GUIDELINES AND AUDIT IMPLEMENTATION NETWORK

Evidence Tables for

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

Assessment and Care Provision by Occupational Therapists and Physiotherapists

January 2014

Evidence Questions

Prevention / Assessment Questions:

1. Is there any evidence that early detection of MSCC affects outcomes?
2. Is there any evidence of specific clinical features or symptoms for the diagnosis and assessment of MSCC?
3. Do standards / guidelines for service provision exist in MSCC?

Physiotherapy and Occupational Therapy Specific Questions:

1. What is the evidence for physiotherapy gait rehabilitation in spinal cord injury (SCI)?
2. What is the evidence for respiratory physiotherapy in SCI?
3. What is the evidence for physiotherapy exercise / stretching / physical activity in SCI / cancer?
4. What is the evidence for non-pharmacological spasticity control in SCI?
5. What is the evidence for transcutaneous electrical nerve stimulation (TENS) / non-pharmacological pain relief interventions in SCI / cancer?
6. What is the evidence for physiotherapy functional electrical stimulation (FES) in SCI?
7. What is the evidence for mechanical deep venous thrombosis (DVT) prophylaxis in SCI?
8. What is the evidence for spinal stabilisation / mobilisation / safe movement and handling and positioning in SCI?
9. What is the evidence for spinal bracing / orthoses in SCI?
10. What is the evidence for seating and wheelchairs in SCI?
11. What is the evidence for Activities of Daily Living / functional re-education in SCI?
12. What is the evidence for assistive technology / environmental control units in SCI?
13. What is the evidence for fatigue management in cancer?
14. What is the evidence for cognitive assessment and therapy in cancer?
15. What is the evidence for relaxation in cancer?
16. What is the evidence for pressure ulcer management in SCI?
17. What is the evidence for psychological management in SCI / cancer?
18. What is the evidence for carers' needs in SCI?

Appendix 7: Evidence Based Tables

Section 1: Evidence for need and effectiveness of rehabilitation

Author(s	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Tan and New, 2012.	Retrospective open cohort case series	2-	108	Spinal Cord Injury (SCI due to tumour	Inpatient spinal rehabilitation	n/a	Until discharge form hospital	FIM, Pain, Length of stay	Patients with SCI due to tumour have the potential to benefit from a focused, specialised SCI programme to optimise their outcomes. Careful patient selection, modifying the team goals and a close relationship with treating oncologists and palliative care teams is essential.
Pease, Harris and Finlay, 2004.	Two retrospective audits	2-	53 control group 95 on pathway	Inpatients within a Cancer Centre with a diagnosis of spinal cord compression.	Implementation of care pathway	Care prior to implementation of care pathway	time spent as inpatient	Survival Duration of time spent supine, Complication rate, Mobility on admission and at subsequent discharge.	Implementation of the care pathway allowed for earlier mobilisation. Majority up within 1-2 days Lower inpatient deaths. Improvement in early survival rates, however at 78 weeks there is essentially no difference in survival 86% maintained mobility, 14% deteriorated. No significant changes in mobility due to use of care pathway.

Section 1: Evidence for need and effectiveness of rehabilitation

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Conway, Graham et al, 2007.	Prospective study with data collection and interview with consecutive patients.	2-	319 patients	Metastatic Spinal Cord Compression (MSCC) in 3 Cancer centres (Scotland)	Usual care	n/a	1 months after diagnosis	Karnofsky performance status (KPS), Visual analogue pain scale, Schedule for the Evaluation of Individual Quality of life (QoL)-SEIQoL-Dw Hospital Anxiety Depression Scale (HADs), Barthel Disability Index (BDI)	Median survival 59 days. Median Karnofsky score 40, indicating a need for considerable nursing and medical care, poorest for lung cancer (median 40). Of those unable to walk at diagnosis, 7% regained full mobility. Of patients seen at 1 month (123 patients), 19% able to walk unaided, 37% walked with assistance, 44% unable to walk at all. Of those unable to walk at diagnosis, 7% regained full mobility. Mobility and bladder function determined by mobility and bladder function at diagnosis. Place of care dependent on mobility at diagnosis; patients walking were more likely to be at home. Despite radiotherapy pain control remained a significant issue for many, 83% reported pain as high.

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Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
McKinley, Huang, Brunsvold , 1999.	Prospective case controlled.	**2-**	58	Traumatic Spinal Cord Injury vs. MSCC Admission criteria: Tolerate 3 hours of rehab, prognosis of at least 3 months	3 hours of rehab	58 patients (29 consecutive MSCC 29 traumatic SCI) (matched 1 to 1 on age, LOS and ASIA)	admission to discharge	LOS, Function Independence Measures (FIM) Discharge rates to home.	Patients with MSCC had a significantly shorter LOS (P<.01) (25.17 vs. 57.46 days). Motor FIM scores on admission were higher in the metastatic group, but discharge FIM scores and FIM change were significantly lower. Both groups had similar FIM efficiencies and community discharges.
Ruff, Adamson, et al, 2007.	Prospective. Consecutive patients	**3**	12 in rehab group 30 in control group	Non ambulatory patients after spinal epidural metastasis treatment. Patients were inpatients within a Veterans Medical Centre. Non ambulatory ASIA A and B	Rehab programme emphasised transfers, bowel and bladder care, incentive spirometer, nutrition and skin care	Compared with a historical control group	Followed until death.	Survival Independence Pain levels Beck Depression Inventory Satisfaction with life scale (SWLS) Frequency of returning home.	Patients receiving rehab had longer median survival (26 weeks Vs. 6 weeks), fewer deaths from myelopathic complications, less pain 2 weeks after treatment, lower depression scores and higher satisfaction with life scores. 67% became independent with transfers Vs. 0% in control group. Directed rehabilitation reduces patients' pain levels and increases mobility, survival and life satisfaction. Should be offered to help patients and caregivers accommodate the challenges produced by MSCC.

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Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Eriks, Angenot, Lankhorst, 2004.	Retrospective audit	**2-**	131 Reduced to 97 due to incomplete data	Patients with MSCC admitted to a specialised spinal injury unit. With admission criteria: Prognosis >1 year; patient physically able to participate in rehabilitation; potential for discharge home.	Inpatient rehabilitation programme at a specialised spinal injury unit.	none	Date of admission to date of discharge to date of death	Barthel index score, Rehabilitation goals, LOS, Survival.	Average stay 104 days. 66% discharged. Average Barthel score 12 on discharge. Average survival after discharge 808 days (0-3669). At 1 yr. after discharge 52% of patients still alive. They suffered less complications, less hospital readmissions, better functional progress. Patients may benefit from in-patient rehabilitation
Guo, Young, Palmer, (2003).	Retrospective audit with consecutive patients	**2-**	60	Patients with MSCC Admission criteria: Inability to function in ADLs or mobility Requires 2 services	Rehab programme defined	None	Diagnosis to date of death	Discharge destination, Comorbidities, Treatment for MSCC Opioids used Psychological symptoms	Median survival 4.1mths. With exception gastrointestinal, 0.6 months P<0.0001. 1 month gap between diagnosis and admittance to rehabilitation unit. 82% discharge home. Average length of stay 16-7 days

Section 1: Evidence for need and effectiveness of rehabilitation

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Levack et al, 2002. Don't Wait for a Sensory Level - Listen to the Symptoms: A Prospective Audit of the Delays in Diagnosis of Malignant Cord Compression	Prospective Observational Study	5	319	MSCC	Audit	Audit	15 month audit	Pre diagnosis symptoms, Pain, weakness, Sensation, Ambulation, Bladder & Bowel problems, QOL, Timing of reporting, Timing of diagnosis, Investigation Accuracy, Tumour type, Tumour site.	**ISSUES: 1. LATE DIAGNOSIS** At diagnosis: -82% were unable to walk or were only able to walk with help. -94% had pain for approx. 3 months (84% severe pain; 79% nerve root pain/ referred). -Some weakness (84%) and/or sensory problems (58%) were noted before diagnosis (median intervals 20 and 12 days, respectively). Most patients reported early symptoms to their GP and diagnosis was made approximately 2 months later. Patients with spinal metastases are at risk of MSCC. Pain for considerable time and late reporting of symptoms were observed in this audit. **2. URGENT ASSESSMENT AND EARLIER DIAGNOSIS ARE RECOMMENDED** before signs progress to MSCC with an efficient and accessible referral process. **3. NATIONAL INCREASED AWARENESS OF SIGNS &SYMPTOMS OF MSCC** is recommended. **3. MRI IS REQUIRED FOR ACCURATE DIAGNOSIS** (x-rays (21% accuracy) and bone scans (19% accuracy) are insensitive in diagnosis of MSCC).

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Alexeeva, et al, 2011. Comparison of Training Methods to improve walking in persons with Chronic SCI: A RCT	RCT: blinded	1++	35	Chronic (>1yr) incomplete SCI	1. Body Weight Support (BWS) walking on fixed track 2. BWS walking on treadmill 3.Physio rehabilitation and gait re-education ≤60min session x 3d/week x 13 weeks	BWS walking: track versus Treadmill versus physio walking/ rehab	13 weeks	-Walking speed (10m time), -Balance (Tinetti), -Fitness (Peak o2 uptake on arm crank), -Muscle strength (MMT), -Functional Independence Measure (FIM) -QOL (SAWS/ SF-36).	**All 3 groups showed significant increases in walking speed, muscle strength and psycho-logical well-being. Significant increases were demonstrated in balance for the Physio and BWS on track walking groups.** No significant effects were seen on Fitness, FIM and perceived health /vitality in all groups

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Domingo, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Lower Limb Rehabilitation Following Spinal Cord Injury: Gait retraining: Impact on Walking.	Systematic Review: **BWS Locomotor Training: Impact on Walking**	1++ to 2++	25 studies: 3 syst. reviews 8 RCTs, 1 CT, 10 pre-post studies, 3 case control studies	SCI <12 months (acute/ subacute) &> 12 months (chronic) post injury	Body weight support treadmill training (BWSTT), Overground Training, conventional rehab, manual assistance, Robotic Assisted Training, Functional Electrical Stimulation (FES) Range: 45-300mins per week; 3-48 weeks	Review of various methods of locomotor training	3-48 weeks	Functional Walking Scores: FIM/ WISCI, Wernig Scale, mEFAP; Walking speed / Walking distance (2 min/ 6m/ 10m walking test); Lower Extremity Motor Score (LEMS/ LEMMT); Balance Score: Berg, ABC; Gait Variables: Cadence, step/ stride length, symmetry index, intralimb coordination, knee extension timing; H reflex modulation, EMG, ROM (knees/ankles)	**BWSTT training has equivalent effects to conventional rehabilitation consisting of overground mobility practice *in acute/ subacute SCI*** based on level 1 evidence from 2 RCTs. **BWS gait training can improve gait in chronic, incomplete SCI but most BWS strategies are equally effective (overground, treadmill, with FES) in improving walking speed** based on a level 1 RCT and level 4 evidence**. Robotic training was least effective at improving walking speed.**

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Domingo, et al. 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Lower Limb Rehabilitation Following Spinal Cord Injury: Gait retraining: Impact on Muscle Strength	**Loco-motor Training: Impact on Muscle Strength**	1++ to 2++	11 studies: 1RCT, 1CT, 2 case control studies, 5 pre-post studies, 1 case series, 1 observat-ional study.	SCI	Gait training (BWSTT, FES, Overground walking, conventional physio rehab, manual assistance, robotic assistance) Range: 20-90mins, 2-5days /week, x8-20 weeks	Review of a variety of methods of gait training for impact on muscle strength	8-20 weeks	Gait parameters: walking speed distance and function e.g. WISCI; Muscle Parameters: H Reflex Modulation; Strength: Dynamometry LEMS, MMT, voluntary muscle scores, MVC; muscle CSA. Spasticity, balance score	**Locomotor Training programs are beneficial in improving lower limb strength** (level 1b evidence that most forms of locomotor training increase lower limb strength). In acute SCI similar strength gains may be obtained with locomotor programs and conventional rehabilitation (level 3 evidence). The real benefit of locomotor training on muscle strength may be realised when it is combined with conventional therapy, necessitating further research.

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Domingo, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Lower Limb Rehabilitation Following Spinal Cord Injury: FES & Locomotor Function	Systematic review: **FES: Effect on Locomotor Function**	2++	9 studies: 8 pre-post studies, 1 case control study	SCI	FES Range: 20-30min+, 2-5x/week, x11wks-3yrs	Review: Effect of FES on gait	11 weeks to 3 years	Gait Parameters: Walking distance/ speed/ cadence/ stride length/ cycle time; Ankle ROM; skin condition.	**FES assisted walking can enable walking or enhance walking speed in incomplete or complete (T4-T11) SCI** (based on Level 4 evidence). **Regular use of FES in gait training or ADLs can lead to improvement in walking even when the stimulator is not in use.** (Based on Level 4 evidence from 2 independent laboratories).
Domingo, et al, 2012.: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Lower Limb Rehabilitation Following Spinal Cord Injury: FES & gait training: Effect on Locomotor Function	**FES combined with Gait Training: Effect on Locomotor Function**	1++ to 2++	6 studies: 3 RCTs, 3 pre-post studies	SCI	FES & Gait Training: BWSTT, BWSTT + FES, BWS overground training + FES, Robotic Assistance training, FES (common peroneal nerve/ quads/ hams) Range: 20-25mins - <90 mins, 3-5 x/week, x4-12weeks	Review: Effect of FES and Gait Training on Locomotor Function	4-12 weeks	Gait Parameters: walking speed & distance/ Motor Score (LEMS)	**Favourable outcomes for ambulation speed and distance when BWSTT combined with FES** (based on level 1b & level 4 evidence from 4 studies).

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Field-Fote, et al, 2011.: Influence of a Locomotor Approach on Walking Speed and Distance in People with Chronic Spinal cord injury (SCI): A RCT	RCT: Single blinded	1+	64	Minimal walking function due to chronic SCI	1. Treadmill (TM) walking with manual assistance 2. TM walking with electrical stimulation 3. Overground walking with foot electrical stimulation 4.TM walking with robotic assistance 5d/week x12weeks	4 groups: TM walking (X3) with manual, electrical or robotic assistance and overground walking	12 weeks 10 subjects at ≥ 6 months	Walking speed (10m time) and distance (2 min walking test):	**Significant improvement in walking speed and distance for all walking groups. Distance gains greatest for overground walking group.** 10 subjects who improved retested at least 6months after training: walking speed while slower than at 12weeks assessment was faster than before training
Merholz, et al, 2012.: Locomotor Training for Walking after SCI: Cochrane Systematic Review	Cochrane Systematic Review	1++ to 1-	5 RCTs (309n)	Traumatic SCI	Locomotor training: Body Weight Support Treadmill Training (BWSTT); BWSTT with electrical stimulation; Robotic Assisted locomotor training. Range: 30-60mins per session.2-5 x/week x 4-12 weeks	Review of various Locomotor training methods	4-12 weeks and 1 study @ 6 & 12 months	Walking Speed (10-15m walking times) and Walking Capacity (distance)	Data pooled: **No superior method of locomotor training. No significant Improvement in walking speed and capacity with BWSTT. Robotic training may reduce walking capacity.** Inconclusive, limited evidence. More research is required.

