Frimley Health NHS Foundation Trust

Managing Patients with Spinal Cord Injury

Key Points [recommended maximum: 5]

- The management of a patient with a Spinal Cord Injury involves a comprehensive and specialized approach to ensure the best possible care and outcomes. This involves all members of the multidisciplinary Team.
- Patients with a confirmed Spinal Cord Injury should be referred to the link spinal cord injury centre within 24 hours.
- Patients should have a comprehensive respiratory, pressure care, bladder and bowel regime which is continually reviewed to ensure the patient avoids potential complications.
- All staff caring for a patient with a Spinal Cord Injury should be aware of and understand the implications of Autonomic Dysreflexia.
- All patients with a Spinal Cord Injury should received regular therapy sessions from a multidisciplinary team working towards agreed goals.
- Discharge planning should commence as early as possible.

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Abbreviations

BOAST	British Orthopaedic Association Standards
FEES	Fibreoptic endoscopic evaluation of swallow
ISNCSCI (ASIA)	International Standards for Neurological Classification of Spinal Cord Injury (American Spinal Injury Association)
MDT	Multidisciplinary team
MRI	Magnetic Resonance Imaging
MSCC	Metastatic spinal cord compression
NICE	National Institute for Health and Care Excellence
SCI	Spinal cord injury
SLT	Speech and Language Therapy

Introduction

The management of a patient with a Spinal Cord Injury involves a comprehensive and specialized approach to ensure the best possible care and outcomes. We should plan for individualised care and treatment strategy, but this document will provide a general overview of the key considerations. The document provides guidance on the acute management, rehabilitation, psychological wellbeing, and discharge.

The acute management of this patient group is extremely important as can have major implications for long-term outcomes. Appropriate management from a dedicated multidisciplinary team can prevent secondary complications, preserve neurology and optimise functional outcome. Patients with spinal cord injury are vulnerable to avoidable complications such as pressure ulcers, autonomic dysreflexia, urinary and bowel complications and contractures. This guideline will support with the avoidance of these complications and can be used in conjunction with gaining advice from our local Spinal Cord Injury Centre, Stanmore.

Rehabilitation should be considered from the outset with treatment from a co-ordinated multidisciplinary team. When the patient is medically fit for rehabilitation, they should be managed using goal orientated pathways. The MDT should meet to set patient specific goals as soon as is appropriate and these should be reviewed on a regular basis.

The consequences of a spinal cord injury affect the individual in nearly every life domain. This can have a large impact on psychological wellbeing and social interactions. This guideline highlights the importance of offering psychological support and signposts to spinal cord injury charities who can offer support for the patient and their family.

Discharge planning for this patient group is highly specialised and requires input from all members of the MDT. Multiple assessments will need to be carried out prior to discharge and consideration of the patient's home accommodation, care package and equipment is necessary. Care of a patient with a SCI is life-long with regular clinic or telephone review appointments.

This guidance is to be used locally within Frimley Health but is largely based on the Standards for Specialist Rehabilitation of Spinal Cord Injury [Budd et al., 2022] and recommendations from our local Spinal Cord Injury Centre, The Royal National Orthopaedic Hospital, Stanmore. The guideline is suitable for use in the Emergency Department, Critical Care and within a ward-based setting including community wards that are part of Frimley Health.

All clinical staff who care for, manage, or review a spinal cord injured patient should be familiar with the guideline.

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1. Add Patient onto Spinal Register

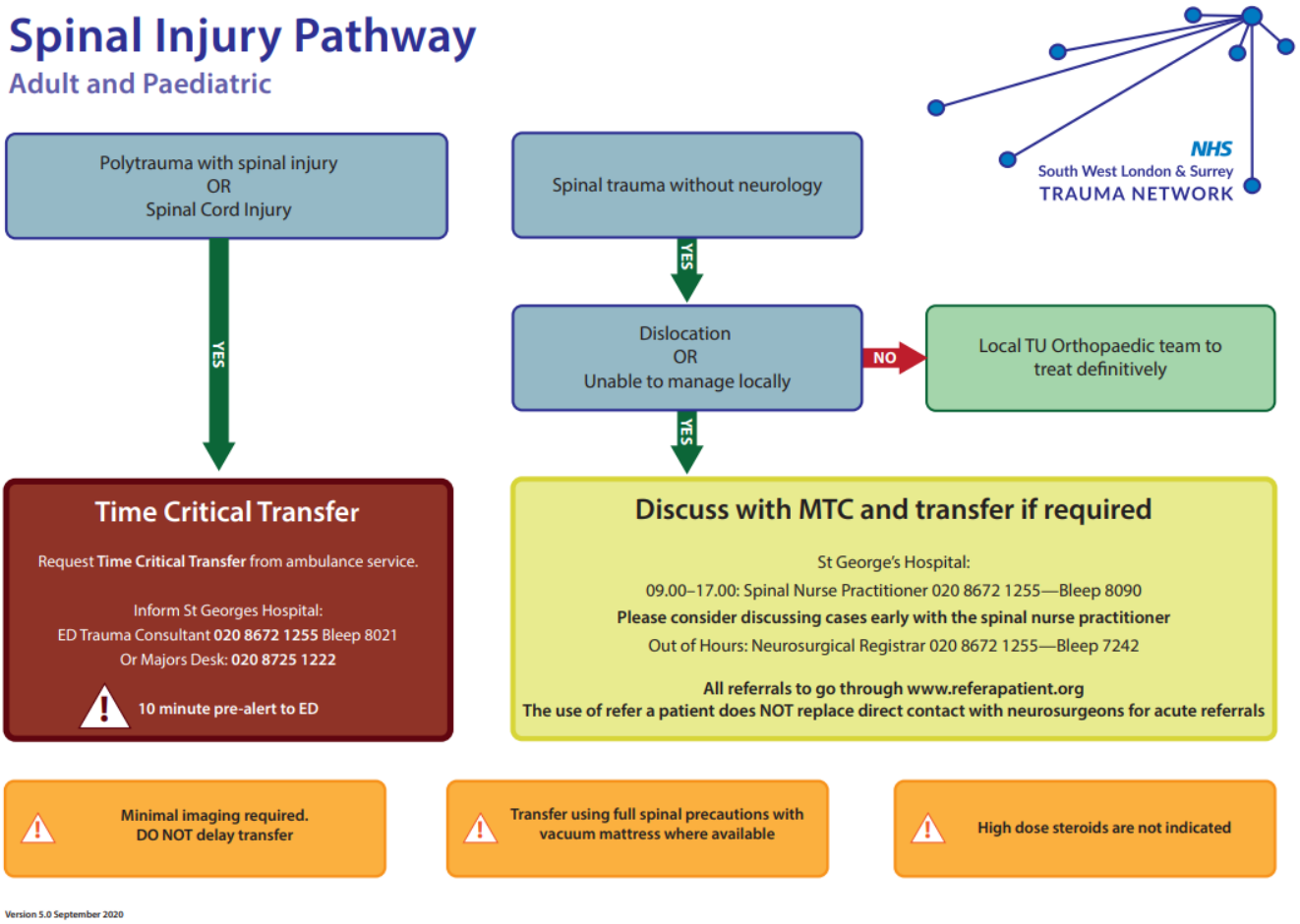
1.1. All patients admitted to acute hospitals in England who are identified as having a spinal cord injury, traumatic or non-traumatic, should be referred to the link spinal cord injury centre within 24 hours using the electronic referral system.

