Meal provision, a care package, placement in an environment where the required support can be provided or provision of family / carer support may need to be arranged.

4.7 Leisure

Opportunity should be provided to discuss, explore and partake in leisure activities [17, 108.] The potential to modify activities to allow participation should be explored [105.]

4.8 Physiotherapy exercises

Widespread strong evidence exists to support the use of exercise in SCI. Cardiorespiratory [28, 46, 73, 75], cardiac [28, 118], vascular [28, 118], metabolic [28], bone [5, 28], biomechanical/ROM [28, 73, 75], muscular [28, 46, 73, 75, 120], balance, functional [73, 75, 120], QOL [28, 71, 73, 75] and psychological benefits [73, 75] for exercise in SCI and cancer are well documented throughout the literature.

Physiotherapy exercises are advocated in the rehabilitation of the MSCC patient largely to stretch muscles and joints and maintain ROM, strengthen muscle and neural pathways, promote circulation, encourage balance reactions, restore function, improve physical capacity, reduce fatigue, promote bone health and improve psychological well-being and QOL.

Exercises may include static, passive, active assisted, active and resisted exercises, stretching techniques, balance exercises and Bobath techniques in various positions depending on the patient's muscle activity, spinal stability and pain [11, 15, 40, 108.] Exercises for the trunk, upper limbs and lower limbs may be performed. A home exercise regime may be taught with written instructions issued to patients and carers [119.]

FES of the muscles may also be a useful adjunct to exercise and movement. Evidence exists to support its use in improving muscle strength and endurance and reducing muscle atrophy and in enhancing gait and functional recovery of movement [29, 120.]

Table 7: Precautions on exercise in the rehabilitation of the MSCC Patient: Based on expert opinion and best practice guidelines: [15, 37, 38, 40, 82, 95, 108, 119.] See Section 3.4 and Table 3.

• Physiotherapy exercises should be performed within strict pain limits and with monitoring of pain, power and sensation. Stop any activity worsening pain or neurology and seek medical advice.
• Neck exercises should be avoided and care should be taken on activities involving head movement with MSCC of the cervical spine [38, 108]
• Back exercises should be avoided with MSCC of the thoracic, lumbar or sacral spine [15]
• Avoid prone positioning for exercise with all levels of MSCC
• Care should be taken when performing shoulder movements to end of range and /or with resisted arm exercise in patients with cervical or upper thoracic MSCC [15, 37, 40, 108, 119.] If any increase in pain or altered neurological symptoms occurs, the activity should be stopped.
• Avoid overstretching of the wrist and finger flexors in C6 / 7 tetraplegics who require a tenodesis grip [95, 108]
• Care should be taken when performing hip / pelvic movements to end of range and straight leg raising in patients with low thoracic, lumbar or sacral MSCC [15, 37, 40, 108, 119.] If any increase in pain or altered neurological symptoms occurs, the activity should be stopped.
• Care should be taken to preserve ankle dorsiflexion range of movement and to prevent drop foot contractures [15, 82, 108]

4.9 Pain control

For those patients who experience and/or anticipate pain on movement, administration of pain relief should be considered prior to movement and break through analgesia provided as appropriate [80.]

A range of non-pharmacological interventions [2] can be useful in managing pain:

- Gentle limb movement and exercise [112]
- Positioning [17]

- Massage [112]
- Bracing and collars [40]
- Relaxation [58, 112]
- TENS [49, 112]
- Acupuncture [112]
- Heat (contraindicated over the site of cancer and pressure ulcers) [17, 112]
- Cognitive Behavioural Therapy (CBT) aimed at modifying dysfunctional pain cognitions and coping abilities [16, 44, 112]
- Motivational interviewing [114]

4.10 Respiratory care

Respiratory assessment and respiratory physiotherapy treatment should be provided as required [15, 40, 80.]

Table 8: **Respiratory care:** This may include**:**

• Respiratory examination and monitoring of clinical observations (See 2.5 & 2.4)
• Breathing exercises; exercise; inspiratory and respiratory muscle training; incentive spirometry; glossopharyngeal breathing; lung volume recruiting techniques / breath stacking and IPPB (unless contraindicated): to increase lung volumes, reduce the work of breathing and aid clearance of secretions [97, 102, 103, 117]
• Forced expiratory techniques and coughing, manual assisted coughing, suction, mechanical insufflation / exsufflation and cough assist machines, abdominal binders and abdominal muscle electrical stimulation: to aid clearance of secretions [97, 103, 106]
• Chest wall vibrations and Expiratory flow resistive devices: to aid clearance of secretions [103]
• Positioning: to maximise ventilation / perfusion matching, increase lung volumes, aid clearance of secretions and reduce the work of breathing. N.B. Diaphragmatic excursion is improved in supine for the tetraplegic patient through elimination of gravity and abdominal displacement [38, 40, 82]

• O2: for hypoxia, shortness of breath and to ensure adequate oxygenation of the spinal cord [40, 82]
• Inhalers / Nebulisers e.g. bronchodilators should be considered in tetraplegics with an element of obstructive airway impairment [103]
• NIPPV / IPPV [82]

Care should be taken during the delivery of certain respiratory physiotherapy techniques e.g. assisted cough, to ensure that the stability of the spinal cord is not jeopardised by monitoring pain and neurological symptoms throughout treatment.

Any swallowing difficulties should be reported to medical staff and referral to the speech and language therapist should be made as appropriate. Medical staff should also be informed of any significant deterioration in respiratory function.

Relaxation techniques and energy conservation measures may also be beneficial in the management of breathlessness [110.]