Section 2: Evidence for gait rehabilitation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristics	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Lam et al (2007): A Systematic Review of the Efficacy of Gait Rehabilitation Strategies for Spinal Cord Injury	Systematic Review:	1++ to 2 ++	41 studies: **BWSTT:**13 2 RCT, 8 pre-post, 2 case report, 1 case control **FES:** 7 pre-post studies **Lower Extremity Bracing:** 12 studies:10 post test, 2 pre-post **Gait training and FES:** 4 studies: 1RCT, 3 pre-post **FES & Bracing:** 6 studies: 5 post test, 1 pre-post (some publications overlap)	SCI	Strategies for improving Gait: **BWSTT, FES, Braces/ Orthoses or combination of these methods** (gait training & FES, FES & Bracing) **BWSTT:** range: 21-300 mins per week, x 3-48 weeks **FES:** protocol only recorded in 2 studies: range: ≥30mins, 3-5 x / week, ≤ 3months. **Bracing:** range: 4 weeks-14 months **Gait & FES:** range: 20 - <90 mins, 3-5 x/ week, x 5-12 weeks. **FES & Bracing:** range: 2-14months	Review of the Effect of various Gait Rehabilitation strategies	3 weeks-14 months	FIM, walking speed, 6 or 10 MWT, WISCI, LEMS, Wernig scale, TUG, Functional reach test, Garrett scale, Assistive device usage scale, gait distance, steps/day, stride length, cadence, walking speed flat/ inclines, function e.g. transfers, sit to stand, curbs, stairs	**There is strong level 1 and level 3 evidence that functional ambulation outcomes are improved with BWSTT but this improvement is comparable to other methods of overground gait training. FES may augment functional ambulation in SCI** (supported by level 1 evidence)**. Braces may afford particular benefits to people with complete SCI to stand up and ambulate with assistive devices** (based on level 4 evidence).

Section 3: Evidence for respiratory physiotherapy

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Reid, et al, 2010.: Physiotherapy secretion removal techniques in People with SCI: A Systematic Review	Systematic Review	1+to 2++	24studies: (2 RCTs, 7case reports, 3 case series, 9 pre-post design and 3 prospective controlled trials)	SCI	Glosso-pharygeal breathing (GPB), Abdominal binders, Respiratory Muscle Training (RMT), Electrical stimulation, Abdominal Assisted Cough, IPPB, Mechanical insufflation/ exsufflation (MIE)	Review of various methods of secretion removal in SCI.	Not recorded- 1 week - 1year	Infections, Hospita-lisations, Suction needs, Chest Xrays, Ventilation Scintiscan, Time off ventilator, Lung volumes: VC, FEV1, FVC, ERV, FRC, RV, TLC, MIP, MEP, PFTs, Sniff, PEFR, VT, Cough volume; Sao2, RR	**Positive support for some physiotherapy respiratory techniques in secretion removal** but limited and mostly low level evidence (Level 4 & 5) and unable to meta-analyse: Level 4 & 5 evidence to support **GPB.** Level 2 & level 4 & 5 evidence to support **abdominal binders** in assisting breathing**.** Level1 evidence from 1 RCT for **RMT** improving respiratory muscle strength, reducing respiratory infections and aiding clearance. Level 4+5 evidence to support **electrical stimulation to the lower thoracic- lumbar spinal cord and abdominal muscles** for increasing expiratory flow rates during coughing. Level 2 + level 4 evidence to support **assisted cough with abdominal compression. Insufflation with assisted cough** improves cough and PEFR. **Insufficient evidence for IPPB and MIE.**

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2008: Effects of Exercise training and Inspiratory Muscle training (IMT) in SCI: A Systematic Review	Systematic Review: of the effects of Exercise Training and IMT on Respiratory Function.	1++ to 2++	13 studies: 5 studies on **exercise** (4 case series design and 1 non-RCT /cohort trial) 8 studies on **IMT** (3 RCTs + 5 non-RCTs)	SCI: paraplegics +tetraplegics	Exercise training and Inspiratory Muscle Training (IMT) (resistive and threshold trainers). **Exercise Training**: Range: 20-60mins/ 3xper week/ 6-8 weeks **IMT**: Range: 15-30mins/ 2-6xper week/ 6week-1year	Review of the effects of Exercise Training and IMT on Respiratory Function.	6 weeks - 1 year	Lung Volumes: FVC, VC, VT, VE, FEV1, TLC, PEFR, MIP, MVV, SIP, MEP; Ventilatory muscle endurance V02 max; Lung infection rate; Hospitalisation rate; Suction needs	**Exercise studies (**4/5 positive for exercise improving respiratory function)**:** **Level 2 evidence for exercise increasing respiratory muscle strength and endurance.** **Level 4 evidence for exercise increasing resting and exercising respiratory function** (lung volumes/ FEVs). **IMT: Level 4 evidence for IMT reducing SOB and increasing respiratory muscle strength and endurance** Positive support for exercise and IMT but limited and some low quality evidence and unable to meta-analyse. IMT: Benefits well documented in COPD (Geddes et al 2005, cited by Sheel, et al, 2008).

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Exercise Training – Effect on respiration	Systematic Review: **Exercise Training for improving Respiratory Function**	1++ to 2++	10 studies: 1syst. review, 1 cohort study, 2 CTs, 6 pre-post studies	SCI	Exercise Training: Included arm cranking, weights, Treadmill + NMES (neuro-muscular electrical stimulation), hand cycling, leg cycling with NMES, arm & breathing exercises, wheelchair training. Range: 20-60mins 2-3 x/week 6 weeks-1 year	Review of the Effects of Exercise on Respiratory Function	6 weeks to 1year	VO2/ VO2 peak/ VCO2; FEV1/ FVC; PEFR; VE/ VE peak; VT; HR; BP; Spirometry	**Level 2 and level 4 evidence to support exercise training for improving resting and exercising respiratory function in SCI.** For exercise training to improve respiratory function, **the intensity must be relatively high (70-80% of max HR) performed 3 times per week for 6weeks.** Optimal training regimes have not been identified.

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Inspiratory Muscle Training (IMT)	Systematic Review: **Inspiratory Muscle Training**	1++ to 2++	9 Studies: 4 RCTs, 1 CT, 2 pre-post studies, 2 case series	SCI	IMT Range: 15- 40mins (some studies: split into 2 sessions per day) 3-6 days/ week, x6 weeks -1 year	Review of Evidence for IMT	6 weeks – 1 year	Maximal Inspiratory Pressure (MIP), Vital Capacity (VC), Maximal Voluntary Ventilation (MVV), Maximum incremental threshold load (TL max) Respiratory muscle endurance, Spirometry, Respiratory infections.	**Respiratory Muscle Training improves respiratory muscle strength and endurance in people with SCI:** Level 1 evidence from an RCT and level 4 evidence from several studies to support IMT in decreasing dyspnoea and improving inspiratory muscle function in some people with SCI. IMT has consistently shown improvements in inspiratory muscle strength and endurance in **COPD** patients (optimal IMT protocol: training at 30-70% of MIP, up to 30mins per session, 4-6 days per week, indefinitely)

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Bronchodilators	Systematic Review: **Broncho-dilators**	1++ to 2++	1 RCT, 3 CTs, 5 pre-post studies	SCI	Bronchodilators: Salmeterol, Ipratropium bromide, Metaproterenol, Baclofen (GABA agonist to treat spasticity), Oxybutynin (drug used to treat bladder spasms)	Review of broncho-dilators/ muscle relaxants in the treatment of obstructive ventilatory impairment (airway hyper-responsive-ness/ broncho-spasm) seen in some tetraplegic patients.	N/A	Spirometry Lung volumes, MIP, MEP, plethys-mography, PC20/ PD20 (measures of broncho-constriction)	**The use of bronchodilators should be considered in patients with tetraplegia who demonstrate an element of obstructive airway impairment.** Level 4 evidence for ipratropium and metaproterenol and level 1 evidence for salmeterol having a positive effect on pulmonary function in subjects with tetraplegia. (Strong evidence for bronchodilators in Asthma and COPD). **Other medications used in SCI e.g. baclofen and oxybutynin should be considered in airway hyperactivity in tetraplegia** (based on Level 2 evidence).

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Intermittent Positive Pressure Breathing (IPPB)	Systematic Review: **IPPB**	1++ to 2++	2 studies: 1 RCT, 1 pre-post study	SCI: tetraplegia	IPPB Range: 4 reps of 6 breaths x 2hrly or 20minsx 2/day, 5days / week, x 2months	Review of IPPB in SCI	2 months	Lung Function Tests; Tidal Volume (TV); Vital Capacity (VC); work of breathing; Lung compliance	Limited evidence on the effects of IPPB in SCI. **There is Level 2 evidence that IPPB has no short term or long term effects on lung function within 1 year of SCI. There is Level 4 that IPPB has no effects on lung function in acute SCI** (Increases during IPPB in tidal volume and vital capacity were seen but not sustained). More research is required.
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Abdominal Binders	Systematic Review: **Abdominal Binders**	1++ to 2++	5 studies: 1 observat-ional study, 3 pre-post studies, 1 CT.	SCI	Abdominal Binders	Review of the effect of Abdominal Binders on Respiratory Function	N/A	Vital Capacity (VC); Inspiratory Capacity (IC); Expiratory Residual Volume (ERV); Spirometry; Voluntary cough peak expiratory flow rate (PEFR).	**Abdominal binding can be used to achieve immediate improvements in respiratory function** (reduced SOB, FRC and RV and increased IC, VC, FVC, TLC, diaphragmatic force and PEFR) **but long term effects have not been established** (based on level 2 evidence).

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Chest Wall Vibration	Systematic Review: **Chest Wall Vibration**	1++ to 2++	1 pre-post study	SCI	Chest Wall Vibration	Effect of Chest Wall Vibration on respiratory function	N/A	Spirometry	**Chest wall vibration may improve pulmonary function while the vibration is applied but carry-over effects when the vibration is not in use have not been evaluated.** Level 4 evidence that chest wall vibration increases tidal volume and minute ventilation in subjects with tetraplegia.
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Secretion Removal	Systematic Review: **Secretion Removal**	1++ to 2++	9 studies: 1 RCT, 2 CT, 1 case series, 5 pre-post studies.	SCI	Secretion removal techniques: Manual respiratory kinesitherapy, Mechanical insufflation/ exsufflation (MIE), Assisted cough, FES, Suction, Magnetic stimulation.	Review of the efficacy of secretion removal techniques.	N/A	Lung Function: VC,FVC, IC, FEV1, PEFR, FBC, Spirometry, Maximum inspiratory & expiratory pressures (MIP & MEP), hospitalisation rates & causes, end tidal CO2 (EtCO2), gastric/ oesophageal pressure.	**There is limited evidence to suggest that improving inspiratory and expiratory muscle force maximises expiratory flow during cough. Cough effectiveness can be enhanced by a variety of methods including manual cough assistance by a caregiver, respiratory muscle training and/ or electrical stimulation triggered by the person with SCI. Hand-held expiratory pressure devices e.g. Flutter may enhance secretion removal in people with SCI.** -Based on mainly level 4 evidence only. There is Level 2 evidence (1 RCT) to support MIE coupled with manual respiratory kinesitherapy. Further research is required.

Section 3: Evidence for respiratory physiotherapy:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management: Abdominal Neuro-muscular Electrical Stimulation (NMES)	Systematic Review: **Abdominal NMES**	1++ to 2++	2 studies: 1 CT, 1 pre-post study	SCI	Abdominal NMES (25mins daily x 8weeks in CT)	Review of the effectiveness of Abdominal NMES	8 weeks (in CT)	FVC, PEFR, FVC, max voluntary ventilation (MVV)	There is Level 2 evidence that abdominal NMES decreases/ worsens the forced vital capacity and accelerates colonic transit. There is Level 4 evidence that EMG-activated FES significantly increases both PEFR and FVC in tetraplegia patients compared to patient-activated FES. Evidence is inconclusive and limited.
Van Houtte, et al, 2006 : Respiratory Muscle Training in Persons with SCI: A Systematic Review	Systematic Review	1-	6 controlled trials (128n)	SCI	Respiratory Muscle Training : Resisted Inspiratory and Expiratory Muscle Training Range: 5-30mins per session,1-5x per day, 5-7days per week, x4-8 weeks	Review of Respiratory Muscle Training in SCI	4-8 weeks	Pectoral muscle strength, Lung volumes: RV, ERV, VC, PI / PE max, VE, FRC, IC, SIP, FVC, FEV1, PEF, TLC; VO2/ PO2 peak, Borg scale, Chest Circumference	Unable to meta-analyse. **RMT tends to improve expiratory muscle strength** (in 2 studies); **Vital Capacity** (in 3 studies) and **Residual Volume** (in 1 study). **Insufficient data was found on inspiratory muscle strength, respiratory muscle endurance, QOL** (1 study showed a significant decrease in SOB), **exercise performance** and **respiratory complications.**

Section 4: Evidence for exercise/ physical activity:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Devillard, et al, 2007: Effects of training programs for spinal cord injury: Systematic review	Systematic review	2++	65 studies (did not state study designs limiting evaluation of quality of evidence)	SCI	Exercise Training e.g. Interval / continuous training; wheelchair ergometry; arm crank; treadmill; quads strengthening and FES cycling; FES knee extension. Range: 15-60min sessions, 2-7 days per week, x 4- 36weeks.	Review of effects of exercise training in SCI	4- 36 weeks	VO2 max; physical work capacity; muscle strength / endurance/ morphology; Spirometry; lung volumes; HR; CO; stroke volume; catecholamine; vascular blood flow & resistance; Platelet aggregation; lipid profiles; bone mass; biomechanical efficiency; functional independence measure; QOL.	**Training programs after SCI offer cardiorespiratory, cardiovascular, cardiac, metabolic, bone, biomechanical, muscle, function and QOL benefits.** Reconditioning training increases VO2max, reverses leg vascular resistance in paralysed legs, produces possible cardiac and neural adaptations, and has favourable effects on platelet aggregation and catecholamine. Reconditioning training can also modify lipid profiles (reducing risk for cardiovascular diseases), prevent osteoporosis, increase muscle strength and power, and increase biomechanical efficiency and wheelchair propulsion techniques.