1.2. Referrals using the electronic referral system http://nww.spinalreferrals.nhs.uk/ trigger a referral to the outreach team at The Royal National Orthopaedic Hospital, Stanmore.

1.3. All patients that have a spinal cord injury should have a lifetime of personalised care that is guided by a spinal cord injury centre.

2. Initial Assessment and Diagnosis

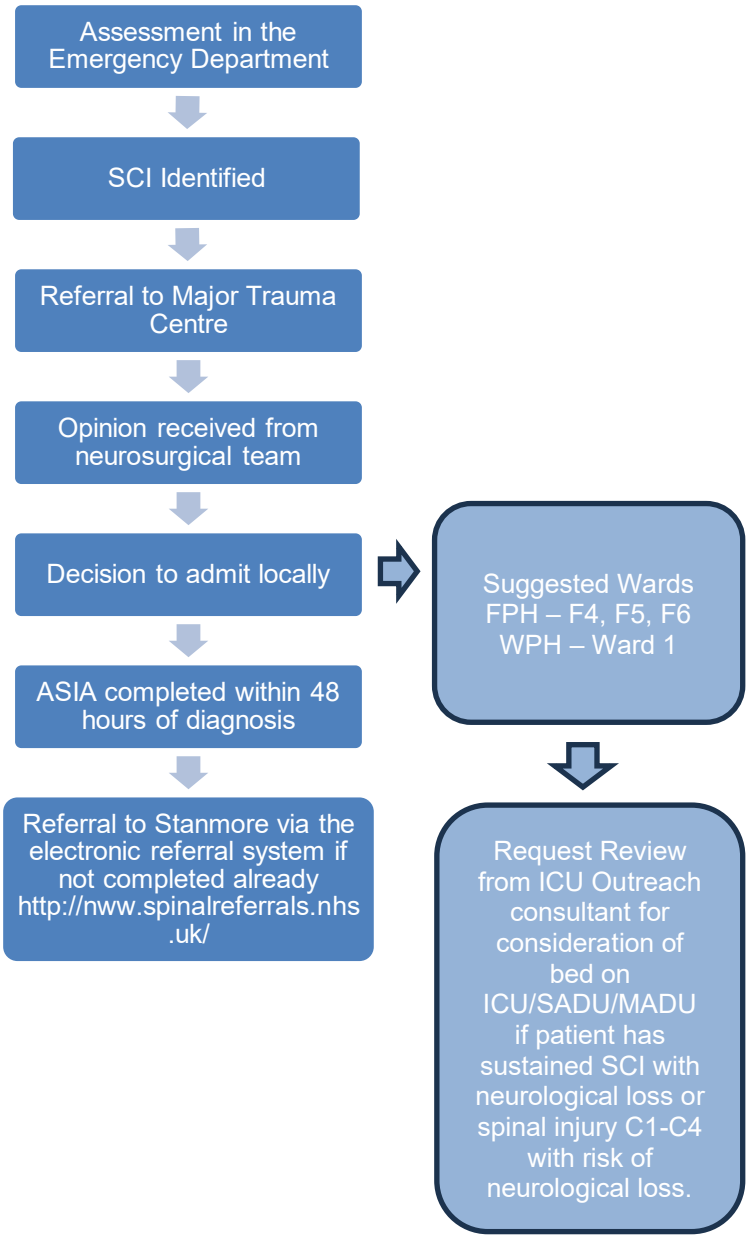
2.1 Patients admitted to the emergency department with polytrauma with spinal injury OR spinal cord injury should follow the South West London & Surrey Trauma Network Spinal Injury Pathway.



South West London & Surrey Trauma Network Spinal Injury Pathway, 2020

Add in WPH trauma network pathway

2.2 A typical pathway for a patient who does not require a time critical transfer includes:



2.3 For patients who have sustained a traumatic spinal cord injury, the trauma team leader should immediately inform the specialist spinal surgeon on call in the trauma unit or the nearest major trauma centre.

2.4 For patients who have a spinal cord injury, the specialist spinal surgeon who has accepted the patient should refer to the Royal National Orthopaedic Hospital, Stanmore within 24 hours of diagnosis to establish a partnership of care https://referrals.mdsas.com/. Where appropriate, consultant to consultant discussion is advised.

2.5 The initial assessment and care of all traumatic spinal cord injury patients should follow the guidelines set out in NICE guidance NG41 and BOAST Guidelines:

2.6 For guidance on assessment and management of patients with a cauda equina injury please refer to the Getting It Right First Time (GIRFT) National Suspected Cauda Equina Pathway.

2.7 Routine neurological assessments to evaluate motor and sensory function should be undertaken:
i) An initial neurological sweep of myotomes for upper and lower limbs and sensory testing using light touch should be performed to identify areas of compromise

2.8 All patients should have an ISNCSCI (ASIA) chart completed within 24-48 hours of diagnosis. Proforma for ASIA documentation can be found via smart phrase .ASIA on EPIC

2.9 An ISNCSCI (ASIA) chart should be completed prior to and following any surgical intervention, at 6 weeks and/or any change in neurological condition (MASCIP, 2022)

2.10 If the ISNCSCI (ASIA) chart is unable to be completed due to low GCS, cognition or other reason the attempt and reason for non-completion should be clearly documented in the medical notes

2.11 A joint review (outreach or in-reach) with a SCI centre clinician and member of referring team should take place within 72 hours of referral and plan of care agreed.

2.12 During the acute phase, regular review (every 48-72 hours) is recommended between the two services.

2.13 Patients considered 'at risk' with injuries C1-4 should be admitted to a monitored bed or remain in RESUS until decision made by orthopaedic team regarding suitable placement.

2.14 Patients transferred from Major trauma centres and admitted to critical care, high dependency units or the ward should have clear documentation of aetiology, surgical and rehabilitation plans.