4.11 Prevention of contractures and/or spasticity control

Prevention of contractures and/or spasticity control may include:

- **Corrective positioning and splinting**

  Corrective positioning and regular change of limb position are critical aspects in maintaining joint ROM, preventing contractures and controlling spasticity [10.]

  Patients with MSCC are at risk of developing upper and lower limb muscle contractures due to muscle weakness or occasionally spasticity.

  Splints and serial casting may be considered for the elbows, wrists, hands, knees, ankles or feet to prevent or reduce contractures, prevent deformity, stabilize joints, maintain functional position and prevent overstretching of ligaments [105.] Regular skin checks for pressure areas with splints and serial casting are necessary and modifications to the splint should be anticipated and provided as required [105.]

  Soft supportive foot splints or alternatively propping the feet to at least 90° in bed should be implemented to prevent a drop foot contracture in MSCC patients in bed [15, 30, 82, 108.]

Patients with ankle weakness or a “drop foot” may also require provision of an Ankle Foot Orthosis (AFO) for safe walking to prevent catching of the toes and trips, foot and ankle trauma and contractures.

Consideration should be given to positioning limbs out of spastic patterns where spasticity is evident, to reduce spasticity and prevent contractures of muscles and joints [11, 40, 108, 119.]

- **Physiotherapy stretching and exercises** (see sections 3.4 and 4.8): Bobath techniques, massage, rhythmic passive movements, active exercises and stretching techniques may be beneficial for reducing spasticity and preventing contractures however supportive research evidence is limited and often of low quality [11, 15, 40, 48, 108.]

  Weight bearing activities e.g. standing or weight bearing muscle stretches, may also decrease spasticity and prevent contractures [11.]

  Mixed and limited research evidence exists for physiotherapy stretching in SCI to increase ROM and prevent contractures with both positive evidence [25, 42, 65, 68] and negative evidence [41, 52.] There is a need for more good quality, large, randomised controlled trials to establish the effectiveness of physiotherapeutic techniques for increasing ROM, preventing contractures and reducing spasticity.

  Expert opinion and best practice guidelines recommend certain positions for stretching and prevention of contractures in SCI provided there are no contraindications:

  - Tetraplegic physiotherapy arm positioning stretches may be considered: See Appendix 7 [40, 82, 108]
  - Frog leg positioning stretches may also be considered [108]
  - Feet should be propped up to at least 90° to maintain ankle dorsiflexion and tendo achilles length [82, 108]

- **Muscle relaxants** e.g. baclofen/botulinum toxin may be considered for spasticity control [40, 48, 108, 119]

4.12 Swelling/DVT management and prevention (see section 3.8) DVT is a potential complication after spinal cord injury and with cancer and chemotherapy owing to haemostasis and / or increased blood viscosity but incidence can be reduced with prophylactic management [40, 81, 101.] Strong

evidence exists to support the use of GCS alone [9] and combined with LMWH [4, 51, 81, 111] to reduce the incidence of DVT.

According to research and best practice, prophylactic GCS should be fitted and LMWH administered while MSCC patients are on bed rest and if / until mobility is resumed, unless contraindicated (see section 3.8) [15, 38, 40, 80, 81, 82, 101, 113, 119.] GCS may be removed in patients with good preservation of power; mobilising regularly throughout the day and with no history of or current DVT or swelling [81.]

Exercises, passive movements, change of position, elevation and specialist lymphoedema input may also be provided to increase circulation and to reduce swelling and DVT incidence [40, 81, 82, 108, 113, 119.]

4.13 Pressure ulcer prevention and skin care

The patient will be commenced on the local trust pressure ulcer prevention and management pathway.

The pressure ulcer risk assessment should be repeated regularly and as frequently as is required by the individual's condition [30.]

The skin should be inspected frequently for signs of redness in individuals identified as being at risk of pressure ulceration [30.] Areas of special concern include the sacrum, coccyx, ischial tuberosities, trochanters, scapulae, occiput, heels, digits, nose and ears [104.] For the MSCC patient no longer on bed rest and mobile, skin should be checked at least once daily [80.] The skin beneath GCS, bracing (e.g. cervical collar) or splints should be checked at least once daily or more frequently if necessary [82.]

The selection of an appropriate support surface when in bed should take into consideration pressure ulcer risk, skin integrity, sensation, the individual's level of mobility within the bed and comfort [30.]

Shear forces increase at the sacrum, heels and ischial tuberosities when sitting above 30° in bed. These forces can be reduced by bending the knees using the bed mechanism [30, 121.] The patient's knees should always be bent before the head of the bed is raised [70.] A pillow under the calves to elevate the heels may be considered so that the heels are free from the surface of the bed [30.] Heel-protection devices may also be considered.

Repositioning: See section 4.2.

Those patients, who sit out and are at risk of pressure ulcers, have restricted mobility, reduced sensation or postural needs should be assessed by occupational therapy for an appropriate pressure-redistributing cushion. This

assessment will be conducted in conjunction with seating and as appropriate wheelchair assessments [30.] See section 4.2 and 4.4.

Sitting time recommendations: See section 4.2.

During transfers, there can be increased risk of friction, shearing and injury due to the inadvertent bumping or striking of body surfaces on equipment. There is also the risk of paralysed limbs falling from beds and trolleys or becoming trapped in cot sides [40.] Care should be taken to prevent skin trauma and injury through safe handling.

Attention should be paid to good skin hygiene and moisturising, and adequate nutrition and hydration [40.]

Skin emollients should be used to hydrate dry skin in order to reduce the risk of skin damage [121.]

The skin should be protected from exposure to excessive moisture e.g. perspiration, urinary or faecal incontinence, wound or fistula drainage or vomit. Barrier creams and sprays can be useful in protecting moist skin from damage, especially from urine. However it is best to manage incontinence so that the skin does not come into contact with urine e.g. through catheterisation. Care is required to ensure that the use of pads does not interfere with the pressure redistribution properties of any support surface [30, 121.]