Section 4: Evidence for exercise/ physical activity:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hicks, et al, 2011: The Effects of Exercise Training on Physical Capacity, Strength, Body Composition and Functional Performance among Adults with SCI: A Systematic Review	Systematic Review	1++ to 2++	82 Studies: case studies, experi-mental & quasi experi-mental designs	Acute and chronic SCI	Exercise Training: Arm Ergometry; Wheelchair Ergometry, Resistance exercise/ pulleys; leg press; standing & gait training; mixed exercise (mobility, strength, coordination, aerobic resistance, relaxation); FES cycling; swimming; basketball; FES rowing. Range:12-120 mins; 2-7x/week; x4-57 weeks	Review of Exercise Training in SCI	4 - 57 weeks	Oxygen uptake, power output, peak work capacity, muscle strength, body composition, Exercise & functional performance.	**Strong evidence that exercise, performed 2-3 times per week at moderate to vigorous intensity, increases physical capacity and muscle strength in chronic SCI.** **Wheelchair ergometry significantly increases peak power output** following 6 weeks of training. 16 studies (including 2 level 1 RCTs) provide **strong evidence for combined resistance and aerobic exercise and FES-assisted exercise in significantly improving power output.** Evidence not strong for an exercise effect on body composition and functional performance. There is insufficient high quality evidence in Acute SCI for exercise effects.

Section 4: Evidence for exercise/ physical activity

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Mishra, et al, 2012: Exercise Interventions on Health-Related Quality of Life (HRQOL) for people with cancer during active treatment (Review)	Cochrane Systematic Review	1++ to 2++	56 studies: (4826 patients) RCTs, CCTs	Patients undergoing cancer treatments (36 studies), during & post cancer treatments (10 studies) & scheduled for cancer treatments (10 studies)	Exercise v. comparison group (usual care or other type of non-exercise intervention). Exercise Interventions: Walking alone or with cycling, resistance training or strength training; Resistance training; strength training; cycling, Yoga, Qigong. Range: 12 weeks- 6 months	Review : Effect of Exercise on HRQOL	12 weeks-6 months	Scales for: HRQOL; Condition Specific QOL; Anxiety; Body Image/ Self Esteem; Cognitive/ Physical/ Spiritual/ Social Functioning; Depression; Emotional Wellbeing/ Mental Health Functioning; Fatigue; General Health Perspective; Pain; Role Function; Sleep.	**Exercise resulted in improvements in overall HRQOL and in certain HRQOL domains including physical functioning, role functioning, social functioning and fatigue.** Positive effects of exercise (Improved HRQOL and physical functioning and reduced anxiety, fatigue and sleep disturbances) are **more pronounced with *moderate to vigorous intensity exercise*** versus mild intensity programs. Exercise interventions resulted in a significantly greater **reduction in anxiety for breast cancer patients** than for patients with other types of cancer. **In patients with cancers other than breast cancer, there was greater reduction in depression, fatigue and sleep disturbances and improved HRQOL, emotional wellbeing, physical functioning and role function with exercise.**

Section 4: Evidence for exercise/ physical activity:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
NHS National Cancer Action Team, Nov 2009; Jan 2012 Update: Cancer and Palliative Care Rehabilitation: A Review of the Evidence	Review / guidance on Exercise	1++ to 2++	16 studies: 4 Systematic Reviews 12 RCTs, (1 RCT: effect of exercise on fatigue)	Patients with Breast, prostate, bowel, gynaecological, CNS (brain and & spinal cord), Head & Neck and Haematological Cancers.	Resistance Training, impact training, Aerobic Training; Walking; Arm exercises in chair; marching, dancing; circuit training; Personally Tailored Workbook; cycle ergometry; Pilates.	Review of benefits of exercise and physical activity	6 weeks – 12 months	Peak O2 uptake (VO2 max), rep max, body composition, lung capacity measures, fatigue; QOL questionnaires Walking test/ log; functional assessments, Assessment of sleep, haematological variables.	**Positive effects of exercise on cardiopulmonary/ aerobic function and muscle function and strength** were reported (significant increases in VO2max & rep max). **Reduced muscle wasting and increased lean body mass with exercise** were also found. **Improvements in QOL, fatigue, sleep quality, physical functioning, mental and emotional well-being** (mood, perception of symptoms, depression and body image) and **ROM** with exercise were also reported in the literature.

Section 4: Evidence for exercise/ physical activity:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Ashe, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Bone Health: Systematic Review: Effect of Physical Modalities on Bone Health	Systematic Review: **The Effect of Physical Modalities on Bone Health**	I++ to 2++	**Electrical Stimulation** 9 studies: 1 RCT, 4 CT, 2 pre-post, 1 case control, 1 case report. **FES cycling:** 11 studies: 2 CT, 8 pre-post, 1 case series. **Treadmill Training:** 1 pre-post study. **Standing/ Walking:** 9 studies: 1 RCT, 1CT, 6 pre-post, 1 observat-ional study. **Ultrasound:** 1 RCT. **Vibration:** 1 pre-post study.	SCI	Physical modalities e.g. Therapeutic Ultrasound, FES cycling, Walking, Reciprocating Gait Orthoses, Long leg Bracing, Standing, Electrical Stimulation.	Review of the Effects of various Physical Rehabilitation Modalities on Bone Health	N/A	Bone Marrow Density (BMD)	**Short term therapeutic ultrasound (6 weeks) is not effective for treating bone loss post SCI** based on a level 1 RCT. **Electrical stimulation can maintain or increase BMD over the stimulated areas** based on level 2 evidence (2 CTs). **FES cycling does not improve or maintain bone at the tibial midshaft in the acute phase** based on level 2 evidence (1CT) but may maintain or increase BMD at later stages post SCI: **Six months of FES cycle ergometry may increase lower extremity BMD over areas stimulated** (based on level 4 evidence/ 1 pre-post study). **There is inconclusive evidence for Reciprocating Gait Orthosis, long leg braces, passive standing or self-reported physical activity in improving low bone mass.**

Section 4: Evidence for exercise/ physical activity:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Warburton, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Systematic Review: Cardiovascular Health and Exercise following SCI	Systematic Review: **Effects of Exercise on Cardio-vascular Health in SCI**	1++ to 2++	**1.BWSTT :** 9 studies: 2 RCTs, 1 CT, 6 pre-post studies. **2. Upper Extremity Exercise:** 8 studies: 4 RCTs, 2 CTs, 1 case control study, 1 cohort study **3. FES/ FES-assisted exercise:** 30 pre-post studies **4.Exercise & Glucose Haem-ostasis:** 7 studies: 1RCT, 6 pre-post	SCI	Exercise: included Treadmill, upper extremity exercise, FES, FES exercise	Review of the Effects of exercise on cardio-vascular health	N/A	HR, VO2 max, Minute ventilation, O2 consumption, CO2 production, BP, Systolic BP, Lung volumes, left ventricular diastolic function, left ventricular dimensions, coronary reserve flow, plasma ADMA, Plasma inflammatory markers, arterial diameters/ compliance/ resistance, blood velocities, arterial blood flow, LF/HF ratio, maximal power output,	**1. There is growing evidence that BWSTT can improve indicators of cardiovascular health in SCI.** Level 1b and 4 evidence for BWSTT in improving cardiac autonomic balance and arterial compliance and level 2 evidence that FES gait training can increase metabolic and cardiorespiratory responses. **2. Aerobic arm cycling exercise in SCI can improve cardiovascular fitness and physical work capacity through aerobic training of moderate intensity, 20-60mins per day, at least 3 times per week for a minimum of 6-8 weeks. Resistance training at moderate intensity at least 2 days per week also appears to be beneficial in SCI.** (based on level 1 and 2 evidence). The optimal exercise intervention for improving cardiovascular fitness remains to be determined. **3. FES training a minimum of 3 days per week for 2 months can improve muscle endurance, oxidative metabolism, exercise**

	studies **5.Exercise on lipid lipo-protein profile:** 6 studies: 1 RCT, 4 pre-post studies, 1 CT	peak workload, peak O2 pulse, cardiac output, Stroke volume, lactate levels, muscle strength, Rating of perceived exertion (RPE), Anti-thrombin 3, Camp levels, Insulin sensitivity, glucose levels/ markers, plasma leptin, lipid profiles	**tolerance and cardiovascular fitness** (based on level 4 & 5 evidence). **4. Aerobic exercise and FES training may lead to clinically significant improvements in glucose haemostasis in SCI, for the prevention and treatment of Type 2 Diabetes,** with moderate training for a minimum of 30 mins on 3 days per week (based on level 1 & 4 evidence). **5. Aerobic and FES exercise training may lead to improvements in lipid lipoprotein profile, with training at a minimal aerobic intensity of 70% heart rate on most days of the week recommended** (based on level 1 & 4 evidence).

Section 4: Evidence for exercise/ physical activity

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Wolfe, et al, 2010: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Physical Activity and Spinal Cord Injury: Systematic Review: Physical Activity: Effects on Muscle Morphology, Strength and endurance	Systematic Review: **Physical Activity: Effects on Muscle Morphology, Strength and endurance**	1++- 2++	31 studies: 4 RCTs, 4 CTs, 22 pre-post studies, 1 cohort study	SCI	Physical Activity: including gait training, BWSTT, conventional physio, FES, FES cycling, cycle ergometry, resistance training, arm ergometry, arm cranking, endurance training, circuits, coordination exercise, Relaxation. Range: 10-120mins, x2 to 7 times per week, x4weeks-2years	Review of the effects of Physical Activity on Muscle Morphology, Strength and endurance	4 weeks – 2 years range	Muscle CSA, density, composition/ histology, metabolism, glucose/ insulin/ lipid levels. Muscle: Adipose Fat composition, BMI, body weight, muscle strength, torque/power output, work output, VO2 max. Neurological assessment, Blood flow/velocity, capillarisation Neuro-muscular fatigue.	**Various forms of exercise most notably FES of the upper and lower limbs, BWSTT and circuit resistance training may be effective in increasing muscle strength and reducing muscle atrophy. FES and BWSTT are more appropriate for those with greater muscle impairment.** There is Level 2 & 4 evidence for FES in increasing muscle fibre and muscle size and in the prevention and/or recovery of muscle atrophy and in increasing aerobic (endurance) muscle fibre types. Also level 1 and level 4 evidence exists to support FES upper limb cycling in increasing muscle strength. Increased upper limb strength was also found with upper limb cycle ergometry (based on level 2 evidence), upper limb resistance training (from a level 1 RCT) and circuit/ resistance training (based on level 4 studies). Level 4 evidence suggests BWSTT may increase muscle fibre size and overall muscle size and may prevent and/or recover muscle atrophy.

Section 4: Evidence for exercise/ physical activity

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Wolfe, et al, 2010: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Physical Activity and Spinal Cord Injury: Systematic Review: Physical Activity: Effect on Function and ADLs	Systematic Review: **Physical Activity: Effect on Function and ADLs**	1++- 2++	7 studies: 1 RCT, 2 CTs, 4 pre-post studies	SCI	Physical Activity: included physiotherapy exercises, FES, FES cycling, EMG biofeedback, swimming, sport, standard rehabilitation, arm ergometry, BWSTT. Range: 30-120mins, x1 -5 per week, x12-16 weeks	Review of the effect of Physical Activity on Function and ADLs.	12-16 weeks range	Functional/ ADL assessment, FIM Scores, Wheelchair tests, muscle strength/ power, VO2max, EMG, Walking tests, health questionnaire	**Physical activity programs may improve functional outcomes e.g. the performance of ADLs but there is very little evidence on specific exercise parameters to improve function.** There is level 2 evidence to suggest 16 weeks of exercise; FES OR EMG biofeedback may enhance self-care and mobility scores. Swimming (2 x per week x 4months) may enhance motor FIM scores, based on level 2 evidence. Improved FIM scores and ADL performance with exercise was also found in three level 4 studies. More quality trials are required.

Section 4: Evidence for exercise/ physical activity

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Wolfe, et al, 2010: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Physical Activity and Spinal Cord Injury: Systematic Review: Physical Activity: Effect on Subjective Well-being	Systematic Review: **Physical Activity: Effect on Subjective Well-being**	1++-2++	12 studies: 4 RCTs, 6 pre-post studies, 1 case study, 1 cohort study	SCI	Physical Activity: including exercise training- stretching, arm ergometry, resistance/ aerobic training; BWSTT, treadmill, standing, education, FES walking, FES exercise, sport. Range: 30-120min sessions, 2-5/week, x6weeks-12 months, or 1 week intense sport course	Review of the effect of Physical Activity on Subjective Well-being	6 weeks – 12 months	Question-naires/ Scales for QOL, Pain perception, Health perception, Stress, Satisfaction, Anxiety, Depression. Exercise adherence, Physical activity actigraph.	**Exercise is an effective strategy for improving at least 2 aspects of subjective well-being: depression and QOL** (based on level 1 and 2 evidence from 4 studies and most of the additional level 4 and 5 evidence). Changes in stress and pain may be the mechanisms underlying the effects of exercise on depression and QOL. Further research is required.

Section 4: Evidence for exercise/ physical activity

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Harvey, Ristev, Hossain, et al, 2011.	RCT	1+	32	Recently acquired paraplegia and limited ability to sit unsupported	3 additional 30 minute sessions per week of motor retraining directed at improving ability to sit unsupported.	Standard inpatient rehabilitation	Completion of intervention	Maximal lean test, maximal sideward reach test, performance item of the Canadian Occupational Performance Measure (COPM), satisfaction, impression of change, the T-shirt test SCI falls concern scale.	People with recently acquired paraplegia do not benefit from a 6-week motor retraining program directed specifically at improving their ability to sit unsupported. Their ability to sit unsupported does, however improve over time, suggesting that the practice of activities of daily living has important carry–over effects on unsupported sitting.