3. Spinal Stability and Restrictions

3.1 Following a SCI spinal immobilization should be maintained using a cervical collar, backboard, or specialized spinal immobilization device as advised. Please see Moving & Handling Patients with actual or suspected spinal cord injuries (SCI), MASCIP, 2015 for pictorial guidance on:
Adapted ATLS head hold
Application of a one piece collar
Application of a two piece collar

3.2 Movement should be minimized during all patient handling procedures, including transfers and turning. Please see Moving & Handling Patients with actual or suspected spinal cord injuries (SCI), MASCIP, 2015 for pictorial guidance on:
Acute tetraplegic spinal logroll
Acute paraplegic spinal logroll
Airway protection
Removal from vacuum mattress
Lateral transfer using a spinal board
Lateral transfer using scoop stretcher

3.3 Following any turn or reposition a patient's alignment and skin loading should be checked. Postural alignment and protection of bony prominences/skin should be maintained at all

times. Please see Moving & Handling Patients with actual or suspected spinal cord injuries (SCI), MASCIP, 2015 for pictorial guidance on:
Postural alignment
Adjusting skin loading

3.4 Spinal stability and restrictions should be discussed with the spinal team. - Spinal bracing and stability form to be completed by Orthopaedic team by entering FHFT BRACING GREEN FORM SPINAL into the Smart text box.

4. Referral to MDT

4.1 Patients who have sustained a spinal cord injury have extremely complex needs and require a multi-disciplinary approach to their care and management.

4.2 Patients should be referred to the appropriate disciplines as soon as is practicable.

4.3 Referrals should be made to Physiotherapy, Occupational Therapy, Dietetics, Speech and Language Therapy and Psychology.

4.4 Referral to Physiotherapy can be made via EPIC. Under the 'Orders' tab place a new order for 'Physiotherapy Assessment' or refer a patient to the ward physiotherapist at handover.

4.5 Referral to Occupational Therapy can be made via EPIC. Under the 'Orders' tab place a new order for "occupational therapy" or refer a patient to the ward occupational therapist at handover. Ensure to highlight that the patient has sustained a SCI as these patients will be prioritised.

4.6 Referral to Dietetics should be made via Epic at the initial nutrition screening post admission. Under the 'Orders' tab place a new order for 'Inpatient consult to Dietetics'. Provide as much information as possible in order that the referral is accepted by the Dietetic team (poorly completed or inappropriate referrals may be rejected).

4.7 Referral to Speech and Language Therapy can be made via EPIC.

a. SLT referral required for all SCI patients with a tracheostomy.
b. For all other SCI patients, referral indicated if; signs of aspiration when eating and drinking, history of recurrent chest infections, new neurology which may impact swallowing and/or not managing secretions.
c. Referrals will be triaged and prioritised by the SLT service.

4.8 Referral to the Critical Care Rehabilitation and Follow Up Service including Psychology on Critical Care can be made via EPIC. Under the 'Orders' tab place a new order for 'CCRFT'. Alternatively, for Wexham Park Hospital email; fhft.wphicufollowup@nhs.net and Frimley Park Hospital email; fhft.icufollowupfph@nhs.net

4.9 A referral should be made to the Acute Oncology Team if there is suspicion of metastatic disease causing spinal cord compression – usually identified by MRI. The MSCC pathway will be triggered if appropriate.

5. Respiratory Management

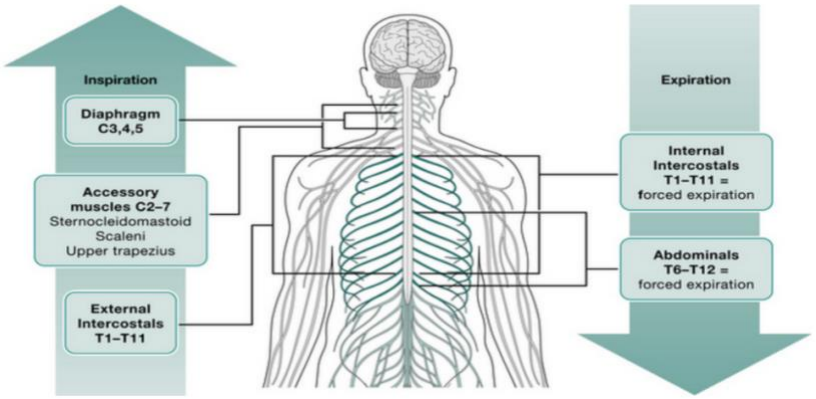
5.1 Background Physiology

i) Respiratory dysfunction immediately following spinal cord injury is due to flaccid paralysis of respiratory muscles both inspiratory and expiratory (RISCI, 2023)

ii) Respiratory failure results from ineffective ventilation from compromised respiratory muscles acting on a flaccid rib cage aggravated by intrapulmonary compliance changes and an inability to spontaneously clear secretions.

iii) Respiratory complications are the main cause of morbidity and mortality in the acute phase of SCI, with an incidence of 36% to 83%. (Brown A et al, 2008, Shavelle R et al, 2006)

iv) The degree of respiratory dysfunction is directly related to the extent and level of the neurological injury (Como J et al, 2005), in such a way that high cervical and thoracic injuries are at the highest risk. See below diagram for the muscles of respiration and their innervation.



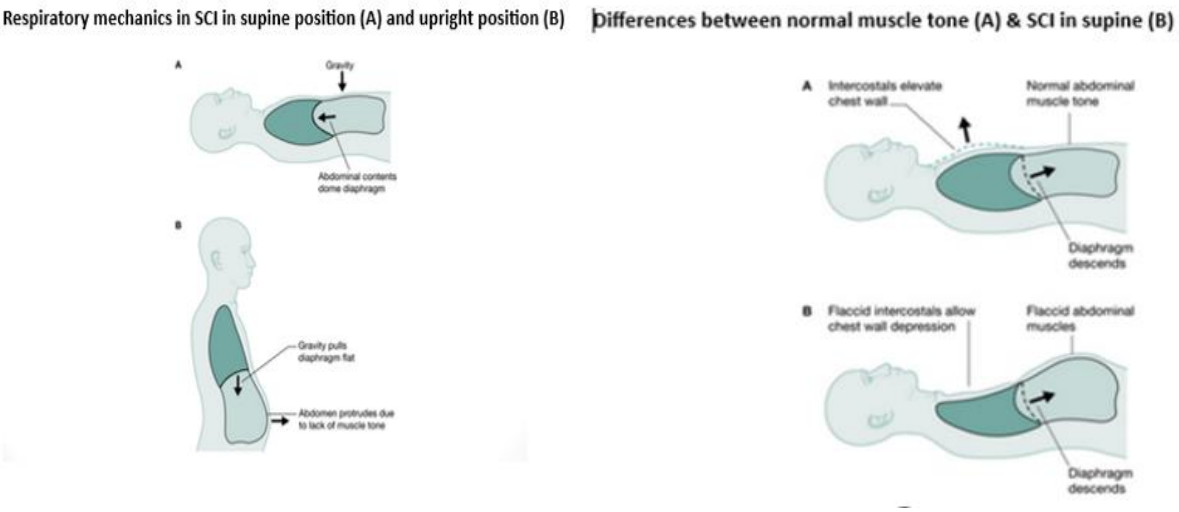
Spinal Innervation of the Respiratory Muscles. (Harris & Ward, 2016)

v) Respiratory dysfunction that leads to respiratory complications may be related to 3 factors:

- VC impairment (a reduction in respiratory muscle strength and fatigue, a reduction in inspiratory capacity, and atelectasis)
- Retention of secretions (increased production of secretions, ineffective coughing)
- Autonomic dysfunction (increased secretions, bronchospasms, and pulmonary oedema) (Berlly, M and Shem K, 2007)

vi) Patients with SCI may not feel dyspnoeic or become tachypnoeic when struggling as some respiratory afferent information may be lost therefore close monitoring is necessary.

vii) There is a drop of up to 20% in vital capacity from supine to sitting associated with the mechanics of the diaphragm and paralysed abdomen. If a patient is in respiratory distress they should be put in a supine position and weaning should be commenced in this position.



The effect of position on diaphragm function in tetraplegia A) Lying B) Sitting or standing and Paradoxical breathing in tetraplegia. (Harris & Ward, 2016)

5.2 Initial management

i) Baseline Spirometry including Forced Vital Capacity (FVC) and Peak Cough Flow (PCF) should be completed within 48 hours of admission for all SCI L1 and above who are self ventilating.

ii) FVC can be initiated by nurses on ED/MADU/ICU/SADU. Spirometry smart phrase can be found on EPIC .spinalspirometrytable.

FVC	Action	PCF	Action
<1.0l	Critical Care Team/Rapid Response Team should be notified	<270	Referral to physiotherapy within 24 hours
<2.5l	Referral to Physiotherapy within 24 hours		

iii) Physiotherapy team should implement a management plan for secretions, volume improvement and cough augmentation within 24 hours of referral

iv) Regular Salbutamol nebulisers should be prescribed for all patients with acute cervical SCI and considered for T1-T12 depending on severity of SCI and clinical presentation. (Almenoff P et al, 1995, Spungen A et al, 1993, Barratt D et al, 2012)

v) Patients with SCI above C5 and complete quadriplegia should be assessed by the Critical Care Team, intubation may be required and should be considered early as delays may cause preventable morbidity (Velmahos et al, 2003)

5.3 Management of self-ventilating patient (patient with injury L1 upwards, any spinal level on prolonged bedrest, any spinal level with risk factors such as obesity, smoker or chest pathology)

- Spirometry (FVC) and Peak cough flow (PCF) should be continued as indicated and completed once weekly whilst an inpatient or until otherwise advised by the spinal injuries centre.
- Respiratory management plans should be individualised for each patient and reviewed regularly based on patient need. The table below provides guidance:

FVC	Risk	Action	PCF	Risk	Action
<1.0l	Respiratory Failure	Close Monitoring Refer to rapid response team/critical care for consideration of ventilatory support	**<270l/min**	Inability to effectively clear sputum	Cough augmentation plan may include: Intermittent positive pressure Manual insufflation / exsufflation (cough assist) Manual assisted cough
<2.5l	Atelectasis Sputum Plugging Weak cough	Prophylactic respiratory management may include: Intermittent positive pressure Manual insufflation / exsufflation (cough assist) Manual assisted cough	**<160l/min**	Inability to clear sputum without augmentation	Cough augmentation plan: Manual insufflation / exsufflation (cough assist) AND Manual assisted cough

- When appropriate to start sitting the patient, FVC should be reviewed in both sitting and lying and abdominal binders should be considered to optimise FVC in sitting.

- Abdominal binders should be considered for all patients with a SCI above L1 as they will all have some form of lung dysfunction. The abdominal binder helps to increase FVC and reduce residual lung volume in the sitting position by elevating abdominal contents, allowing the diaphragm to move effectively.

- Abdominal binders should be fitted for the individual and should be issued prior to sitting out of bed or mobilising.

5.4 Main principles of respiratory management for patient requiring invasive ventilation

i) Early tracheostomy is recommended, as successful early extubation is rare. Tracheostomy simplifies weaning, reduces the need for sedation, improves communication and enables efficient secretion clearance. (Foran S et al, 2022, Wang X-R et al, 2021)

ii) Patients should be ventilated with higher tidal volumes whilst maintaining normocapnia. Evidence suggests that this is safe, reduces atelectasis and accelerates weaning from ventilation. Ventilation of around 10-15mls/kg is recommended. (RISCI, 2023, Peterson et al, 1999)

iii) During periods of pulmonary infection normal tidal volume ventilation (6-8ml/kg) should be utilised as per protective ventilation strategy

iv) Secretion clearance to reduce work of breathing should be a priority. It should be undertaken prophylactically throughout the entire weaning process and prior to any Ventilator free breathing (VFB) attempt (Pillastrini, P. et al, 2006).

v) A secretion clearance plan will be devised by the Physiotherapy team and appropriate training will be given to the multidisciplinary team to ensure that the secretion clearance plan can be performed over 24 hours a day.