Individuals with nutritional risks and pressure ulcer risk should be referred to a registered dietician [30, 53] and a tissue viability nurse for assessment and intervention as necessary [82.]

Clothing should be loose, soft and free from buttons, metal studs and thick seams [108.] With regards to pressure ulcer risk, comfort may be the overriding and acceptable goal, even though it may be in conflict with best skin care practice [104.]

4.14 Fatigue management and increasing exercise tolerance

Fatigue and exercise tolerance should be assessed [76.]

Education about fatigue should be offered to all patients [76.]

Patients should be encouraged to self-monitor their fatigue levels [76.]

Education in pacing, planning, balancing and prioritising activities and energy conservation techniques should be provided as necessary [7, 76, 85.]

Patient education programmes focusing on problem solving, goal setting and cognitive behavioural interventions are effective in the management of fatigue [35, 85, 98].

Relaxation techniques and promotion of sleep hygiene may also alleviate symptoms experienced [35, 58, 85].

Graduated exercise should be taught and encouraged as much positive research evidence exists to support exercise in reducing fatigue and increasing exercise tolerance [24, 28, 46, 71, 73, 75, 76, 85, 118, 120].

4.15 Sensory and proprioception re-education

Education on sensory and proprioceptive deficits and implications on function should be provided. Integration, use and exercise of the affected limb(s) should be encouraged where possible. Compensatory techniques and modification of the environment may be required. The need for increased safety awareness should be emphasised as necessary [21].

4.16 Cognitive care

An acute episode of confusion may occur due to a number of factors (see section 2.14). This can impact on cognitive functions such as memory, judgement, problem-solving and safety awareness.

The occupational therapist may use various approaches including:

- Reinforcing, strengthening or re-establishing previously learned patterns of behaviour
- Establishing new patterns of cognitive activity through compensatory cognitive mechanisms for impaired neurologic systems
- Establishing new patterns of activity through external compensatory mechanisms such as environmental structuring and support
- Enabling persons to adapt to their cognitive disability, even though it may not be possible to directly modify or compensate for cognitive impairment, in order to improve their overall level of functioning and QOL [14, 18, 19].

4.17 Psychological care

Patients and their families should be provided with the opportunity to discuss their concerns, emotions, distressing issues, mood and interests, anxiety, adjustment to illness and treatment, strengths and existing support [13, 62].

Screening and the identification of the types of problems that cause the most distress can indicate which type of professional referral the patient should receive or which type of intervention may be most beneficial [115.] Patients should be informed about the range of support services available and how to access these [40, 78, 80.] A local directory of organisations and community resources that provide support and information can be found at: http://survivorship.cancerni.net/ [84.] Onward referral will be dependent on patient consent.

Cognitive Behavioural Therapy which can include cognitive restructuring, increasing the person's access and willingness to engage in rewarding activities, various forms of relaxation training, problem solving strategies, as well as assertiveness and coping skills training, is moderately effective in improving symptoms of depression, coping and adjustment [86.]

4.18 Adjustment to disability

Patients with MSCC have to live with the psychological, physical and emotional effects of advanced cancer as well as the consequences of a disability and the impact this has on their day to day lives [31.]

In the early stages, patients may be uncertain and unrealistic of their abilities and the potential impact their disability has on their lives. An opportunity should be given to explore and set goals [31, 40, 80.] Realistic goal setting as part of the rehabilitation process to maximise independence and control should be negotiated and implemented. While patients may describe goals and plans that seem overly optimistic and impracticable, other goals may be feasible and grounded. Rather than directly contradict unrealistic goals, reasonable and achievable goals should be encouraged and agreed [31]

4.19 Involvement and education – patient, family, carer

Patients, families and carers should be educated early from admission about the rehabilitation process. They should be encouraged to participate in discharge planning discussions from admission [26, 80.] Patient, family and caregiver education should be provided as appropriate in the following areas: [17, 26, 72, 119]

- Skin care and pressure ulcer prevention
- Management of GCS if required
- Respiratory care
- Stretches and exercises
- Handling and transfer methods

- Walking and walking aids
- Fitting and use of any orthosis and bracing with advice on hygiene / changing of liners and skin checks
- Stair techniques
- Personal care activities
- Safe use of prescribed equipment
- Relaxation techniques
- Fatigue management
- Reporting of increased or recurrence of signs and symptoms e.g. pain or neurological symptoms or worsening mobility.

This is a time when patients and their families are adjusting to a diagnosis of MSCC and are likely suffering from information overload. Under these circumstances, the individuals' ability to appreciate this training and education can be compromised. Reinforcement of this advice will need to be provided through written information and re-education following discharge from the inpatient facility.

4.20 Discharge planning and onward referral

All patients with MSCC admitted to hospital should have appropriate early multidisciplinary discharge planning started from admission involving: [26, 27, 80, 99, 119]

- The patient, their family and carers
- Relevant members of the primary care multidisciplinary team

Direct contact with the community care team (e.g. community physiotherapist and occupational therapist, general practitioner (GP), district nurse, other AHPs, specialist palliative care team and care providers) before discharge [72.] Community staff involved with the patient pre-admission may be contacted for background information on admission [119.]

Patients with MSCC will have advanced cancer. When planning future care, the discussion should focus on what is important to the patient, in the context of what may be realistically hoped for. The patient's preferred and most appropriate place of care needs to be considered and discussed with the patient, family and carers [27.]