SEE ABOVE: Sheel, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Respiratory Management post SCI: **Effects of Exercise Training/ IMT on Respiration**

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Barsevick, Dudley, Beck, et al, 2004.	A RCT of Energy Conservation for patients with cancer related fatigue	**1-**	200 196 in control group	Individuals initiating chemotherapy, radiotherapy or concurrent therapy for cancer	Energy conservation and activity management (ECAM)	Control intervention focused on nutrition.	48 hours post 2nd or 3rd chemo or on last week of radiotherapy	POMS-SF, SCFS, GFS, Functional Performance Inventory	Those who received ECAM intervention derived a modest but significant benefit from it.
Reif, Vries, Petermann, et al, 2013.	RCT Patient education programme for those with cancer related fatigue	**1+**	261	Adults diagnosed with cancer with moderate to severe fatigue	6 weekly group sessions focusing on problem solving, goal setting and cognitive techniques	Control group on waiting list	6 months	Fatigue assessment questionnaire EORTC QLQ-C30, general self-efficacy scale, Physical exercise self-efficacy scale. Freiburg questionnaire on Physical activity. MET. HADS-D	P<0.001 reduction in fatigue and improvement in QOL, general self-efficacy, physical activity, anxiety, depression and fatigue knowledge.

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Oncology Nursing Society, http://www.ons.org/Research/PEP/Fatigue, 2011 **Fatigue: Exercise**	Evidence review	**1 + -2-**	6 RCT 1 two group comparative trial 3 pre-test and post-test quasi experimental 1 mixed qualitative and quantitative repeated measures quasi-experimental design 1 longitudinal repeated measures RCT	Colon, Breast, Haematology general cancer populations and those with advanced cancer.	Exercise	usual care for those that implemented control groups	Limited time frame	Godin Leisure score FACT-F FACT-C Fatigue VAS Rotterdam symptom inventory Brief Fatigue Inventory, Modified sit and reach test, Beck depression Inventory, EORTC QLO C30 EORTC BR23 Piper fatigue Scale Jamar dynamometer Cyber VR2 seated leg press 5 minute walk test Pittsburgh Sleep Quality Index BORG scale FACIT	Combined supervised and home based individual exercise and dietary education were shown to be feasible and demonstrated positive effects on fatigue. Demonstrated to be beneficial in terminal patients. Barriers and facilitators to exercise to be considered.

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Oncology Nursing Society, http://www.ons.org/Research/PEP/Fatigue, 2011 **Fatigue: Energy Conservation and activity Management**	Evidence review	**1-** **2-**	1 RCT 1 pre - post-test with non-equivalent control group	Cancer related fatigue	Energy Conservation and activity Management	pre - post-test with non-equivalent control group	Not stated	Profile of Mood states, Schwartz Cancer Fatigue Scale General fatigue scale	Energy Conservation and activity management intervention had a significant effect on reducing fatigue; the clinical effect was modest, experiencing less disruption of usual activities. Intervention well-tolerated and accepted by patients

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Ev level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Oncology Nursing Society, http://www.ons.org/Research/PEP/Fatigue, 2011 **Fatigue Cognitive Behavioural interventions**	Evidence review	**1-**	7 RCT 1 RCT 1 single arm study	Breast predominately varied cancer diagnosis Breast	Behaviour therapy Intervention and individualised sleep promotion plan (ISPP): • Modified stimulus control • Modified sleep restriction • Relaxation therapy	Usual care and waiting list None None	**Up to 1 year** **Long term follow up**	Symptom experience scale, HADS, MOS-SF 36-v2 Piper Fatigue Scale Pissburgh Sleep Quality Index, Sleep diary FSI, Profile of Mood states Fatigue/Inertia subscale	The 4 component ISPP was associated with improved sleep quality over time Improvement in fatigue from pre-post treatment with maintenance over the 12 months. Improvements in insomnia and fatigue CBT resulted in less fatigue compared to Brief nursing

	2 prospective repeated measures, feasibility study. 1 repeated measure	Breast female	• Sleep hygiene counselling Brief Nursing Intervention and CBT compared to usual care Multimodal CBT, combining cognitive, behavioural and educational strategies Multimodal CBT, individual sleep promotion plan, relaxation Multimodal CBT,	none	**Long term** **8 weeks**	(POMS-F/I) CIS-fat Health survey short form-36 Symmptom checklist-90 EORTC-QLQC30 Actometer Multidimensional fatigue Inventory Piper Fatigue Scale EORTC-QLQ-C30	intervention and usual care Significant improvement in general and physical subscales of the MFI, treatment gains were sustained over time. Adherence to intervention high Significant decrease in fatigue, sleep and mood improved

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Oncology Nursing Society, http://www.ons.org/Research/PEP/Fatigue, 2011 Psycho-educational interventions	Evidence review	**1-**	11 RCTs 2 prospective randomised studies, 3 pre-post test design, 2 prospective trial, 1 observational cohort study, 1 descriptive quasi-experimental	Various cancer diagnosis and specific studies on Lung cancer, gastrointestinal, breast	Various: Education on symptom management, relaxation, physical activity, Advice on energy conservation, distraction, stress management, cognitive restructuring, positive coping, goal setting, Art therapy Social support	Those using control groups = usual care	Varied from end of intervention to 12 months post intervention	Breathlessness VAS, fatigue instruments, Anxiety, Functional ability, Profile of Mood states, symptom distress scale Self-care diary	Varied results from no significant difference to significant differences. Overall recommendation: psycho-educational intervention is an effective treatment for relieving the symptoms of fatigue, anxiety, breathlessness and nausea. Exercise has a positive effect on fatigue.

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Oncology Nursing Society, http://www.ons.org/Research/PEP/Fatigue, 2011 Relaxation and guided imagery	Evidence review	**1-**	3 RCTs	Breast	Cognitive behaviour and relaxation	Usual care	Up to 4 months follow up	Fatigue scales, Profile of Moods Scale	Fatigue symptoms decline when provided cognitive behaviour and relaxation interventions. Significantly lower in relaxation group.
Cramp, Daniel 2009. Exercise for the management of cancer related fatigue	Cochrane review	**1-**	28 studies identified (RCTs only)	Predominately breast cancer all stages of cancer pathway	Aerobic exercise, strength training and flexibility exercises	Exercise compared with no exercise regime, a usual care group or an alternative treatment or exercise regime.	Long term follow up	Patient reported fatigue measures Exercise maintenance on follow up Attrition Time spent exercising Aerobic capacity Anxiety, depression self-efficacy	Exercise can be regarded as beneficial for individuals with cancer-related fatigue during and post cancer therapy. Further research required to determine the optimal type, intensity and timing of an exercise intervention

Section 5: Evidence for cancer related fatigue management

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Goedendorp, Gielissen, Verhagen et al, 2009. Psychosocial interventions for reducing fatigue during cancer treatment	Cochrane review	**1-**	27 studies identified (RCTs only)	Adult cancer patients receiving active treatment	Psychotherapy, psycho-education, education, cognitive restructuring, changing coping strategies, behavioural change, support groups, relaxation, energy conservation or stress management and physical activity	Control group received standard care and standard information or assigned to waiting list	Varied with assessment at end of intervention up to eight months	Fatigue instruments.	There is limited evidence that psychosocial interventions are effective in reducing fatigue. Most promising are psychosocial interventions specifically designed to treat fatigue. In general, during these interventions patients were educated about fatigue, were taught self-care or coping techniques, and learned to manage their activity
Kwekkeboom, Abbott-Anderson, Cherwin, et al, 2012.	Pilot RCT	1-	86	Advanced cancer	Relaxation, imagery and distraction techniques	Waiting list	2 weeks	Symptom cluster severity	Cognitive behavioural interventions may be an efficacious approach to treating the pain, fatigue and sleep disturbance symptom cluster

Author (s) / Title	Reference Type	Evidence level	Description
National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology: Cancer Related Fatigue Version 1.2013	Statements of evidence and consensus of the authors regarding their views on currently accepted approaches to treatment	All recommendations are category 2A unless otherwise stated	The fatigue standards as proposed according to the author represents the best level of care for the assessment and management of fatigue in cancer patients, and provide guidance for health care professionals as they implement the guidelines in the respective clinical settings. The overall goal of the standards and guidelines is to ensure that all cancer patients are identified as well as treated promptly and effectively

Section 6: Evidence for physiotherapy stretching:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Decoster, et al, 2005: The Effects of Hamstring Stretching on Range of Motion: A Systematic Literature Review	Systematic Review	1++ to 2++	28 studies (1338 n): RCTs, CTs, pre-post and cohort studies (numbers of each study type not listed in review) (only 6 studies of good quality)	Healthy subjects 14-60 years	Hamstring Stretching: in *various positions* (supine, standing, seated, standing with anterior pelvic tilt); using *various stretching techniques* (static, active, ballistic, PNF); for *various durations* (range: 1-10 reps, x10-80secs to 10-15 min, 1-14 x/week, x single session-14 weeks).	Review of the Effect of Hamstring Stretching	x single session to 14 weeks	Knee extension, SLR	**Hamstring stretching increases ROM with a variety of stretching techniques, positions and durations.** More and better quality research is however required to establish the most efficient stretching protocol.

Section 6: Evidence for physiotherapy stretching:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Harvey, et al, 2000: A Randomised Trial Assessing the Effects of 4 Weeks of Daily Stretching on Ankle Mobility in Patients with Spinal Cord Injuries	RCT	1++	14	SCI	Ankle Stretch into Dorsiflexion (using a mechanical device) 30 mins per day, x 5-7days per week, x 4 weeks	1 ankle stretched versus no stretch on other ankle (control)	4 weeks	Ankle dorsi-flexion ROM	**No significant change in ankle mobility was found.** Patients were not able to stand or walk during the study which may have adversely affected ankle mobility.
Harvey, et al, 2009: Effects of 6 months of regular passive movements on ankle joint mobility in people with spinal cord injury: A RCT	RCT (20 patients)	1++	20	Tetraplegic SCI: Wheelchair dependent; mild to moderate ankle stiffness; Paralysis both knees to ankles (ASIA A / B)	Passive movements: 10mins morning & evening (20 mins per day); x5days per week; x6months	1 ankle (experimental) mobilised and other ankle (control) not mobilised in each patient	6 months	Primary Measures: Passive ankle dorsiflexion ROM Secondary Measures: Spasticity, patient perception of change, convenience	**Regular passive movements have a small but statistically significant effect on ankle joint mobility (4°) (Questionable clinical significance).** No significant change in spasticity scores was found. Some participants reported that passive movements reduced ankle stiffness, spasticity, and oedema. Participants did not find passive movements inconvenient.

Section 6: Evidence for physiotherapy stretching:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Katalinic, et al, 2010: Stretch for the Treatment and Prevention of Contractures: Cochrane Systematic Review	Cochrane Systematic Review	1++ to 2++	35 studies (1391n) RCTs or CTs	Patients with Neurological and Non-neurological conditions	Stretch: manual passive stretches; splints; casts and positioning compared to no stretch or placebo stretch or stretch added to a co-intervention versus co-intervention alone. (Excluded comparisons of stretch methods or stretch to another active intervention). Range: ≥20secs per stretch, x20mins to 24hrs/day, x2days to 7months	Review of Stretching for Prevention of Contractures	2days to 7 months	Primary: Joint Range of Motion (ROM) Secondary: QOL, pain, spasticity, Activity limitation, Participation restriction.	**Stretch does not have clinically important effects on joint ROM in neurological and non-neurological Conditions** (Some meta-analysis possible). Stretch also has little or no effect on pain, spasticity, and activity limitation and participation restriction although evidence is very limited and therefore inconclusive for these measures.

Section 6: Evidence for physiotherapy stretching:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Marshall, et al, 2011: A randomized controlled trial for the effect of passive stretching on measures of hamstring extensibility, passive stiffness, strength, and stretch tolerance.	RCT	1+	22	Healthy participants	Hamstring and hip stretches (4 types of hip stretches) 30sec x3 reps per stretch / 12-15mins stretch per session, x 5 days per week, x 4 weeks.	Hamstrings/ hip stretches versus no stretch (control)	4 weeks	VAS; Isokinetic dynamometry (hamstring strength); Instrumented SLR test (hamstring length)	**Stretching increased hamstring extensibility significantly (by 20.9%, with a large effect size of 0.86) and reduced passive stiffness (by 31%).** No change in stretch tolerance defined by pain intensity or in hamstring strength was found with stretching. Multiple stretches and increased intensity of stretching may account for the strong clinical effect seen in this study.
Michlovitz, Harris, Watkins, 2004: Therapy Interventions for Improving Joint ROM	Systematic Review	2++	26 studies (moderate to low quality)	Patients with loss of motion after fracture, dislocation, joint trauma or crush injury to the upper extremity	Splinting, Casting, Joint mobilisation, Continuous passive motion (CPM), injection, clinic v. Home exercise programme	Review of effectiveness of physio-therapy methods for increasing joint ROM	3 days to 4.5 months	ROM	**Moderate support for splints and casts, passive movements and supervised exercise in increasing ROM post trauma or immobilisation** based on moderate to low quality evidence (level 2 to 4). Little evidence for CPM post operatively increasing ROM. Some support for steroid injection and exercise in increasing ROM in adhesive capsulitis.

Section 7: Evidence for spasticity control:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hsieh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Spasticity following SCI: Systematic Review: Passive Movements or Stretching for Spasticity Control	Systematic Review: **Passive Movements or Stretching for Spasticity Control**	1++ to 2++	8 studies 4 RCTs, 4 pre-post studies	SCI	Passive Movements or Stretching Range: 20mins-80mins, 2-6/week, x2weeks-6months	Review of Passive Movements or Stretching for Spasticity Control	2weeks-6months	Modified Ashworth Scale, Barthel Index, ROM, Global Impression of Change Scale, VAS of spasticity, mental well-being, electro-diagnostics, MAS, Dynamometry, EMG	**A combination of neural facilitation techniques and baclofen may reduce spasticity** based on a level 1 single study. **Rhythmic Passive Movements may produce short term reductions in spasticity** (from a level 4 single study). **Prolonged Standing or other methods of producing muscle stretch may result in reduced spasticity** (based on a level 4 single study, individual case studies and survey based research). **Electrical Passive Pedalling systems may result in short term reductions in spasticity** (based on level 2 evidence).