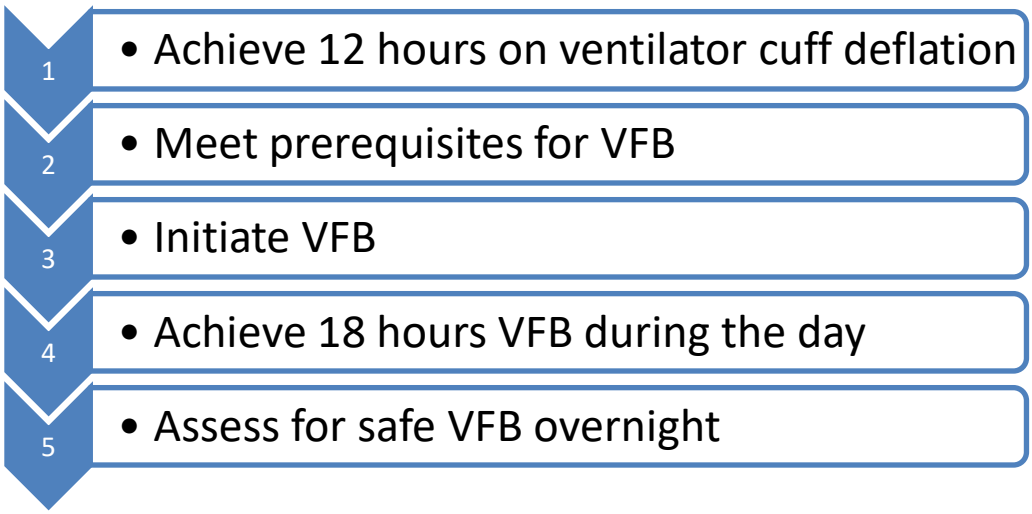
vi) Secretion clearance plan may include; positioning, postural drainage, manual techniques, MI:E up to x6 per day, Manual Assisted Cough (MAC) and suction.

vii) Hypersalivation may occur in some patients and may require pharmacological management, this will be down to the discretion of the lead consultant managing the patient. Pharmacological management options can include hyoscine, glycopyrrolate and sublingual atropine drops.

5.5 Weaning from mechanical ventilation

i) RISCI guidelines should be adhered to and advice can be sought from SCI centre as required. Please see Appendix 1 for RISCI guidelines.

ii) Below is a flowchart demonstrating the steps required to wean from mechanical ventilation:



iii) The ability to communicate is vital to allow rehabilitation and reintegration for all SCI patients. The inability to communicate for long periods of time can contribute to psychological morbidity. Achieving on ventilator cuff deflation will help with patient participation in the weaning and rehabilitation process.

iv) Experience shows that ventilator weaning is expedited if the patient solely focuses on this and that plans to mobilise the patient are addressed after the ventilator weaning process has been completed.

v) VFB should be completed in the supine position or flat side lying. There is a drop of up to 20% in vital capacity from supine to sitting associated with the mechanics of the diaphragm and paralysed abdomen, so VFB is better tolerated in supine.

vi) It is recommended that cervical cord-injured patients have gastrostomies inserted instead if nasogastric tubes which can aid in the weaning process.

5.6 Support with Weaning from Mechanical Ventilation

i) The Outreach Ventilation and Tracheostomy Team at the Royal Brompton Hospital will be able to guide and support the weaning process as well as support with long term ventilation. To refer please complete the referral form and email to rbh-tr.svoutreachteam@nhs.net

Referral Criteria
Mechanical Ventilation >=20 days **OR** has had 2 failed weaning attempts
Tracheostomy
Spontaneous Mode of Ventilation
Minimal or no sedation
Minimal or no vasopressor support

ii) Once the patient is under The Outreach Ventilation and Tracheostomy Team weekly case reviews can be arranged and the team will support with complex discharge planning.

5.7 Post successful wean from mechanical ventilation

i) Patient specific respiratory management plan should be formulated and may include;
IPPB
MI:E
MAC
Pharmacological mucolytic management plan

ii) The patient could be considered for Inspiratory Muscle Training (IMT) if FVC <2L and if deemed appropriate device should be provided with patient specific IMT programme in line with trust processes.

5.8 Secretion Management

For SCI patients presenting with secretion management issues, the following can be offered:

a. Instrumental assessment via FEES to assess for secretion load and management.
b. Saliva swallow programmes implemented by SLT.
c. Pharmaceutical mucolytics recommended by the SLT and MDT.

d. SLT and Physiotherapist should work closely together to put in place a secretion management plan

6. Cardiovascular Management

6.1. Deep Venous Thrombosis

Patients with acute SCI are at high risk of developing deep venous thrombosis. Prophylaxis is mandatory with physical plus Low molecular weight Heparin (LMWH) which should start as soon as possible and before day 3 post injury unless the patient has other injuries that make it contraindicated. LMWH should be omitted prior to spinal surgery. VTE prophylaxis should continue for 3 months post injury unless the patient is mobile where a shorter duration may be considered.

6.2. Circulation Neurogenic (spinal) shock

Spinal shock is the body's response to the sudden loss of sympathetic control. It occurs in lesions above T6 however incomplete injuries may not display the common signs; significant hypotension and bradycardia.

Hypotension

i) A systolic blood pressure of 90mmHg may be normal in patients with a high cervical or thoracic SCI (above T6). Therefore, Hospital Early warning scores will need values adjusted for these patients. See section 10 for how to add a flag to patient notes on EPIC.

ii) Management of hypotension in SCI:

Nurse patient supine
Monitor BP
Maintain mean arterial pressure > 85mmHg
Maintain urine output of ³ 30mls/hour
Administer IV fluids
Inotropes may be required.
Ephedrine or Midodrine may be required

Bradycardia

i) Vaso-vagal responses can occur through stimulation such as rapid position changes, tracheal suctioning or passing an NG tube. Problematic bradycardia usually resolves over a few days. Pacemakers should be avoided where possible as can cause management complication in the long term, such as difficulty to maintain ROM of shoulder post pacemaker insertion, MRI scanning and electrical stimulation treatments.

ii) Management of bradycardia in SCI:
HR < 40bpm administer Atropine 0.3-0.6mg as IV bolus if patient is cardio-vascularly unwell or unstable

6.3. Postural Hypotension

Postural hypotension is more common following a SCI because of loss of nervous system control which works to keep the blood pressure stable, as well as loss of muscle tone which helps to return blood to the heart. It is more common in cervical and high thoracic injuries.

Management of postural hypotension in SCI:

i) An abdominal binder and long compression stockings may help to prevent postural hypotension on sitting up or mobilising.

ii) Abdominal binder and long compression stockings should be fitted for the individual and should be used when sitting the patient up or mobilising out of bed.