Components of the post discharge plan should address: [72, 80, 99, 119]

- Likely residence following discharge, its suitability and accessibility
- Expected functional outcomes
- Patient's care needs

- Availability of family members and friends who can provide assistance outside that provided by core care services
- Availability of follow-up services such as care providers, palliative care services and community rehabilitation services
- Equipment needs and recommended changes to the home / care environment as appropriate
- Provision of discharge and future transport needs as required

Multidisciplinary discharge planning meetings should take place as required to allow for joint planning and ensure a timely, coordinated approach for discharge.

The occupational therapist will arrange a home access assessment and assess the patient within the home environment [119] for those patients who have experienced significant functional loss and where further clarification is required on:

- Suitability of the home environment for discharge
- Patient's ability to manage at home

Patients may be considered for trial weekends at home.

Patients may require transfer to another health care environment until discharge plans can be fully put in place.

Onward Referral

Nursing, physiotherapy, occupational therapy, social work staff, palliative care staff and other relevant AHPs will be involved in making onward referrals to community services for recommended and timely provision of care, rehabilitation, equipment and adaptations and follow-up. The management of unrealistic expectations of patients, family and carers can make this a difficult time and needs to be treated with a sensitive and informed approach.

The occupational therapist may be required to liaise with the medical team and community services to determine the appropriate recommendations for certain equipment, aids and adaptations.

Onward referral for rehabilitation

Survival following MSCC may be short but this varies greatly between different diagnostic groups. Onward referral for rehabilitation may be considered [72, 80, 119.] Rehabilitation teams must balance the goals and prognosis with an appropriate period of rehabilitation [109.] Specialised rehabilitation services such as specialist palliative care rehabilitation teams, hospice rehabilitation and day therapy, primary care rehabilitation teams, spinal cord injury unit rehabilitation,

home from hospital schemes, step down beds and community rehabilitation e.g. domiciliary or outpatient based rehabilitation, may be considered for patients with rehabilitation potential or at risk of deterioration.

Discharge Reports

Full reports from all professionals involved in the patient's care with advice on spinal stability and mobility permitted should be provided to the receiving team [99].

The following information should be included in the discharge report: (Adapted from West of Scotland Network (2007) [119])

- Patient's name, address and telephone number and next of kin's name and telephone number
- GP's name and telephone number
- Dates of admission and discharge
- Details of diagnosis of MSCC, cancer and other co-morbidities
- Investigations and results
- Stability of the spine and mobility permitted/restrictions
- Surgery, radiotherapy and chemotherapy details
- Medication and duration of treatment if applicable, including a dexamethasone reduction plan
- Admission assessment findings: including presenting symptoms, neurology and function
- Social history including support and home environment details
- Discharge physiotherapy and occupational therapy reassessments
- Rehabilitation outcome and potential for deterioration/improvement/goals
- Patient and family's understanding of the condition and ability to cope
- Details of any advanced care planning discussed e.g. resuscitation status, preferred place of death
- Further treatments/reviews/investigations with dates at primary care level or hospital
- Transport arrangements
- The hospital name, hospital telephone number, ward name and telephone number, consultant's name, physiotherapist's name and telephone

number and occupational therapist's name and telephone number as relevant

- Details of any onward referrals made
- Details of any spinal bracing, equipment / adaptations ordered or provided with relevant contact numbers

End of Life Considerations

5 End of Life Considerations

When end of life (last few days / weeks) is approaching, the patient's needs should be discussed with the patient, family and multi-disciplinary team as appropriate. Management may need to be reassessed, regularly reviewed and adjusted in accordance with needs and preferences.

The patient's / family's needs and wishes should be discussed and respected and the preferred place of care identified. Support should be offered to ensure that timely, coordinated care is delivered to meet the patient's / family's needs and wishes as appropriate and to facilitate any desired transfer / discharge plans[26, 72.]

While it may not always be feasible to continue active rehabilitation, independence should be facilitated for as long as possible in agreement with the patient. Attention should also be given to comfort, proper positioning, good skin care and pressure relief, respiratory care, safe swallowing and emotional and spiritual support. Comfort and symptom control should be the overriding and acceptable goal.

The local trust policy on end of life care should also be referred to.

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List of Tables

List of Figures

Appendices

Appendix 1 - Search Terms used in the Electronic Search:

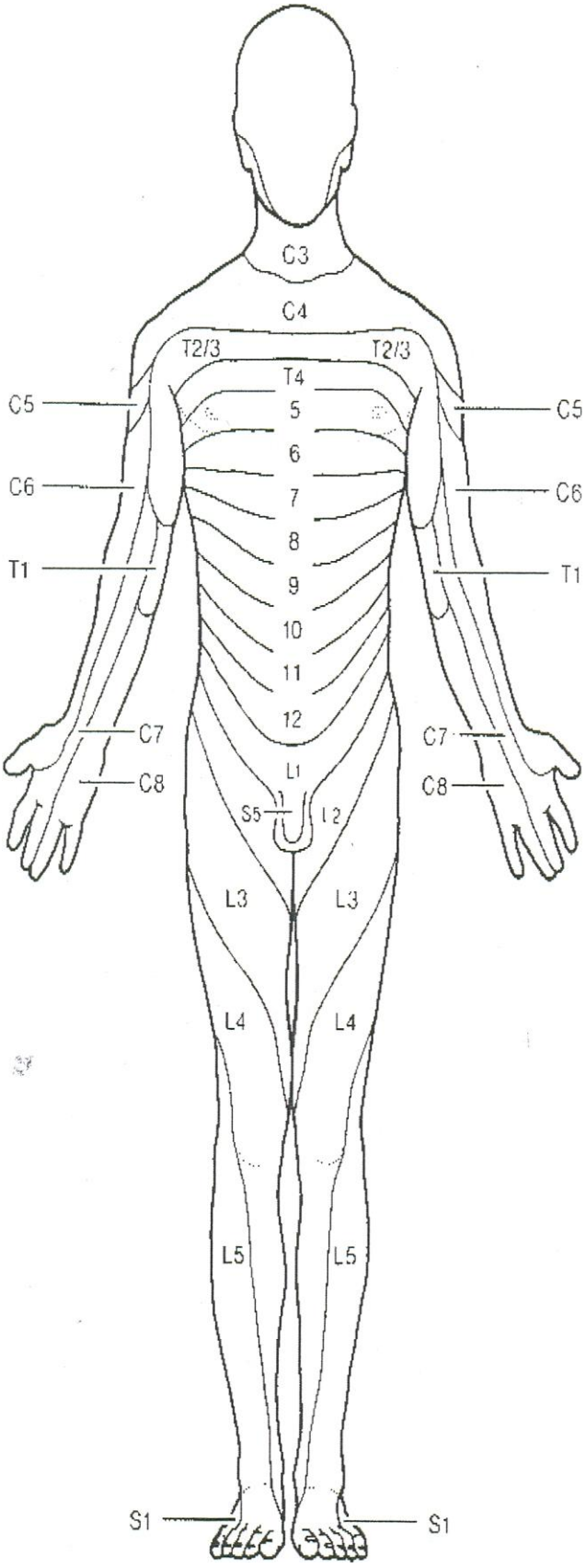
Spinal cord and rehabilitation / therapy / physiotherapy / occupational therapy
Spinal cord cancer and therapy
Spinal cord and assessment and rehabilitation
Metastatic spinal cord compression
Spinal cord and patient positioning / positioning
Spinal cord and moving and handling / manual handling
Spinal cord and bracing / spinal bracing
Spinal cord and cervical collars / cervical collars
Spinal cord and orthoses / and ankle foot orthoses (AFO) / spinal cord and AFO / AFO
Spinal cord and immobilisation / spinal cord and stabilisation / spinal cord and mobilisation
Spinal cord and passive movements
Spinal cord and stretching
Passive movements / range of movement (ROM) / contractures
Stretching and prevention of contractures
Physiotherapy and spasticity
Spinal cord and exercise / and bed exercise / and ROM exercise
Spinal cord and exercise and cancer / cancer and exercise
Spinal cord and chest physiotherapy / respiratory physiotherapy / breathlessness
Assisted cough
Spinal cord and seating / wheelchairs
Spinal cord and Activities of Daily Living
Spinal cord and functional assessment
Spinal cord and assistive technology / environmental control units

Cancer related fatigue
Cancer and cognitive assessment / therapy
Cancer and pain management
Cancer and relaxation
Pressure ulcer / guidelines
Spinal cord and psychological adjustment
Spinal cord and carers needs

Appendix 2: Abbreviations

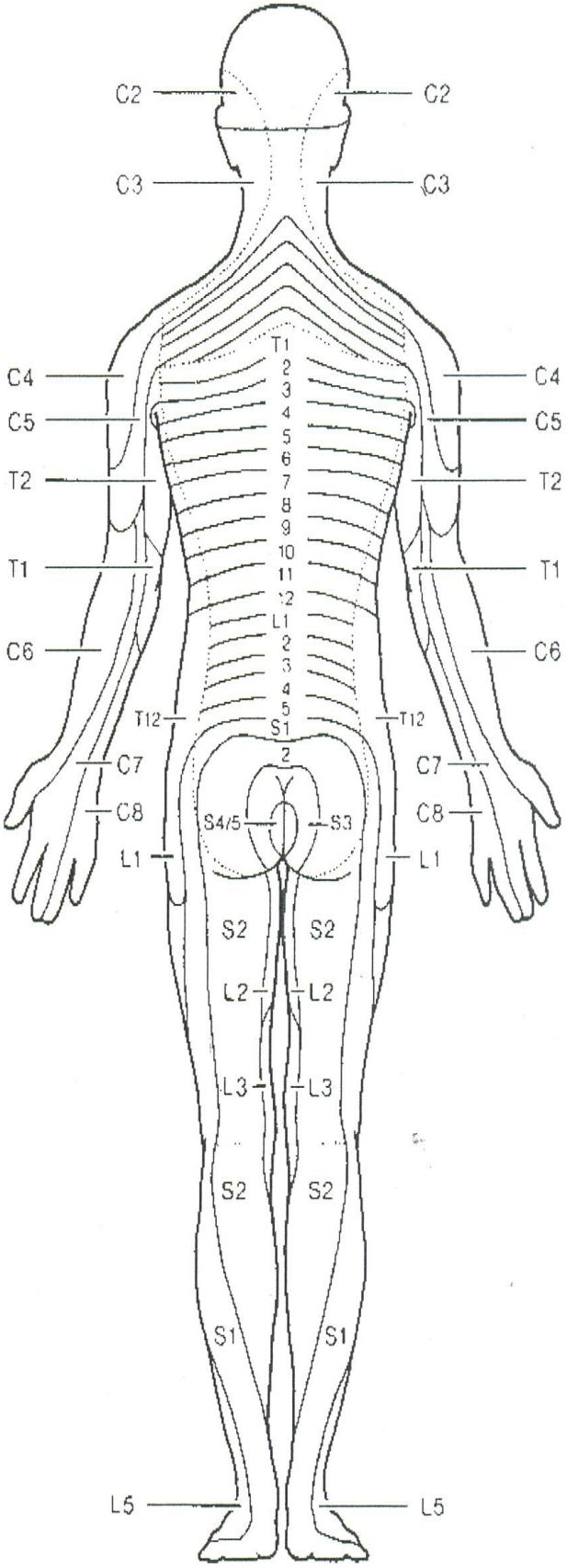
ABGs	Arterial blood gases
ADLs	Activities of daily living
AFO	Ankle foot orthoses
AHP	Allied health professional
BP	Blood pressure
BSI	Brief symptom inventory
COPD	Chronic obstructive airways disease
DR	Delta rollator
DVT	Deep venous thrombus
FES	Functional electrical stimulation
FEV1	Forced expiratory volume in 1 sec
GCS	Graduated compression stockings
GP	General practitioner
HADS	Hospital anxiety and depression score
HCP	Health care professional
HR	Heart rate
IADL	Instrumental activities of daily living
IPPB	Intermittent positive pressure breathing
IPPV	Invasive positive pressure ventilation
LMWH	Low molecular weight heparin
MRI	Magnetic resonance imaging
MSCC	Metastatic spinal cord compression
NIPPV	Non-invasive positive pressure ventilation
O2	oxygen
PADL	Personal activities of daily living
PDI	Psychological distress inventory
PVD	Peripheral vascular disease
QOL	Quality of life
ROM	Range of movement
RR	Respiratory rate
SAO2	Oxygen saturation
SCI	Spinal cord injury
SOB	Shortness of breath
TENS	Transcutaneous electrical nerve stimulation
VC	Vital capacity
ZF	Zimmer frame
ZR	Zimmer rollator