Section 7: Evidence for spasticity control:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hsieh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Spasticity following SCI: Systematic Review: Active Movement including FES-Assisted Movement for Spasticity Control	Systematic Review: **Active Movement including FES-Assisted Movement for Spasticity Control**	1 ++ to 2++	5 studies: 1 RCT, 3 pre-post studies, 1 CT	SCI	Active Movement, FES-Assisted Movement Range: 20-120 mins, 2-7/ week, xOnce-18months	Review of the Effects of Active Movement Approaches for Reducing Spasticity including FES-assisted movement	Once-18 months	Pendulum test, Ashworth Scale, Self-reported Spasticity, Penn Spasm Severity, FIM score, oral baclofen dose, Reflex and Intrinsic Stiffness, Manual Muscle Tests, MVC, Gait, Balance/ Posture.	**Active exercise interventions such as hydrotherapy (based on a level 2 single study) and FES-assisted walking (based on three level 4 studies) and FES-assisted cycling greater than passive cycling (based on a level 2 single study) may produce short-term reductions in spasticity.**
Hsieh et al (2012): Spinal Cord Injury Rehabilitation Evidence (SCIRE): Spasticity following SCI: Direct Muscle Electrical Stimulation for Spasticity	Systematic Review: **Direct Muscle Electrical Stimulation for Spasticity**	1++ to 2++	5 studies: 1 cross sectional study, 2 CTs, 2 pre-post studies	SCI	Electrical Vibration/ Stimulation of Muscle Range: 10 -45 mins, (50Hz/ 3x motor threshold for motor stimulation/ 80% motor threshold for afferent stimulation) 1-6 x / week, Once- x 4-8 weeks	Review of the Effects of Direct Muscle Stimulation on Spasticity	Once- x 4-8 weeks	Modified Ashworth Scale, ROM, Clonus, H Reflex, H/M Ratio, Pendulum test, torque resistance/ muscle stiffness, Self Assessment of Spasticity	**Electrical Stimulation applied to individual muscles may produce a short term decrease in spasticity** (based on two level 2 controlled trials and one pre-post study). **There is also some concern that long term use of electrical stimulation may increase spasticity** (based on a single pre-post study)**.**

Section 7: Evidence for spasticity control:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hsieh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Spasticity following SCI: Various Forms of Afferent Stimulation for Reducing Spasticity	Systematic Review: **Various Forms of Afferent Stimulation for Reducing Spasticity**	1++ to 2++	10 studies: 3 RCT, 1 cross sectional, 5 pre-post studies, 1 case report	SCI	Various forms of Afferent Stimulation: TENS, Helium-Neon Laser Irradiation, Whole body vibration, Massage, Ice.	Review of Various forms of Afferent Stimulation on Spasticity	Once- 4 weeks	Modified Ashworth/ Spasticity score, clonus, spasm frequency, painful spasm scale, deep tendon reflexes, electro-physiological measures, FIM/FDS, EMG, ROM, torque resistance.	**On-going TENS programs result in short term reductions in spasticity which may last up to 24 hours** (based on level 1 and 4 evidence) **Other forms of afferent stimulation including massage, ice, helium-neon laser irradiation and whole body vibration may result in immediate spasticity reduction but more research is required into their long term effects** (based on level 2 and 4 evidence).

Section 7: Evidence for spasticity control:

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hsieh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Spasticity following SCI: Systematic Review: Pharmacological Treatment for Spasticity- Oral Baclofen, Intrathecal Baclofen, Botulinum Toxin and other drugs.	Systematic Review: **Pharma-cological Treatment for Spasticity- Oral Baclofen, Intrathecal Baclofen, Botulinum Toxin, Other drugs**	1 ++ to 2++	**Oral Baclofen** 7 studies: 5 RCTs, 1 CT, 1 pre-post study **Intra-thecal Baclofen** 20 studies: 5 RCTs, 1 Retro-spective study, 8 pre-post, 6 case series studies **Bot-ulinum Toxin:** 4 studies: 1 RCT, 2 case studies, 1 case series	SCI	Pharma-cological Treatment for Spasticity: **Oral Baclofen** (Range:20-100mg per day, x 2-8 weeks) **Intrathecal Baclofen** (Range:12.5-100mg daily, x30 days -108 months) **Botulinum Toxin:** Range: unstated-210 units total.	Review of the effect of drug management on Spasticity	**Oral Bac-lofen:** 2-8 weeks **Intra-thecal Baclofen:** 30 days to 108 months. **Bot-ulinum Toxin:** 12 weeks- 2 years	Torque resistance, Self-report of spasms/ VAS, global impression of treatment, movement resistance scale, clonus, pain, use of limbs, EMG, ROM, Muscle Strength, Ashworth Scale, frequency of spasms (SFS), Reflexes, electrodiagnostic measures, Function: (FIM, FDS, Barthel Index, River mead Motor Assessment Scale, transfer ability ADLs, Hand Function, 9 hole peg test, grip strength) Pendulum test, cough thresholds, costs, bladder & respiratory function, Adverse effects, drug tolerance.	**Oral Baclofen reduces muscle spasticity in people with SCI** (based in four level 1 RCTs). **Bolus or long-term Intrathecal Baclofen decreases spasticity and may improve functional outcomes with low complication rates and is a cost effective intervention** (based on level 1 and 4 evidence). **Botulinum Toxin appears to improve focal muscle spasticity in SCI** (mainly based on level 4 evidence) **Other Drugs: Tizanidine, Clonidine, Cyproheptadine, Gabapentin, Orphenadrine Citrate, Cannibis (THC) and phenol block** may be useful in treating SCI spasticity but more evidence is required.

Section 7: Evidence for spasticity control:

Author (s) / Title	Reference Type	Evidence level	Description
Birns and Fitzpatrick, 2008. Management of spasticity: A brief overview of educational and pharmacological therapies	Expert opinion	4	The management of spasticity involves a multidisciplinary approach to direct treatment. The management of spasticity is integral to the aims of rehabilitation involving re-education of movement and promotion of independence.

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Hurlow, et al, 2012: Trans-cutaneous Electric Nerve Stimulation (TENS) for Cancer Pain in Adults (Review)	Cochrane Systematic Review	1+	3RCTs (88n)	Patients with cancer related pain for a minimum of 3 months	TENS	Review of TENS for pain relief in cancer	5days- 3 weeks	Pain, anxiety, depression, physical functioning	Unable to meta- analyse studies due to small sample sizes and patient differences. **Evidence is inconclusive and limited** and further large multi-centre RCTs are required to evaluate TENS in cancer pain: -1RCT:TENS may reduce bone pain in cancer patients; 1 RCT: no significant benefit with TENS for chronic pain secondary to breast cancer; 1 RCT: no significant benefit with TENS in palliative care patients.

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury**: A Systematic Review:** Massage and Heat	Systematic Review: **Massage and Heat**	1+ to 2++	2 studies: 1 CT (30 subjects) 1 case series (90 subjects)	SCI	Massage, Massage and heat. X2 per week, X 6weeks in CT	Review of the effects of massage and heat on pain in SCI	6 weeks and 2 months later (in CT)	VAS, Pain questionnaire, Life questionnaire, hospital anxiety and depression scale, Pain drawing.	**Massage may not be helpful for post SCI pain** (based on level 2 evidence). **Massage and heat may be helpful for post SCI pain.** There is limited level 4 evidence that massage and heat are the **best non-pharmacological treatments** for pain post SCI
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury**: A Systematic Review:** Acupuncture	Systematic Review: **Acupuncture**	1++ to 2++	6 studies: 3 RCTs, 2 pre-post studies, 1 CT	SCI	Acupuncture: Range: 10-15 treatments, 2x per week, X 5-7.5 weeks. (protocol available only for some studies)	Review of effect of Acupuncture on pain in SCI	5-7.5 weeks	WUPSI, NRS, Intake questionnaire, weekly log, VAS, ROM, BPI, general health symptom rating scale, activity scale, Mood, psychological wellbeing scale, expectations.	**Acupuncture may reduce post SCI pain** based on level 1 and 4 evidence**. Electrostimulation acupuncture is effective in improving SCI pain** based on level 1 and 4 evidence.

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury: **A Systematic Review:** Exercise	Systematic Review: **Exercise**	1++ to 2++	5 studies: 2 RCTs, 1 CT, 2 pre-post studies	SCI	Exercise: including stretching, arm ergometry, resistance exercise, shoulder stretching and strengthening exercises, HEP, theraband exercise, circuit resistance training. Range: 45-95 mins per session, x 2-3 per week, x8 -16 weeks (incomplete data on protocols in some studies)	Review of the effect of exercise on pain in SCI	8-16 weeks	Pain perception/ VAS, Symptom control perception, Stress, Exercise Adherence, QOL, WUPSI,	**Regular exercise reduces post SCI pain** based on level 1 evidence. **A shoulder exercise protocol reduces post SCI pain** based on level 2 evidence.

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury**: A Systematic Review:** TENS	Systematic Review: **TENS**	2++	3 studies: 1 RCT, 1 CT, 1 case series	SCI	TENS	Review of the effect of TENS on pain in SCI	4 weeks (in CT) (not given for other studies)	VAS, BPI, NRS, subjective report	**TENS may reduce pain at site of injury in patients with thoracic and caudal but not cervical injury based on limited level 4 evidence. Some limited support also for TENS in reducing pain post SCI from the RCT and CT.**
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury: A Systematic Review: Cognitive Behavioural Therapy (CBT)	Systematic Review	2	2 studies: 2 PCTs	SCI	Cognitive Behavioural Pain management Programme and CBT programme	Review of the effect of CBT on pain in SCI	9 – 12 months	Pain response self-statement scale, pain self-efficacy questionnaire, MPI; HADS; SF-12 Mental Component Scale. Pain chart, Borg CR10 scale, quality of sleep, Nottingham Health Profile, HADS.	A cognitive behavioural pain management program with pharmacological treatment improves chronic pain post SCI over the short term. **CBT alone does not change post-SCI pain intensity.**

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Teasell, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Pain following Spinal Cord Injury: Visual Imagery	Systematic review	Conflicting evidence	3 studies: 1 RCT, 2 pre-post	SCI	Visual illusion, movement imagery, virtual walking exercise	Review of Visual illusion, movement imagery, virtual walking exercise on pain in SCI	Up to 3 months follow up	NRS, MPQ,VAS	**Conflicting evidence from a significant reduction in pain to a significant increase. No long lasting effects observed. Participants left studies due to distress.**
Budh, Kowalski, Lundeberg, 2006.	Prospective repeated measures study with a control group.	2-	27 patients participated in programme and 11 in the control group.	Spinal Cord injury with neuropathic pain.	10 week programme with education, behavioural therapy, relaxation, stretching, light exercise and body awareness training.	No intervention	3, 6 and 12 month follow up.	Pain intensity, quality of sleep, quality of life, mood, sense of coherence, use of the healthcare system	Significant improvements in depression and sense of coherence reduced use of pharmacological treatments and decreased use of healthcare visits. 48% considered they were better able to cope with their pain. Patients with neuropathic pain benefit from a multidisciplinary pain management programme.
Thomas, Elliott, Rao, et al, 2012.	RCT	1-	318	Oncology outpatients	Motivational interviewing based coaching for cancer pain management	Control, standardised education and coaching group.	6 weeks	Attitudinal barriers, pain intensity, pain relief, pain interference and Quality of Life	Patients randomised to the coaching group reported significant improvement in their ratings of pain related interference with function, as well as general health, vitality and mental health.

Section 8: Evidence for pain relief interventions

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Heutink, Post, Bongers-Janssen, et al, 2012.	RCT	**1-**	61 randomised to either intervention or control group	Persons with chronic neuropathic pain after SCI	Multidisciplinary cognitive behavioural treatment programme. 10 sessions 3 hours over a 10 week period and a comeback session. Education and cognitive and behavioural elements targeted using Bio - psychosocial model and the Activating event-Belief-Consequence (ABC) model	Control group put onto waiting list.	6 months	Chronic Pain Grade Questionnaire and Hospital Anxiety and Depression Scale, Utrecht Activities List and Life Satisfaction Questionnaire.	No intervention effects for pain intensity and pain related disability. Significant treatment effects were found for anxiety and participation in activities.

Author (s) / Title	Reference Type	Evidence level	Description
Akyuz and Kenis, 2013. Physical Therapy Modalities and Rehabilitation Techniques in the treatment of Neuropathic Pain	Review article	4	Review of articles identified from PubMed about physical therapy modalities and rehabilitation techniques in the treatment of neuropathic pain. Recommends that rehabilitation programmes be emphasised and combined with pharmacotherapy in daily practice.

Section 9: Evidence for Functional Electrical Stimulation (FES):

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Domingo, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Lower Limb Rehab-ilitation Following Spinal Cord Injury: EFFECTS OF FES ON MUSCLE (See effects of FES on gait in gait rehab: Section 2)	**Systematic Review: Effects of FES on muscle** **1. FES assisted cycling** **2. FES assisted Stand and Gait Training**	1++ to 2+	**1**. 9 studies: 1RCT,1 CT, 7 pre-post studies **2.** 6 studies: 1CT, 4 pre-post studies & includes 1 system. review (1RCT & 32 quasi exper. studies)	SCI	**1**. *FES assisted cycling* Range: 3-30min, 1-7 x per week, 5weeks-18 months **2.** Treadmill training with or without FES v. conventional physio; Muscle stimulation- (glutei & quadriceps), FES assisted Standing practise, Nerve stimulation (sciatic, pudendal, sacral). Range: 20 min, 1-5 days/ week, x6months- 2 years	**1.** Review: Effect of FES cycling on muscle **2**.Review: Effect of FES assisted stand and gait training on muscle	1. 5weeks - 18 months 2. 6 months to 2 years	1 & 2: Peak Quadriceps or hamstrings torque/ power output/ contractile speed/ endurance/ fatigue resistance, lower limb lean body mass/ thigh circumference (CT/ manual), HR, VO2, VCO2, Pulmonary ventilation (Ve), muscle morphology & proteins, spasticity, ROM	1 & 2: **FES assisted exercise prevents and reverses lower limb muscle atrophy** -based on level 2 evidence in recent SCI (10 weeks post SCI) and level 4 evidence in patients with long-standing SCI >1year. **FES cycling may increase lower limb muscle strength and endurance in motor complete SCI** (based on level 4 evidence)