7. Pressure Ulcer Prevention and Management

Pressure ulcer prevention

7.1 The aim of pressure ulcer management is to try to prevent the patient from developing pressure ulcers and ensure the patient is well prepared to avoid them in the future

7.2 Patients skin should be visually assessed on admission to the critical care unit or ward and at least once a shift

7.3 Common sites of pressure sores:

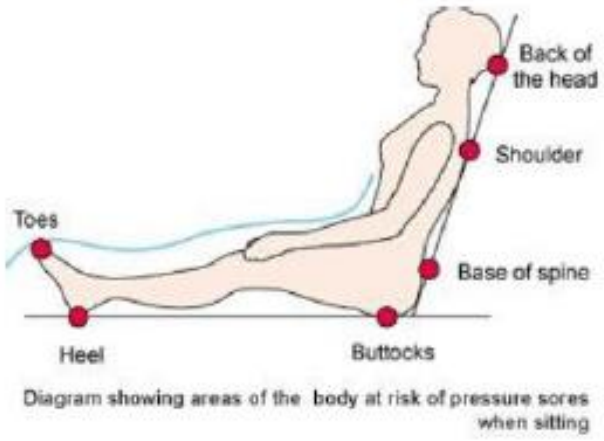
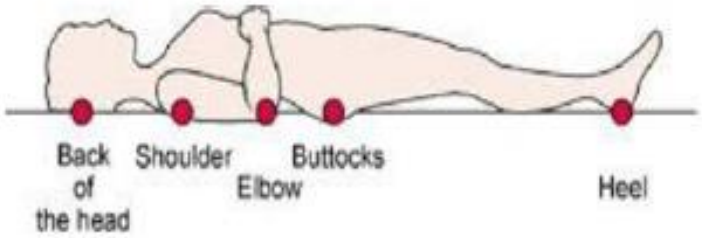


Diagram showing areas of the body at risk of pressure sores when sitting



National Rehabilitation University Hospital, Preventing Pressure injuries

7.4 An assessment tool for pressure ulcer risk (such as the Waterlow Score or Purpose T) should be completed and documented within 6 hours of admission and weekly thereafter

7.5 Continence routine should be established and maintained as quickly as possible (see Bladder and bowel management sections)

7.6 Continence pads and incontinence sheets are not recommended as these can place the patient at higher risk of developing a pressure sore

7.7 Bowel management systems are not advocated in this patient group

7.8 Documented positioning programme should be in place within 72 hours of admission and prior to this patient should be repositioned every 2 hours.

7.9 After every manoeuvre, the patient's position and alignment should be checked, and the skin loading adjusted as required, the SCI patient tends to place undue pressure upon underlying bony surfaces and weight bearing areas as they are unable to adjust the loading pressure upon their skin independently. Click here for guidance on how to adjust skin loading.

7.10 The patient should be nursed on an air mattress, however, must have spinal stability cleared by a spinal surgeon before transferring to an air mattress.

7.11 Repositioning turns can be reduced when a patient is NOT septic, does NOT have a pressure sore and IS compliant with their individualised turning/positioning regime.

7.12 Every patient should be assessed on an individual basis, the below table can be used as guidance:

Day	**Time between turns**
Decision to increase time between turns – Day X Using an Air Mattress	2 hrs 30 mins
Day X + 3 days	3 hours
Day X + 6 days	3 hours 30 mins
Day X + 9 days	4 hours

7.13 Should the decision be made to progress to normal mattress, the table below can be used as guidance:

Decision to change to a normal mattress – Day X	2 hours
Day X + 3 days	2 hours 30 mins
Day X + 6 days	3 hours
Day X + 9 days	3 hours 30 mins
Day X + 12 days	4 hours

7.14 When following a splinting regime, the area of skin covered by the splint should be closely monitored and skin should be checked on donning and doffing the splint

7.15 Patients should be encouraged to dress in clothes as early as possible, however it is recommended that clothing should not be made of any rough materials, have large bulky seams or pockets which could cause indentation in the skin

7.16 Please refer to the National Institute of clinical Excellence (NICE), 2014 guidance on Pressure Ulcers: Prevention and Management for further information on pressure ulcers

Managing a pressure sore

7.17 Existing and acquired pressure ulcers should be documented in the notes and an incident report raised in line with trust protocol

7.18 Advice on staging a pressure sore can be found here

7.19 Patients with a pressure sore should be following a strict positioning/ turning plan avoiding any pressure on the area affected and NOT sitting out of bed until the sore is fully healed.

7.20 Following a pressure sore a strict regime for mobilisation should be followed:

DAY	Mobilising time	DAY	Mobilising time
1-2	Up for 15 mins twice a day	31-32	Up 4 hours twice a day
3-4	Up for 30 mins twice a day	33-34	Up 4 hours 15 mins twice a day
5-6	Up for 45 mins twice a day	35-36	Up 4 hours 30 mins twice a day
7-8	Up 1 hour twice a day	37-38	Up 3 hours 45 mins twice a day
9-10	Up for 1 hour 15 mins twice a day	39-40	Up 5 hours a day
11-12	Up 1 hour 30 mins twice a day	41-42	Up 5 hours 15 mins twice a day
13-14	Up 1 hour 45 mins twice a day	43-44	Up 5 hours 30 mins twice a day
15-16	Up 2 hours twice a day	45-46	Up 5 hours 45 mins twice a day
17-18	Up 2 hours 15 mins twice a day	47-48	Up 6 hours a day
19-20	Up 2 hours 30 mins twice a day	49-50	Up 6 hours 15 mins once a day
21-22	Up 2 hours 45 mins twice a day	51-52	Up 6 hours 30 mins once a day
23-24	Up 3 hours twice a day	53-54	Up 6 hours 45 mins once a day
25-26	Up 3 hours 15 mins twice a day	55-56	Up 7 hours a day
27-28	Up 3 hours 30 mins twice a day	57-58	Up 7 hours 15 mins once a day
29-30	Up 3 hours 45 mins twice a day	59-60	Up 7 hours 30 mins once a day

Managing pressure relief when mobilising

7.21 Patients using wheelchairs should have an OT assessment and recommendations should be in place for the most suitable cushion type to optimise posture and pressure relief on initial mobilising and ongoing. Seating Assessment and Wheelchair Provision section covers all elements of wheelchair and cushion selection.

7.22 On commencing sitting out, a graded seating plan should be followed:

Day	Sitting Time
1	20-30 mins maximum
2	1 hour
3	2 hours (if staffing permits 2x day)
4	3 hours (if staffing permits 2x day)
5	4 hours
6	5 hours
7	6 hours
8	7 hours
9	8 hours

7.23 Patient should not sit out for > 1 hour without pressure relief, pressure relief should be completed for 2 consecutive minutes every hour.

7.24 Pressure relief techniques, pictures kindly provided by London Spinal Cord Injuries, Centre, Stanmore.

Independent forward lean pressure relief

- Leaning forwards onto the elbows is likely to be sufficient for a pressure relief (Picture B).
- In some cases individuals may need to lean further forwards (Picture C).

Assisted forward lean pressure relief

- Ensure the upper limbs are positioned for protection.
- Careful handling of the shoulder
- If head control is limited, may require support.
- Again, a pillow can be used if needed.

Tilting of wheelchair - 65 degrees

- When tilt in the wheelchair is not sufficient to achieve pressure relief (65 degrees), assistance will be needed to manually tilt the wheelchair. Most power chairs will not achieve this.
- Apply the brakes.
- Ensure the carer has a chair available to sit on during the process.
- The patients head may need to rest on the carers shoulder if there is no headrest, or a pillow can be used to assist with this.