Appendix 3: Dermatome Chart : Sensory Levels



C2-C3	**Neck**
C4	**Upper shoulder** **Upper anterior chest**
C5	**Lateral shoulder**
C6	**Radial forearm** **Thumb** **Index finger**
C7	**Middle finger** **Median strip of hand** **Back of hand**
C8	**Ring and little Finger** **Ulnar forearm**
T1-T2	**Proximal medial arm** **Axilla**
T2-T-12	**-**
T4	**Nipple line**
T7	**Lower costal margin**
T10	**Umbilicus**
T12	**Groin**
L1-L2	**Proximal anterior thigh**
L3	**Anterior knee**
L4	**Anterior lower leg**
L5	**Great toe** **Medial dorsum of foot**
S1	**Lateral border of foot** **Sole** **Along Achilles tendon**
S2	**Proximal posterior thigh**
S3, S4, S5	**Genitals and saddle area**

Appendix 4a: Myotome Chart



MOTOR LEVELS

Neck muscles

Diaphragm (Phrenic Nerve)
Trapezius

Deltoid Biceps

Extensor carpi radialis

Triceps
Extensor digitorum

Flexor digitorum

Hand intrinsics (T2)

Intercostals

Abdominals (T7-L2)

Ileo-psoas
Adductors (L2)

Quadriceps

Medial hamstrings
Anterior tibialis

Lateral hamstrings
Posterior tibialis
Peroneals

Extensor digitorum
Extensor halluxis
Gastrocnemius
Soleus

Anal/Bulbocavernosus reflexes
(S2, S3, S4)

Bladder Lower Bowel

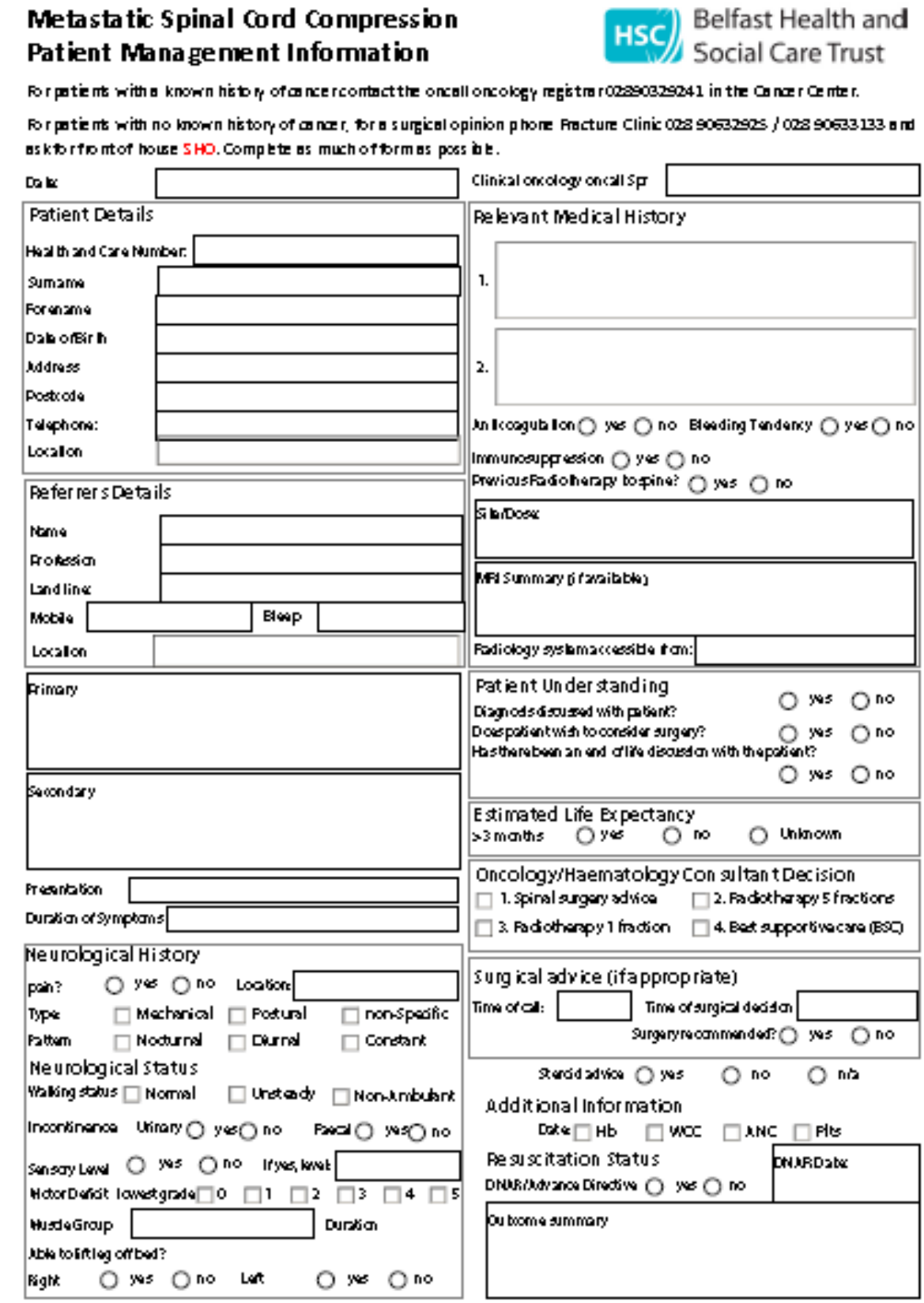
Appendix 4b: Oxford Classification of Muscle Power