Section 10: Evidence for DVT prophylaxis: LMWH / mechanical prevention

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Amaragiri and Lees, 2000: Elastic Compression Stockings for prevention of deep venous thrombosis: Cochrane Systematic Review	Cochrane Systematic Review	1++	16 RCTs	Post operative hospitalised patients	Graduated compression alone or in combination with another prophylaxis	Review of GCS alone or with another prophylaxis	Until discharge or until fully mobile	DVT incidence	**Strong evidence exists to show that GCS alone lower the risk of DVT** with a 15% incidence of DVT in the GCS group compared to a 29% incidence of DVT in the control group (no GCS). **GCS may be more effective with another form of prophylaxis.** 3% of the GCS and another prophylaxis group developed a DVT compared to 14% of the patients receiving another prophylaxis only
Benko , Cooke, McNally & Mollan, 2001: Graduated compression stockings (GCS) – knee length or thigh length	RCT	1+	200n	Peri-operative orthopaedic patients	Thigh versus knee length GCS (4 groups) versus no GCS (control group)	Comparison of thigh versus knee length versus no GCS	After 20mins bed rest	Venous blood outflow	**Results showed a highly significant increase in venous blood outflow with all types of graduated compression stockings.** No significant increase in venous blood outflow was observed in the control group with no GCS. **The authors concluded that graduated compression stockings should be used routinely for DVT prevention in peri-operative, immobilised patients.**

Section 10: Evidence for DVT prophylaxis: LMWH / mechanical prevention

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Kalodiki, Hoppensteadt, Nicolaides, et al, 1996: Deep Venous Thrombosis Prophylaxis with low molecular weight heparin (LMWH) and elastic compression in patients having total hip replacement	RCT	1+	78	Total hip replacement patients	Group A: Placebo injection (control); Group B: LMWH; Group C: LMWH and GCS	No intervention versus LMWH versus LMWH and GCS	8-12 days	DVT incidence	**The combination of LMWH and GCS appeared to be more effective in reducing the incidence of DVT than LMWH alone**
Teasell, Mehta, Loh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Venous Thromboembolism following SCI: A systematic Review: LMWH	Systematic Review: **LMWH**	1++to 2++	6 studies: 2 RCTs, 1 case cohort, 1 case control, 1 case series & 1 pre-post study	SCI	Low Molecular Weight Heparin (LMWH) Range: 30-40mg subcut, 8hrly-once daily, x 6-8 weeks/ duration of hospital stay (v.unfractionated Heparin)	Review of the effects of LMWH in Venous Thrombo-embolism Prevention	6-8 weeks/ duration of hospital stay	DVT, PE, major bleeds, complications of anticoagulation, Doppler, V/Q scans, reduced hb and platelet levels	**LMWH reduces the risk of venous thromboembolism post SCI more effectively than standard or unfractionated heparin with fewer bleeding complications.** Strong level 1 evidence based on 2 RCTs exists to support LMWH.

Section 10: Evidence for DVT prophylaxis: LMWH / mechanical prevention

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Teasell, Mehta, Loh, et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Venous Thromboembolism following SCI: A systematic Review: Mechanical Compression alone or with LMWH	Systematic Review: **Mechanical Compression alone or with LMWH**	1++to 2++	10 studies: 4 RCTs, 1 pre-post study, 5 case series	SCI	Mechanical Compression (e.g. Graded compression stockings (GCS), pneumatic compression) alone or with LMWH	Review of effects of mechanical compression +/- LMWH on Venous Thrombo-embolism Prevention	Hospital stay	Venous flow & velocity/ impedance blood plethysmography, DVT, PE, major bleeds, PAR, Factor 8 coagulant activity, Marder score.	**Mechanical compression may reduce the incidence of venous thromboembolism post SCI. A combined regime of mechanical compression and LMWH may reduce incidence of venous thrombus and the effect is better if instituted early post SCI.** All based on level 4 evidence.

Author (s) / Title	Reference Type	Evidence level	Description
Scottish Intercollegiate Guidelines Network (SIGN) 2010: Prevention and management of venous thromboembolism	Regional Guideline	4	Regional good practice guideline from SIGN on the management of venous thromboembolism (VTE) based on expert opinion and a comprehensive evidence based literature review. Key Recommendations: • Screening for Risk Factors similar to NICE 2006 • Effective prophylaxis of VTE in major surgery, trauma and acute medical illness (with > 3 days bed rest) should be provided • GCS and LMWH are advised in patients with identified risk factors

Section 10: Evidence for DVT prophylaxis: LMWH / mechanical prevention

Author (s) / Title	Reference Type	Evidence level	Description
National Institute for Health and Care Excellence (NICE), 2012: Venous thromboembolic diseases: the management of venous thromboembolic diseases and the role of thrombophilia testing	National Guideline	4	National good practice guideline from NICE on the management of venous thromboembolism (VTE) based on expert opinion and a comprehensive evidence based literature review. Key Recommendations: • Screening of all patients for VTE risk on admission. Risk factors for VTE are identified as history of VTE; thrombophilias; cancer; chemotherapy agents; combined oral contraceptives; hormone replacement therapy; varicose veins with phlebitis or history of VTE; obesity; immobility; prolonged travel (>3hrs) before or after surgery; >60years. • All surgical patients should be offered graduated compression stockings from admission. • GCS should be provided by properly trained staff and patients shown how to wear them properly with monitoring and assistance as required. • For patients with 1 or more risk factors, GCS with low molecular weight heparin (LMWH) or fondaparinux are advised • GCS should be worn until the usual level of mobility is resumed. • GCS should be avoided in peripheral vascular disease • Leg exercises, early mobility and adequate hydration are advised for all patients

Section 11: Evidence for Spinal Stabilisation / Mobilisation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Gavin, et al, 2003: Biomechanical Analysis of Cervical Orthoses in Flexion and Extension: A Comparison of Cervical Collars and Cervical Thoracic Orthoses	Controlled Trial	1+	20	Normal volunteers	Biomechanical Analysis of cervical flexion and extension in: 1. Aspen cervical collar 2. Miami J cervical collar 3. Aspen Cervical Thoracic Orthoses (CTO): 2 post 4. Aspen CTO: 4 post	Amount of gross and intervertebral cervical motion in flexion and extension for: 2 cervical collars - Aspen & Miami J and 2 CTOs - Aspen 2 post and Aspen 4 post	N/A	*Gross cervical motion* (opto-electronic motion measurement System), *Intervertebral motion*- angular and transitional (video fluoroscopy) *EMG*	**Each orthoses (collar or CTO) significantly reduced gross and intervertebral motion.** No statistically significant difference in gross and intervertebral movement was found between the Aspen and Miami J except at C5/6 where Miami J allowed more flexion. **Both CTOs offered significantly more restriction of gross and intervertebral motion compared to the collars.** Aspen 2 post and 4 post CTOs offered similar restrictions for flexion/ **Aspen 4 post CTO however gave significantly more restriction of extension.** **Aspen 4 post CTO offered the most restriction of motion** compared to the collars and Aspen 2 post CTO.

Section 11: Evidence for Spinal Stabilisation / Mobilisation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Kilbride, et al, 2010: Metastatic Spinal Cord Compression : A Review of Practice and Care	Systematic Review	2++	35 studies : (1 systematic review, 12 literature reviews, 3 guidelines, 10 retrospective studies, 1 descriptive study, 4 prospective studies, 2 review articles, 1 retrospective audit, 1RCT)	MSCC	Immobilisation, Mobilisation, Bracing, Positioning	Review of spinal stabilisation/ mobilisation	N/A	Imaging, MRI, Clinical outcomes, symptoms, complications,morbidity, survival, ambulation, function, Pain, Neurology, retrospective patient record analysis, length of stay/ rehabilitation.	**There is limited and inconclusive evidence relating to spinal stabilisation, bracing, mobilisation and positioning. More research is required.** Some recommendations were made: Need early detection; MRI is a useful diagnostic tool; Need clarification of spinal stability; Need timely referral for surgery if unstable; Role for surgery if unstable or > 3months prognosis; Need prophylactic DVT management; Consider patient preference and QOL; Consider vertebroplasty and braces; Consider earlier mobilisation and adequate rehabilitation in MSCC patients.

Section 11: Evidence for Spinal Stabilisation / Mobilisation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Kwan, et al, 2009: Spinal Immobil-isation for Trauma Patients (Review)	Cochrane Systematic Review	- 1++/1+	(0)No RCTs in spinal trauma patients→ Unable to continue review Instead included 17 RCTs in healthy volunteers (529n)	As no RCTS in spinal trauma patients, included evidence from RCTs in healthy volunteers	Investigated methods of stabilisation: Boards: padded and unpadded, Collars, air/ vacuum mattresses for primarily stabilisation, skin break down and comfort in healthy volunteers	Review of Immobilisation Methods	Not stated	Pain/comfort; Respiration; Skin break down; Contact pressure; Sacral pressure oxygenation; Immobilisation effectiveness (radiologically; video frames; EMG); Ease/Speed of application; Storage.	**There is statistically significant immobilisation with collars. Short Boards with collars are more efficient than collars alone in restricting spinal motion**. Abdominal straps may reduce lateral movement (based on 1RCT). **Air/Vacuum mattresses and padded back boards are more comfortable than rigid backboards.** *Conscious* patients are likely to reposition themselves for comfort which could worsen SCI. Whole body immobilisation especially with decreased sensation may increase risk of skin trauma and reduce respiratory function (though the evidence is inconclusive and inadequate). There is an ethical and legal dilemma not to stabilise in trauma resulting in no RCTs comparing stabilisation to mobilisation. There is however a need for more RCTs in spinal trauma patients to compare immobilisation strategies for best practice.

Section 11: Evidence for Spinal Stabilisation / Mobilisation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Lee, et al, 2012: Patient Positioning (mobilisation) and Bracing for Pain Relief and Spinal Stability in Metastatic Spinal Cord Compression in Adults	Cochrane Systematic Review	4	No RCTs- 1611 studies but none met inclusion criteria of RCT	Metastatic spinal cord compression	Positioning / Mobilisation / Bracing	Review of spinal stabilisation/ mobilisation	n/a	n/a	**Lack of evidence and mixed expert opinion for bed rest versus mobility and bracing in MSCC.** **No clear guidelines exist at present**
Powers, Daniels, McGuire, et al, 2006.	Prospective descriptive		484	Patients wearing a cervical collar for longer than 24 hours	Cervical immobilisation	n/a	Duration of hospital stay	Skin breakdown	Skin breakdown noted in 6.8%. Days in collar are a significant predictor of skin breakdown. Most of the skin breakdown occurred on the shoulders, chin, and back, generally from plastic edges not being covered entirely by foam, not a true pressure breakdown.

Section 11: Evidence for Spinal Stabilisation / Mobilisation:

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Miller, et al, 2010: Soft and Rigid Collars Provide Similar Restriction in Cervical Range of Motion During Fifteen Activities of Daily Living	Cohort Study	2++	10	Normal healthy subjects	Analysis of ROM - Actively & During 15 Functional Activities, in Soft and Rigid Collars. (Soft Collar = Ultra Cervical Collar (Corflex) & Rigid Collar = Aspen Vista)	Comparison of ROM (Actively and during 15 Functional Activities) in Soft and Rigid collars. (15 Functional Activities: Standing to sitting; Reversing car; Putting on socks; Tying Laces; Reading a magazine in the lap; cutting food and bringing to the mouth; standing up; washing hands in standing; shaving face/ applying make-up; washing hair in shower; picking up object from floor by bending/ by squatting; walking; walking upstairs/ downstairs)	N/A	Active ROM & Functional ROM during 15 ADLs (electro-goniometer & torsiometer)	**A rigid collar (RC) reduces full, active ROM more effectively than a soft collar (SC):** **Significant Restriction in Flexion/ extension (sagittal plane) for RC:** 53.7% (RC), 27.1% (SC). **Significant Restriction in Rotation (Axial plane) for RC**: 59.2% (RC), 29.3% (SC). Non-Significant Restriction in Lateral Bend (coronal plane) for RC: 34.9% (RC), 26.1% (SC). **There were no significant differences for soft and rigid collars in functional ROM values during 13 out of 15 ADLs.** Greater motion was only noted on reversing the car and on standing to sitting in the soft collar.

SEE ALSO ADDITIONAL REFERENCES AND GUIDELINES BELOW FOR STABILISATION AND MOBILISATION ADVICE

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Jan, Liao, Jones, et al, 2013.	Repeated measures, intervention and outcomes measure design	**3**	9	Powered wheelchair users with SCI	Various durations (3 mins, 1 min and 0 min) of wheelchair tilt in space 35 degree and recline 120 Degree	Baseline measure and at second sitting post tilt/ recline.		Skin perfusion assessed by laser doppler	Performing the 3 min duration of wheelchair tilt in space and recline is more effective than the 1 minute duration in enhancing skin perfusion of weight bearing soft tissues (P<.017)
Mimura, Eng, Ohura, et al, 2009.	Repeated measures.	**3**	14	Healthy volunteers	Surfaces pressure and shear forces measured during bed operations.	Pre and post	n/a	Surface pressure and shear forces	Shear forces at the sacrum and coccygeal bone sites can be reduced during a bed exercise by raising the knees.
Michael, Porter, Pountney, 2007.	Systematic review of **tilted seat position for non-ambulant individuals with neurological impairment**	**2-5**	19	Non ambulant individuals with neurological and neuromuscular impairment	Tilt in space seating	17 before - after studies			A posterior seat tilt of 20° or more reduces pressures under the pelvis. There is a lack of quality evidence to support and guide the use of tilted position in seating.

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Regan, Teasell, Keast, et al, 2010: SCIRE, Pressure Ulcers Following Spinal Cord Injury: Pressure relief practices on pressure ulcer prevention post SCI	Systematic review	**3-4**	5 studies: 1 pre-post, 2 case control /repeated measures, 2 case series	SCI	Interface pressure using various seat inclinations and sitting protocols	Repeated measures	N/A	Interface pressure	**There is level 3 evidence that 1-2 minutes of pressure relief must be sustained to raise tissue oxygen to unloaded levels.** **There is level 4 evidence to support position changes to reduce pressure at the ischial tuberosities**. 65 ° of tilt or forward leaning of >45°both showed significant reductions in pressure. The type and duration of pressure relief by position changing must be individualised using pressure mapping or similar techniques. A push up/vertical lift of 15-30 seconds is unlikely to be sufficient to allow for complete pressure relief. The Braden scale is the best tool available currently for pressure ulcer risk assessment. Individuals at risk for pressure ulcer development should be referred to a dietician for assessment. Pressure ulcers in Individuals with haemoglobin values less than 10g /dL may be difficult to heal because of impaired tissue oxygenation.