Assisted side to side pressure relief

- In some instances where the forwards lean technique is not appropriate, side lean relief is an alternative.
- The leg opposite to the leaning side needs to be crossed to ensure IT clearance.
- Ensure the upper limbs are positioned for protection.

Education on pressure relief

7.25 Patients should be provided education as early as is possible on the avoidance and initial management of pressure ulcers with an emphasis on making this information applicable to their daily life to include:

a. nutrition
b. SCI consequences on circulation and sensation and impact on tissue viability
c. how to inspect their own skin (using mirrors and/or photos).
d. how to evaluate and adjust or verbally instruct adjustment of posture in sitting and lying
e. how to conduct or verbally instruct pressure relief manoeuvre in sitting for 2 consecutive minutes in every hour (Coggrave & Rose 2003)

7.26 It is recommended that patients are given the opportunity to watch a video titled 'The importance of skin care' produced by The Royal National Orthopaedic Hospital.

8. Bladder Management

Overview

8.1 After almost all spinal cord injuries, bladder function is impaired. The aim of bladder care is to empty your bladder, prevent incontinence, maintain kidney health, and reduce risk of UTI's and bladder stones and to maintain an independent lifestyle.

8.2 Patients should be assessed and provided treatment and education for optimal urinary and renal function

8.3 The method in which the bladder should be managed following SCI will depend on the level of injury, how the bladder behaves, hand function, personal life and lifestyle
8.4 All patients with a SCI should have a urology referral and this should include consideration of Cystoscopy and KUB.
8.5 The method of bladder management should be agreed with your local urology team and further advice can be sought from LSCIC, Stanmore
8.6 For comprehensive information on catheter care please refer to the RCN catheter care guidelines

Indwelling Catheters

8.7 Local procedure for use of indwelling catheters should be adhered to
8.8 Long-term indwelling catheter should be inserted within 3 hours of admission and urine output recorded hourly (achieve 0.5mls/kg/hr). This should be continued until patient is out of spinal shock
8.9 If catheterisation is not medically required and patient is able to pass urine, do baseline pre and post void bladder scan to assess bladder function.
8.10 Indwelling catheters should be changed every 4-6 weeks for this patient group due to the risk of build up of sediments.
8.11 Bowel routines should be consistent and effective before consideration of TWOC
8.12 Before consideration of TWOC consider whether the patient has good hand function, intact cognition and whether leg spasms are manageable?
8.13 Please refer to the guideline for indwelling catheters and appendix 1 within indwelling catheters guideline for flow chart detailing TWOC

Intermittent catheterisation

8.14 Consideration for Intermittent catheterisation should be assessed by a specialist nurse who can assess suitability and problem solve.
8.15 If deemed appropriate Intermittent Catheterisation should be started as soon as clinically possible.
8.16 Intermittent Catheterisation:
a. The aim of intermittent catheterisation is to preserve and maintain bladder and kidney function, to promote urinary continence and for the patient to be physically/verbally independent in bladder management.
b. The patient should be commenced initially on 5 intermittent catheters daily
c. All input and output should be recorded on a fluid balance chart for 4 consecutive days in order to analyse intake and volume of catheters
d. The patient should be encouraged to maintain a fluid intake of 2L to ensure catheter volumes are <500mls, thus ensuring bladder is not over distended with the risk of urinary leakage and bladder muscle damage
e. Observe urine for signs of infection i.e. haematuria, foul odour, dark colour and pyuria. If infection suspected, take a sample to dipstick and record. If signs of infection on dipstick send sample to lab for MC&S. Inform medical team.
f. Observe for major diuresis due to the subsidence of spinal shock and increase ICS frequency accordingly
g. Observe for bladder reflex activity, if patient ‘’firing off’’ in between catheters refer to medical team and if male, then advise convene drainage. Exclude UTI
h. Educate the patient in becoming physically/verbally independent in ISC. Educate the patient to be able to trouble shoot. Educate the patient in the product range available to perform an ISC.

Suprapubic Catheters

8.17 The consideration for a suprapubic catheter should include a holistic assessment including:
Level of injury (C6 ASIA A and above usually require a suprapubic catheter)
Arm and hand function
Level of mobility
Age
Cognition
Other comorbidities
Skin conditions
Infection risk
Quality of life for the patient

8.18 To refer for consideration of suprapubic catheter please refer to local urology team

9. Bowel Management

9.1 Please refer to the Guidelines for the Management of Neurogenic Bowel dysfunction in Individuals with Central Neurological Conditions

9.2 A comprehensive assessment of bowels should be completed at the onset of injury to determine whether the patient has a reflexic or areflexic (flaccid) bowel and the reflex should be assessed regularly until spinal shock has resolved

Reflex bowel function	Areflexic (flaccid) bowel function
Positive anal reflex (anal wink) – visible contraction of anus in response to pinprick of surrounding skin	No anal reflex (anal wink)
Positive bulbo-anal reflex – contraction of anus in response to pressure on glans penis/clitoris	Absent bulbo-anal reflex
Injury/damage usually at or above T12 Reflex paralysis	Injury/damage usually L1 and below (conus or cauda equina, flaccid or areflexic paralysis)

9.3 A bowel management programme should be implemented immediately based on the outline below:

Reflex bowel	Areflexic (flaccid) bowel
Daily or alternate days	**Once or more daily**
(Aim for Bristol Scale 4 stool) Stimulant laxative 8-12 hours before planned care if necessary ↓	(Aim for Bristol Scale 3 stool) Stimulant laxative 8-12 hours before planned care if necessary ↓
Gastrocolic reflex ↓	Gastrocolic reflex ↓
Rectal stimulant suppository/microenema ↓	Abdominal massage ↓
Abdominal massage ↓	Digital removal of faeces ↓
Digital rectal stimulation ↓	Single digital check to ensure rectum is empty 5-10 minutes after last stool passed
Digital removal of faeces if reflex evacuation incomplete ↓	
Single digital check to ensure rectum is empty 5-10 minutes after last stool passed	
Medications to adjust stool consistency (e.g. macrogols such as Movicol or Laxido, Lactulose, Fybogel or Dioctyl) should be taken regularly if needed	

Guidelines for the Management of Neurogenic Bowel dysfunction in Individuals with Central Neurological Conditions, 2012

9.4 The nursing team should aim to complete daily care by 11am

9.5 Goals of bowel management

i) Regular production of a formed stool at a regular time of day without any accidents or complications
ii) Avoid constipation, faecal impaction and faecal leakage
iii) Maintain patient dignity and confidence

9.6 A patient who is experiencing constipation, diarrhoea, impaction, anal fissures, haemorrhoids or autonomic dysreflexia requires a review of their bowel regime.