Numerals	Letters	Description
Against gravity tests		The patient is able to actively move through:
5	**N (normal)**	The full available ROM against gravity and against maximal resistance
4	**G (good)**	The full available ROM against gravity and against moderate resistance
4-	**G-**	Greater that one half the available ROM against gravity and against moderate resistance
3+	**F+**	Less than one half of the available ROM against gravity and against moderate resistance
3	**F (fair)**	The full available ROM against gravity
3-	**F-**	Greater than one half the available ROM against gravity
2+	**P+**	Less than one half the available ROM against gravity
Gravity eliminated tests		The patient is able to actively move through:
2	**P (poor)**	The full available ROM gravity eliminated
2-	**P-**	Greater than one half the available ROM gravity eliminated
1+	**T+**	Less than one half the available ROM gravity eliminated
1	**T (trace)**	None of the available ROM gravity eliminated and there is a palpable or observable flicker of a muscle contraction
0	**0 (zero)**	None of the available ROM gravity eliminated and there is not palpable or observable muscle contraction

Appendix 5: The Modified Ashworth Scale of Spasticity

The Ashworth Scale		
Score	**Ashworth Scale (1964)**	**Modified Ashworth Scale Bohannon & Smyth**
0 (0)	No increase in tone	No increase in muscle tone
1 (1)	Slight increase in tone giving a catch when the limb was moved in flexion or extension	Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) is moved in flexion or extension
1+ (2)		Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM (range of movement)
2 (3)	More marked increase in tone but limb easily flexed	More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
3 (4)	Considerable increase in tone - passive movement difficult	Considerable increase in muscle tone passive movement difficult
4 (5)	Limb rigid in flexion or extension	Affected part(s) rigid in flexion or extension

Appendix 6 – The Spinal Stability and Mobility Recommendations Proforma



Metastatic Spinal Cord Compression
Patient Management Information

Belfast Health and Social Care Trust

For patients with a known history of cancer contact the oncall oncology registrar 02890329241 in the Cancer Center.

For patients with no known history of cancer, for a surgical opinion phone Fracture Clinic 028 90632925 / 028 90633133 and ask for front of house SHO. Complete as much of form as possible.

Date:

Clinical oncology oncall Spr

Patient Details

Health and Care Number:
Surname
Forename
Date of Birth
Address
Postcode
Telephone:
Location

Referrers Details

Name
Profession
Land line:
Mobile
Bleep
Location

Primary

Secondary

Presentation
Duration of Symptoms

Neurological History

pain? yes no Location:
Type: Mechanical Postural non-Specific
Pattern: Nocturnal Diurnal Constant

Neurological Status

Walking status: Normal Unsteady Non-Ambulant
Incontinence: Urinary yes no Faecal yes no
Sensory Level yes no If yes, level:
Motor Deficit lowest grade 0 1 2 3 4 5
Muscle Group Duration
Able to lift leg off bed?
Right yes no Left yes no

Relevant Medical History

1.
2.

Anticoagulation yes no Bleeding Tendency yes no
Immunosuppression yes no
Previous Radiotherapy to spine? yes no
Site/Dose:
MRI Summary (if available)
Radiology system accessible from:

Patient Understanding

Diagnosis discussed with patient? yes no
Does patient wish to consider surgery? yes no
Has there been an end of life discussion with the patient? yes no

Estimated Life Expectancy

>3 months yes no Unknown

Oncology/Haematology Consultant Decision

1. Spinal surgery advice
2. Radiotherapy 5 fractions
3. Radiotherapy 1 fraction
4. Best supportive care (BSC)

Surgical advice (if appropriate)

Time of call: Time of surgical decision
Surgery recommended? yes no

Steroid advice yes no n/a

Additional Information

Date Hb WCC ANC Plts

Resuscitation Status

DNAR/Advance Directive yes no
DNAR Date:

Outcome summary

Identifying Spinal Instability

Spinal instability is thought to account for pain in approximately 10% of patients with vertebral metastases and is characterised clinically by severe pain at the site of the lesion on attempted movement. Instability may be present if the patient has any of the following are present:

1. Severe pain at site of lesion, increasing on movement.
2. Worsening neurology (increasing pins and needles and/or weakness)
3. Involved vertebral bodies have collapsed to less than 50% of their original height.
4. The odontoid process has been destroyed, leading to possible atlanto-axial subluxation.

Patients may complain of severe pain when turning over in bed or attempting to get up especially when there is spinal instability at lower spinal levels. Such a patient may be unwilling to move the affected part and exhibits tenderness to palpation or percussion over the area.