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Regan, Teasell, Keast, et al. 2010: SCIRE, Pressure Ulcers Following Spinal Cord Injury: Wheelchair cushion selection and pressure ulcer prevention post SCI	Systematic review	**3**	7 studies: 2 case control, 1 prospective controlled trial, 4 case series	SCI	Sitting protocols, altered sitting positions, pressure lifts, selection of cushions	Various techniques and cushions	N/A	Interface pressure. Normal and shear seating forces	Cushion selection should be based on a combination of pressure mapping results, clinical knowledge of prescriber, individual characteristics and preferences.
Regan, Teasell, Keast, et al, 2010: SCIRE, Pressure Ulcers Following Spinal Cord Injury: Pressure Ulcer prevention education post SCI	Systematic review	**1-2**	2 RCT	SCI	Education regarding preventative strategies	MS	2 years	Recurrence of pressure ulcers, pressure ulcer knowledge test	Structured pressure ulcer prevention education, helps individuals post SCI gain and retain knowledge of pressure ulcer prevention practices.

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Regan, Teasell, Wolfe, et al, 2009.	Systematic review	**4**	26 articles (7 RCTs on treatment,1 RCT on prevention)	Spinal Cord Injury	Prevention and treatment	SCI	n/a	n/a	Little research exists on preventative interventions.
Gelis, Dupeyron, Legros et al, 2009.	Systematic review of pressure ulcer risk factors following SCI	**2-**	6 studies	SCI	N/A	N/A	N/A	N/A	Immobility as well as the relationship between interface pressure and the length of immobilization time is identified as a risk factor for pressure ulcer development. Identified the need for carefully assessed and care management especially during the acute stage.

Author (s) / Title	Reference Type	Evidence level	Description
European Pressure Ulcer Advisory Panel (EPUAP) and National Pressure Ulcer Advisory Panel, 2009, Prevention and treatment of pressure ulcers: quick reference guide	European and National evidence based guidelines	4	Evidence based guidelines on pressure ulcer prevention and treatment. Developed as a 4 year collaborative effort between the European Pressure Ulcer Advisory Panel and American National Pressure Ulcer Advisory Panel. In the absence of high quality evidence, expert opinion was used to make recommendations.
Keast, Parslow, Houghton et al, 2007.	Practice recommendations	4	Recommendations for best practice in the prevention and treatment of pressure ulcers based on a review of literature.

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author (s) / Title	Reference Type	Evidence level	Description
Wounds International. 2010. Pressure Ulcer Prevention: pressure, shear, friction and microclimate in context.	International review	4	Defines extrinsic factors and how they contribute to the aetiology of pressure ulcers and explains the rationale for the clinical interventions that aim to prevent or ameliorate the adverse effects of the extrinsic factors.
Wound, Ostomy, And Continence Nurses Society (WOCN), 2010. Guideline for prevention and management of pressure ulcers.	Guidelines	4	Recommendations for best practice in the prevention and treatment of pressure ulcers based on a review of literature.
Sibbald, Krasner, Lutz, 2010. SCALE: Skin Changes at Life's End; Final Consensus Statement.	Consensus Statement from a modified 3 phase Delphi method approach	4	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. Patient and family should have a greater understanding that skin organ compromise may be an unavoidable part of the dying process. Comfort may be the overriding and acceptable goal, even though it may be in conflict with best skin care practice. Discussions regarding specific trade-offs in skin care should be documented. Risk factors, signs and symptoms associated with SCALE identified. A total skin assessment should be performed regularly and document all areas of concern consistent with the wishes and condition of the patient. Areas of special concern include sacrum, coccyx, ischial tuberosisties, trochanters, scapulae, occiput, heels, digits, nose and ears. Consider 5 P's, prevention, prescription, preservation, palliation, preference.
National Institute For Health And Care Excellence, 2005. Pressure ulcers: The management of pressure ulcers in primary and secondary care.	NICE Guidance	4	Clinical guidelines on the management of pressure ulcers in primary and secondary care. The guideline was produced by a multidisciplinary Guideline Development Group and the development process was wholly undertaken by the Royal College of Nursing.

Section 12: Evidence for pressure ulcer prevention / management and positioning

Author (s) / Title	Reference Type	Evidence level	Description
Whitlock, Rowlands, Ellis, et al, 2011. Using the SKIN Bundle to prevent pressure ulcers.	service improvement	3	Article describing the implementation of the SKIN bundle within Wales. 95% compliance and increase in days between pressure ulcer events occurring.
Stockton, Gebhardt, Clark, 2009. Seating and Pressure ulcers: Clinical practice guidelines	Clinical guidelines developed by the UK Tissue Viability Society based on a systematic review and consensus opinion	4	Provides health professionals with specific recommendations intended to minimise any risk of developing pressure ulcers when clients are seated. It covers sitting when people are acutely ill in hospital and where people have a long term need for prolonged sitting for example after spinal injury. Particular focus is places on seating assessment and cushion selection.

Section 13: Wheelchairs

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Lemay, Routhier, Noreau, et al, 2012.	Cross sectional	**3**	54	Experienced manual wheelchair users with spinal cord injury	Wheelchair skills test	n/a	n/a	Wheelchair skills test (WST) Cateye Cycle computer (VELO8)	Level of injury is related to manual wheelchair skills but not wheeled mobility. Manual wheelchair skills are related to greater wheeled distance, but to a lesser extent when controlling for age

Section 13: Wheelchairs

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Connolly, McIntyre, Titus, et al, 2012. SCIRE Wheeled mobility and seating equipment for the spinal cord injured individual: Axle position of wheelchairs	Systematic review	**4**	4: 1 case series, 1 pre-post test, 2 repeated measures	SCI	Adjustable angle position and seat positions	Repeated measures	Completion of intervention	Speed, acceleration, stroke frequency, shoulder range of movement	There is level 4 evidence that the more forward position of the rear wheel improves push rim biomechanics, shoulder joint forces, push frequency and stroke angle.
Connolly, McIntyre, Titus, et al, 2012. As above: Physical conditioning from using a wheelchair	Systematic review	**2**	1 Cohort study	SCI	Wheelchair circuit test	Pre and post intervention	Point of discharge	Upper extremity strength, peak oxygen uptake, wheelchair circuit ability	There is level 2 evidence that exercise training (at physical capacity) and upper extremity strengthening influence wheelchair skill performance during inpatient rehabilitation.

Section 13: Wheelchairs

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Connolly, McIntyre, Titus, et al, 2012. SCIRE Wheeled mobility and seating equipment for the spinal cord injured individual: Weight of wheelchair	Systematic review	**4**	4 studies: 2 repeated measures 2 case series	SCI	Adding additional weight to wheelchairs and propulsion trials	Repeated measures	Completion of intervention	Propulsion and recovery phase timing Range of movement, dynamometer, and Oxygen consumption. Median and ulnar nerve conduction	There is level 4 evidence that a change of range of 5-10kg to the weight of a particular wheelchair system or user will not affect the wheeling motion in short distance, level wheeling. There is level 4 evidence that the use of an ultra-light wheelchair will improve the propulsion efficiency for users. There is level 4 evidence that user weight is directly related to push rim forces, the risk of median nerve injury and the prevalence of shoulder pain and injury. Those who rapidly load the push rim during propulsive strokes may be at greater risk of carpel tunnel syndrome. It is suggested that weight loss and training to incorporate smooth low impact strokes may reduce the chance of median nerve damage. Body weight management is important in reducing the forces required to propel a wheelchair and reducing the risk of upper extremity injury.

Section 13: Wheelchairs

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Connolly, McIntyre, Titus, et al, 2012. SCIRE Wheeled mobility and seating equipment for the spinal cord injured individual: Wheelchair tyre pressure	Systematic review	**4**	1 repeated measures	SCI	Wheelchair propulsion with different tyre pressures	Repeated measures	On completion of intervention	Energy expenditure, heart rate, oxygen consumption, distance travelled	There is level 4 evidence that tires with less than 50% inflation cause an increase in energy expenditure.
Connolly, McIntyre, Titus, et al, 2012. SCIRE Wheeled mobility and seating equipment for the spinal cord injured individual: Power positioning technology	Systematic review	**4**	3 studies: 2 observational, 1 repeated measures	SCI	Different degrees of tilt and recline	Pre intervention measures	On completion of intervention	Self-report, blood flow and interface pressure.	There is level 4 evidence to suggest that larger amounts of tilt alone or in combination with 100° or 120° recline result in increased blood flow and decreased interface pressure at the ischial tuberosities. There is inconsistency in the minimum amount of tilt needed.

Section 14: Housing and Attendant services

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Boucher, Ballantyne, Boschen, 2012.	Systematic review – **Housing and Attendant services after SCI**	**2++**	n/a	SCI	Housing and Attendant services	n/a	n/a	n/a	The transition process from rehabilitation setting to community is difficult because of the lack of resources mainly in terms of adaptation, accommodation and equipment. Caregivers indicated to be overwhelmed with their care-giving responsibilities. Goad directed Occupational Therapy can achieve gains in role performance and improvements in life satisfaction

Section 15: Adjustment to disability

Author(s)	Study type	Evidence level	No of patients	Patient characteristic	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Eva, Paley, et al, 2009.	Process tracing, longitudinal case studies - with the aim to ascertain **the constructions placed upon disability by patients with MSCC**. Maximum variety sampling with newly diagnosed	**3**	9	Newly diagnosed MSCC patients who attended a radiotherapy unit within a Regional Cancer Centre (UK).	n/a	n/a	Not stated	58 interviews with 9 patients, 6 carers and 29 staff in one National Health Service area	Patient's orientation to disability incorporated two apparently inconsistent attitudes. Patients acknowledged their situation had changed and their future plans would need to accommodate altered circumstances. However, they also resisted the idea of themselves as disabled, wanting to retain an image of themselves as resourceful and resilient. Patients used a number of strategies to reconcile the tension between the two positions. Providing effective and acceptable

	MSCC patients who attended a radiotherapy unit within a Regional Cancer Centre (UK). 58 interviews with 9 patients, 6 carers and 29 staff in one National Health Service area								support to patients living with disability relies on professional responses that are able to sustain patients' sense of their own competence.

Section 15: Adjustment to disability

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Levack, Graham, et al, 2004.	Prospective study with data collection and interview. Involving consecutive patients diagnosed with MSCC in 3 Cancer centres (Scotland) during Jan 1998-April 1999.	**2+**	180 pts. Inter-viewed out of 261 patients who consente d.	MSCC patients	n/a	n/a	1,4,7 and 10 months after diagnosis	Karnofsky performanc e status (KPS), Visual analogue pain scale, Schedule for the Evaluation of Individual Quality of life (QoL)-SEIQoL-Dw Hospital Anxiety Depression (HAD), Barthel Disability	The 'average' patient considered 1/3 of their total QOL to be dependent on family life. Similar importance was given to marriage (30%). The contributions to QOL from other areas were: health (20%), mobility/physical activity (20%), friends (18%), independence (15%), leisure activities (13%), religion (15%) and social life (10%). Median score 66, range 51-83 out of 100 HAD– 60% not abnormally anxious, 32% - moderate, 18% severe anxiety. 76% - not depressed, 18% mod, 7% severe depression Younger patients recorded more psychological distress. Patients with lower KPS scores had significantly poorer QOL scores (P<0.004). No statistical significance of QOL score and ability to walk.

								Index (BDI)	Higher BDI was associated with increasing QOL (P<0.01) What health professional's judge to be a patient's QOL, may not correspond with what the patient themselves judges it to be. Physical function matters, but nonphysical issues may matter more. Some areas, such as marriage, family, independence, and freedom from pain, are common to many patients, but their contribution to QOL varies. The use of SEIQol-Dw in advanced cancer not only shifts our focus from the physical, but may help us plan care

Section 16: Evidence for assessment and management of distress

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Bonacchi, Rossi, Bellotti, et al , 2010.	Evaluation of the role of clinical interview within psycho-oncologic interview. Case controlled	**2-**	320 consecutive patients	Patients admitted to an oncology unit.	Programme for the assessment of psychological distress divided into three steps.	None	Study over 1 year	Needs evaluation questionnaire, PDI, HADS, Middlesex Hospital Questionnaire.	50% of those suffering from elevated distress did not express the wish for supportive counselling. People with coping style of avoidance or minimisation tens less to seek psychological distress. People with greater social support tend to make fewer requests for psychological support. A single questionnaire evaluating distress in association with clinical interview is the best method of assessing distress.
Grassi, Johansen , Annunziata et al, 2013.	Semi structured interview and completion of psychological instruments Conducted over a 2 day period in 38 cancer centres.	**2+**	1108	outpatients with cancer	Patients completed a booklet containing the following psychological instruments: the Distress thermometer and problem list, the	the Distress thermometer and problem list, the Hospital Anxiety and Depression Scale, and the Brief Symptom Inventory-18	n/a	the Distress thermometer and problem list, the Hospital Anxiety and Depression Scale, and the Brief Symptom Inventory-18	The Distress Thermometer was identified as a simple and effective screening instrument for detecting distress in cancer patients as a first step towards more properly referring those in need of psychological intervention

					Hospital Anxiety and Depression Scale, and the Brief Symptom Inventory-18				

Section 16: Evidence for assessment and management of distress

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Arbour-Nicitopoulos, Matin Ginis, Latimer, 2009.	10 week, single blind RCT	**1+**	44 Adults with SCI randomly assigned to either an action planning only or an Action and Coping planning condition group	Adults with SCI	Action and Coping Planning condition – formed coping plans for managing self-identified activity barriers, in addition to forming action plans and self-monitoring	Participants in the Action Planning Only condition formed action plans for leisure-time physical activity (LTPA) at weeks 1 and 5, and self-monitored their LTPA behaviour.		Measures of intentions, coping self-efficacy and behaviour assessed at week 1,5 and 10	Those in the Action Coping Planning condition reported significantly greater LTPA, scheduling, and general barriers self-efficacy at week 5 and 10. Scheduling self-efficacy mediated the effects of the intervention on LTPA accounting for 38% of the total effect of the intervention on week 5 LTPA. Forming coping plans allows people to anticipate and develop plans to manage potential barriers that may interfere with LTPA, and perhaps increase the likelihood of participating in LTPA under threatening situations
Tuinman, Gazendam-Donofrio, Hoekstra-Weebers, 2008.	Cross sectional	**2+**	277	Cancer patients	Completion of Distress Thermometer and the Hospital Anxiety and Depression Scale	Distress Thermometer and the Hospital Anxiety and Depression Scale	n/a	Distress Thermometer and the Hospital Anxiety and Depression Scale	The Distress Thermometer was identified as a good instrument for the routine screening and ruling out of distress. Experiencing clinically elevated distress did not necessarily suggest that patients wanted referral.