Patients with odontoid fractures or atlanto-occipital dislocations may hold their neck stiffly and sometimes in a slightly awkward position. They may refuse to move it actively or allow
themselves to be moved passively. Occasionally numbness is felt in the tongue where there is compression of afferent nerves which lead to the second cervical root. The subluxed vertebral column may compress the cord causing quadriparesis and respiratory distress.

"Clinical features of pain and neurology are the best indicators of instability""

Moving and Handling

Moving and handling recommendations need to be made for each patient with MSCC. Alongside radiological findings consider the following moving and handling options and then **select one option** for the patients care team. For patients at end of life, be aware of the implications of recommendations on quality of life.

Recommendation for patients (tick on ly one)

☐ Bed rest & log roll
If patient has increasing pain and worsening neurology on movement consider recommending bed rest and log roll. Review recommendations daily.

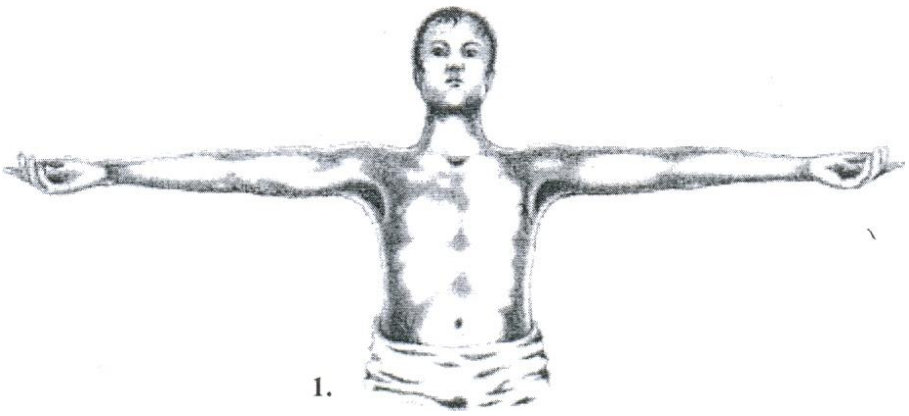
☐ Monitored g rad uated sit-up and mobilise as pain and neurology allow s
If patient has manageable pain, stable neurology and walking prior to diagnosis consider recommending graduated sit up and progress to mobilise as pain and neurology allows. Bracing may also be appropriate - liaise with physiotherapists.

☐ Mobilise as pain and neurology allow s
If patient has minimal pain, neurology and is independently mobile consider recommending mobilise as pain and neurology allows.

Email to RVH | Email to Cancer Centre | Print Form

Appendix 7: Tetraplegic Arm Positioning

Pictures 1-3 illustrate appropriate arm positioning for the prevention of upper limb contractions in tetraplegic patients.



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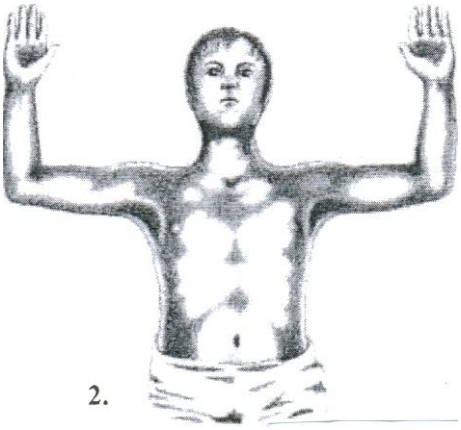
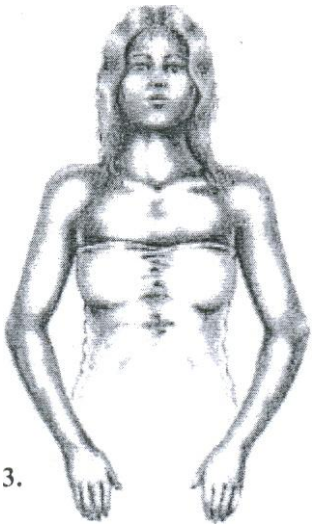


2.



3.

Appendix 8 - Guidelines for the Rehabilitation of Patients with Metastatic Spinal Cord Compression – Assessment and Care Provision by Occupational Therapists and Physiotherapists

Organisation	Name	Job Title
Chair		
NICaN	Clodagh O'Brien	MSCC Regional Project Manager
Project Team Members		
BHSCT	Nicola Evans Paula Finlay Maggie McCurry Catherine Elliman Yvonne Smyth Kim Gregg	Lead Occupational Therapist Cancer Centre Clinical Specialist Physiotherapist Cancer Centre (Neurology) Clinical Specialist Occupational Therapist Clinical Specialist Physiotherapist Community Specialist Palliative Care Occupational Therapist Lead Specialist Physiotherapist (Spinal Cord Injury Unit)
NHSCT	Alison Smyth Bernie McGreevy	Macmillan Clinical Specialist Occupational Therapist Macmillan Clinical Specialist Physiotherapist
SEHSCT	Bronagh Lynch Kathryn Carson Kerry McGrillen Gail Watson	Community Specialist Palliative Care Occupational Therapist Community Specialist Palliative Care Physiotherapist Specialist Palliative Care Physiotherapist Marie Curie Specialist Palliative Care Physiotherapist Marie Curie
WHSCT	Elaine Johnston	Clinical Specialist Physiotherapist
HOSPICE	Patricia Hutchinson	Hospice Therapy manager
NI CANCER RESEARCH FORUM	Margaret Grayson	Person and Public Involvement Representative
GAIN	Nicola Porter	Manager
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Further copies of this guideline can be obtained by logging on to the GAIN Website.

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