Section 16: Evidence for assessment and management of distress

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Mehta, Orenczuk, Hansen, et al, 2011.	Systematic review	**1, 2**	9	Post Spinal Cord Injury	CBT for Psychosocial Issues	RCTs and Non RCTs	Up to 1 year	Depression, anxiety, adjustment and coping	Level 1 evidence and Level 2 evidence supporting the use of specialised CBT protocols in persons with SCI for improving outcomes related to depression, anxiety, adjustment and coping.
Orenczuk, Slivinski, Metha et al, 2012: Spinal Cord Injury Rehabilitation Evidence (SCIRE): Depression following SCI: Exercise for depression	Systematic review: impact of regular exercise upon physical and emotional well-being	1+ 1- 2+ 2-	9 studies: 4 RCT's 4 pre-post 1 cohort	Adults with Spinal cord injury	Participation in supervised exercise training programmes (various content to programmes)	Exercise Vs. usual activity	2 weeks – 6 months	Quality of life, Cardiovascular function, muscle strength, pain perception, symptom self-efficacy and perceived control	Regular physical exercise may contribute to a reduction in pain, stress and depression as well as potentially offering a prophylactic effect on the sources of recurrent pain and in preventing a decline in quality of life following SCI. Level 1 evidence from 2 RCTS and level 2 evidence from 1 RCT that exercise based programmes reduce subjective pain, stress and resulting depressive symptoms. Level 2 evidence from 1 cohort study of individuals with unrealistic expectations report more depressive symptoms following an FES (Functional Electrical Stimulation) exercise programmes.

Author (s) / Title	Reference Type	Evidence level	Description
National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology: Distress management, 2013.	Statements of evidence and consensus of the authors regarding their views on currently accepted approaches to assessment and treatment	All recommendations are category 2A unless otherwise stated	Recommends standards of care for distress management.

Section 17: Evidence for the assessment and management of cognitive deficits

Author(s)	Study type	Evidence level	No of patients	Patient character	Intervention	Comparison	Length of follow up	Outcome measures	Main Findings
Olson, Chhanabhai, 2008.	Prospective case series	4	40	Diagnosed with brain mets	Cognitive assessment using the MoCA (Montreal Cognitive Assessment) vs. MMSE	MMSE (Mini mental state exam)	n/a	MMSE MoCA	80% of patients were deemed cognitively impaired by the MoCA compared with 30% by the MMSE.
Cicerone, Dhlberg, Kalmer, et al, 2000.	Systematic review	2+	171 articles evaluated	Cognitive impairment from TBI and stroke.	Cognitive rehabilitation	n/a	n/a	n/a	Practice Standards set out for cognitive rehabilitation based on evidence from randomised controlled trials. Recommendations based on class 2 studies.
Cicerone, Langenbahn, Braden, et al, 2011.	Systematic review	2+	34 studies evaluated	Cognitive impairment Inclusive of brain neoplasms	Cognitive rehabilitation	n/a	n/a	n/a	Advanced clinical practice recommendations including brain neoplasm.

Section 17: Evidence for the assessment and management of cognitive deficits

Author (s) / Title	Reference Type	Evidence level	Description
Baumgartner, 2004. Neurocognitive changes in cancer patients.	Review article	4	The risk for alteration in mental functioning in cancer patients is varied. Risks include the direct effects of cancer on the CNS by direct invasion in the brain as in primary or secondary brain tumours, or involvement of the cerebrospinal fluid or meninges, or indirect. Indirect factors include the effects of therapeutic interventions for malignancy, specifically radiotherapy to the CNS, chemotherapy, immunotherapy and surgery. Side effects from therapy may also result in metabolic, hematologic, or infectious processes that manifest as alterations in cognition. Nutritional deficiencies and medications, co-morbidities, age, psychiatric disorders, fatigue, sleep disturbances and the psychological factors associated with a diagnosis of cancer are also possible pertinent factors.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
Association of Chartered Physiotherapists interested in Neurology (ACPIN) Manual Handling Working Party, 2001: Guidance on Manual Handling in Treatment.	National Clinical guideline	4	Clinical guideline for physiotherapeutic manual handling in neurology rehabilitation.
Bobath B, 1992: Adult Hemiplegia: Evaluation and Treatment	Book	4	A book on the Bobath approach to neurological rehabilitation.
Bromley I, 2006: Tetraplegia and Paraplegia: A Guide for Physiotherapists	Book	4	A book on the physiotherapy management and rehabilitation of tetraplegia and paraplegia based on expert opinion and literature.
Carr J, Finlay P, Pearson D, Thompson K, White H, 2008: Multi-professional management of patients with neurological tumours and associated conditions. In: Rehabilitation in a Cancer Care.	Book chapter	4	A book chapter on the multi-professional management and rehabilitation of patients with MSCC based on expert opinion and available evidence.
Clarkson HM, 2000: Musculoskeletal Assessment: Joint Range of Motion and Manual Muscle Strength.	Book	4	Clear descriptive instruction and advice on accurate and objective assessment of joint range of motion and manual muscle testing.
Grundy D, Swain A, 2002: ABC of Spinal Cord Injury	Book	4	A book on the management of SCI.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
Rehabilitation Measures: Modified Ashworth Scale	Outcome Measure	N/A	Outcome measure for spasticity.
National Institute for Health and Care Excellence (NICE), 2008: Metastatic Spinal Cord Compression (MSCC)	National Guideline	4	National good practice guideline from NICE on the management of MSCC based on expert opinion and a comprehensive evidence based literature review. For UK implementation. Key priorities for implementation are outlined under the headings of: • Service Configuration and Urgency of Treatment • The Patient's Experience of MSCC • Early Detection • Imaging / Routine MRI • Treatment of Spinal Metastases and MSCC • Supportive Care and Rehabilitation
Greater Midlands Cancer Network, 2010: Rehabilitation Guidance for Patients with MSCC	Regional clinical guideline	4	Regional clinical guideline for the management of MSCC.
National Cancer Action Team, 2009: Rehabilitation Care Pathway for MSCC.	National Care Pathway for MSCC	4	National Care Pathway for MSCC.
Stoke Mandeville Hospital Physiotherapy Department, 2002: Physiotherapy Guidelines for the Treatment of a Patient with Acute SCI.	Local physiotherapy guidance	4	Local advice on the physiotherapy management of acute SCI.
The Christie NHS Foundation Trust, 2009: Spinal Cord Compression Guidelines	Local clinical guideline	4	Local clinical guideline for the management of MSCC.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
Velindre Cancer Centre, 2009: Physiotherapy Management of MSCC.	Local physiotherapy guidance	4	Local advice on the physiotherapy management of SCI.
West of Scotland Cancer Network, 2007: West of Scotland Guidelines for MSCC.	Regional clinical guideline	4	Regional clinical guideline for the management of MSCC.
North Wales Critical Care Network, Midland Centre for Spinal Injuries (Oswestry), North West Regional Spinal Injuries Centre (Southport), 2010. Spinal Injuries Best Practice.	Regional Clinical Guideline	4	Regional good practice guideline based on evidence and expert opinion for the management of SCIs.
Regional Spinal Cord Injury Centre of the Delaware Valley, Thomas Jefferson University Hospital, Magee Rehabilitation Hospital, 2009. Spinal Cord Injury Manual.	Regional Patient-Family Teaching Manual	4	Patient/family guidance with pictures for the management of SCI. Some outdated methods of handling and some questionable exercises therefore this guidance should be used cautiously.
Royal College of Physicians, British Society of Rehabilitation Medicine, Multidisciplinary Association of Spinal Cord Injury Professionals, British Association of Spinal Cord Injury Specialists, 2008. Chronic Spinal Cord Injury: Management of Patients in Acute Hospital Settings. Concise Guide to Good Practice Series.	National Clinical Guideline	4	Concise good practice guideline based on expert opinion and an evidence based literature review for the management of chronic SCI.
Harrison, P: Spinal Injuries Association (SIA), 2000: HDU/ICU: Managing Spinal Injury: Critical Care.	National Clinical Guideline	4	Good Practice Guideline based on expert opinion and a comprehensive evidence based literature review for the acute management of SCI.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
Spinal Injury Association (SIA) Academy, Multidisciplinary Association of Spinal Cord Injury Professional, Huntleigh Healthcare (undated). Moving and Handling Patients with Actual or Suspected Spinal Cord Injuries.	Clinical guideline	4	Good Practice guideline based on expert opinion and some literature on the practical moving and handling of SCI patients, supplemented by photographs.
College of Occupational Therapists, Hope The Specialist Section of Occupational Therapists In HIV / AIDS, Oncology, Palliative Care And Education, 2004. Occupational Therapy Intervention in Cancer. Guidance for professionals, managers and decision makers. London: COT.	College Of Occupational Therapists, Specialist Section Guidance on Occupational Therapy Intervention in Cancer.	4	Describes the contribution of Occupational Therapy in the care of people with cancer. Designed to guide and support those who are involved in the commissioning or providing cancer services..
Department of Health, 2008. End of Life Care Strategy: Promoting high quality care for all adults at the end of life.	Government strategy document	4	The End of Life Care Strategy aims to bring about improvement in access to high quality care for all adults approaching the end of their life
Department of Health, Social Services and Public Safety, 2010. Living Matters Dying Matters: A Palliative and End of Life Care Strategy for Adults in Northern Ireland.	Strategy document for Northern Ireland	4	A Palliative and End of Life Care Strategy for Adults in Northern Ireland.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
National Institute For Health And Care Excellence, 2004. Guidance on Cancer Services: Improving Supportive and Palliative Care for Adults with Cancer: The Manual.	NICE Guidance	4	The guidance defines service models aimed to ensure that patients with cancer, with their families and carers, receive support and care to help them cope with cancer and its treatment at all stages.
Guidelines And Audit Implementation Network, 2011. General Palliative Care Guidelines for the management of pain at the End of Life in adult patients.	General Palliative Care Guidelines for the Management of Pain at the End of Life in Adult Patients	4	Provide a user friendly, evidence based guide for the management of pain at the end of life in adult patients with advanced life limiting conditions
National Cancer Institute Family Caregivers in Cancer: Roles and Challenges.	National Cancer Institute – Cancer topic		Acknowledges the additional roles that caregivers take on and the detrimental effects this can have on their physical and emotional health and financial impact. Recognises the need for effective communication with caregivers and recommends for a family appointed spokesperson. Recommends educating caregivers about pertinent aspects of cancer management and available resources and enhancing their care giving skill, such as positioning, moving and handling, mobilising, along with education in how to manage better symptoms such as pain and fatigue. Recognises that short term hospital admissions may restrict the time available to implement supportive strategies for caregivers.
Hinojosa and Kramer, 1998. Evaluation- Where do we go begin? In: J. HINOJOSA and P. KRAMER, eds. Occupational therapy evaluation: Obtaining and interpreting data. Bethesda, MD: American Occupational Therapy Association, pp.1–15.	Book	4	Discusses the various aspects of an evidence based comprehensive evaluation, including screening, reassessment, and re-evaluation, and reaffirms the importance of understanding people as occupational beings.

Additional References and Guidelines:

Author (s) / Title	Reference Type	Evidence level	Description
North West Midlands Critical Care Network, 2008. Spinal Care Bundle. North West Midlands Critical Care Network.	Spinal Care Bundle	4	The SCI-Link Critical Care Forum reviewed issues of principal concern to Health Care Practitioners managing patients with SCI within Critical Care environments outside of specialist SCICs. The SCI-LINK Critical Care Working Party representing a range of UK adult, paediatric and neurosurgical critical care units and their associated SCI centres, worked with the NHS Modernisation Agency and regional representatives of the Intensive Care Society (ICS to develop a 'Care Bundle' for Spinal Cord Injury Patients admitted to Critical Care environments outside of specialist SCI Centres.
Orlando Health Surgical Critical Care And Acute Care Surgery - Acute Spinal Cord Injury (Quadriplegia/Paraplegia) Therapy Guideline.	Guidelines	4	Evidence based best practice guidelines currently in use by the Surgical Critical Care and Acute Care Surgery teams at Orlando Regional Medical Centre (ORMC).
Regional Occupational Therapy Wheelchair Working Group, 2012. Occupational Therapy Clinical Guidelines for the provision of wheelchairs in Northern Ireland. The Community Occupational Managers Forum NI.	Clinical Guidelines	4	Professionally established clinical guidelines for wheelchair equipment which have been agreed regionally within Northern Ireland by the Community Occupational Therapy Managers Forum.
Sisto, Druin And Sliwinski, 2009. Spinal Cord Injuries: Management and Rehabilitation.	Book	4	Addresses the wide spectrum of rehabilitation interventions and administrative and clinical issues specific to patients with spinal cord injuries
Zoltan, 2007. Vision, Perception, and Cognition: A manual for the evaluation and treatment of the adult with acquired brain injury.	Book	4	Addresses clinical reasoning and decision making for the evaluation and treatment process of the adult with acquired brain injury. Provides theoretical information, guidelines for both static and dynamic assessment, information on specific standardized evaluations, guidelines for adaptive and restorative treatment based on described theoretical and evidence-based information, and information on environmental impact of client performance.

Additional References and Guidelines:

Author (s)	Reference Type	Evidence level	Topic
Anderson, Aito, Atkins, 2008.	Review articles	4	A multinational working group recommends that the latest version of the SCIM continue to be refined and validated and subsequently implemented worldwide as the primary functional recovery outcome measure for SCI.
Eva, Lord, 2003.	Review articles	4	Review article of rehabilitation for metastatic spinal cord compression patients. Emphasis the need for a balanced approach to rehabilitation. MSCC means, in equal measure living with advanced cancer and living with a disability. An approach that brings together and balances the patients' needs and priorities and enables them to lead fulfilling lives.
Fehlings, Cadotte, Fehlings, 2011.	Review articles	4	Systematic review on the treatment of acute spinal injury: A foundation for best practice. Key recommendation: American Spinal Injury Association (ASIA) standards should be used for assessment of motor and sensory function. The Visual Analogue Scale (VAS) should be used for the assessment of pain intensity. Spinal Cord Independence Measure (SCIM) III should be used in the assessment of disability.
Hutchinson, Armstrong, 2010.	Review articles	4	Discusses the development and implementation of clinical guidelines for metastatic spinal cord compression within the West of Scotland and next steps in terms of audit and research.
Taylor, 2007.	Review articles	4	Article describes a range of non-pharmacological approaches for the management of breathlessness at the end of life. Positioning, relaxation, and energy conservation measures are recommended.