9.7 Diarrhoea is usually caused by impaction with overflow or overstimulation of the gut with aperients or high fibre feeds. Flexi-seal systems should not be used for managing diarrhoea, its prolonged use can severely affect sphincter competence and reflex activity.

9.8 For individualised advice please contact London Spinal Cord Injury Centre Outreach team via email at **rno-tr.lscicoutreachteam@nhs.net**

9.9 Further advice on Assessment and Initiation of Bowel Management Programme can be found here

9.10 Further advice on Evaluation of Bowel Care Programme can be found here

9.11 Further advice on Trouble Shooting Bowel Care can be found here

9.12 Advice on laxatives should be sought from the ward pharmacist and specialist advice can be sought from the London Spinal Cord Injuries Centre, Stanmore

9.13 Fact sheet for patient on bowel management can be provided to patient as appropriate

10. Autonomic Dysreflexia

10.1 Autonomic dysreflexia (AD) is a clinical emergency in individuals with SCI. It commonly occurs in individuals with injury at level T6 and above (Mathias & Frankel 1988; Karlsson 1999; Teasell et al. 2000)

10.2 An acute elevation of arterial blood pressure and bradycardia characterises an acute episode of AD.

10.3 An increase in systolic blood pressure (BP) greater than 20-25mmHg should be considered as AD and treated appropriately (Lakra et al, 2021).

10.4 Please note an individual with a spinal cord injury above T6 typically has a normal systolic Blood Pressure (BP) in the 90-110mmHg range. Therefore, a BP of 20-25mmHg above baseline may be a sign of Autonomic Dysreflexia and should not be ignored.

10.5 Baseline BP should be recorded on a patient notes. A flag can be added onto EPIC which will alert all staff to an individuals baseline BP. Follow the instructions below to add a flag to EPIC:

open patient on EPIC,
click down arrow on top right hand side (next to the spanner) to open "more activities". click "rarely used"
scroll down to FYI with a flag icon and click.
click "new flag"
click magnifying glass and scroll down
click "general"
write "SCI patient with BP baseline of xx/xx" in comments box
click "accept"

10.6 Signs and Symptoms of AD

Signs and symptoms of AD
Raised BP
Bradycardia or Tachycardia (Bradycardia at onset, tachycardia may follow)
Pounding headache
Flushing, sweating or blotching above level of injury
Pale, cold, goosebumps below level of injury
Nasal congestion
Visual changes
Respiratory distress or bronchospasm
Metallic taste in mouth
Anxiety (apprehension of impending physical problem to fear of death is common)

10.7 It is essential that the cause of AD is identified and a management plan put in plan to prevent reoccurrence

10.8 An easy way to remember the common causes of AD are The 6 B's, see table below:

	Causes of AD

1	**B**ladder (catheter blockage, distension, stones, infection, spasms)
2	**B**owel (constipation, impaction)
3	**B**ack passage (hemorrhoids, rectal issues, anal abscess, fissure)
4	**B**oils (skin lesions, infected ulcers, decubiti)
5	**B**ones (fractures, dislocations)
6	**B**abies (pregnancy)

10.9 Patients should be prescribed Nifedipine 10 mg which can be administered every 20–30 min if required (maximum of 40 mg in 24 hours).

10.10 Nitrates are the second most used agents. The options for nitrate treatment:

Glyceryl trinitrate (GTN) 400 mg spray, given as one spray sublingually, repeated after 5–10 min (maximum of three sprays in 15 min).

GTN 500 mg sublingual tablet. Held under the tongue (mouth mucosa must be moist) repeated after 5–10 min (maximum three in 15 min).

GTN 5 mg patch, which can be removed once the BP has returned to baseline. (Lakra et al, 2021)

10.11 It is recommended that nifedipine is prescribed for up to age 65 and GTN over 65 yrs old.

10.12 Follow the below algorithm if a patient has a suspected episode of AD:

The acute management of autonomic dysreflexia, adapted from Lakra et al, 2021

10.13 All occurrences of AD should be recorded in medical notes.
10.14 If a patient has frequent episodes of AD advice should be sought from Stanmore LSCIC.
10.15 Effective bowel and bladder programmes should be in place to minimise the risk of occurrence.
10.16 The patient should be educated about the causes, mechanisms and management of autonomic dysreflexia, please refer to the Education booklet
10.17 Give patient autonomic dysreflexia card (ward patients/ready for discharge)
10.18 Autonomic dysreflexia fact sheet can be given to patient as appropriate
10.19 Autonomic dysreflexia poster should be displayed in patients bedspace

11. Pain Management

11.1 A large majority of patients who have sustained a spinal cord injury will experience pain at some point post injury. Both acute and chronic pain can have a substantial impact on rehabilitation but also on a patient's quality of life (Mahnig et al, 2016). Following a SCI patients may experience different types of pain including visceral, musculoskeletal and neuropathic pains. These are often a mixed picture. Pain can be acute or chronic or a mixture of both with acute exacerbations on the background of the persistent pain. It is important to treat all patients as individuals and provide a bespoke pain multimodal analgesic management plan involving pharmacological and non-pharmacological means.

11.2 Musculoskeletal pain is typically felt above the level of injury where sensation is not affected. Musculoskeletal pain may be caused by muscle tightness or excessive use of muscles and joints.

11.3 Visceral pain is usually found in the abdomen and the cause is often due to bladder distension or constipation. Review bladder and bowel management if the patient is complaining of abdominal pain.

11.4 Neuropathic pain is commonly felt at the level of injury or below the level of injury. Characteristics of neuropathic pain can be described as burning, tingling, pricking, shooting or squeezing pain.

11.5 For pharmacological management of pain refer to Frimley Health Guideline's on Optimising analgesia in acute pain and Optimising analgesia in chronic pain.

11.6 If pain is uncontrolled and further advice is required, the team could consider an inpatient consult to the inpatient pain team which can be placed within orders in Epic. Alternatively, the inpatient pain team can be contacted using the details below:

Who to call for help?

Inpatient/Acute Pain Service: available in normal working hours aim to:

- Review inpatients with advanced analgesic techniques: Regional Analgesia (RA) especially Continuous Epidural Analgesia (CEA), and non-standard Patient Controlled Analgesia (PCA)
- Respond to inpatients with complex pain issues such as chronic pain

During office hours Monday to Friday staff should first contact Inpatient Pain Team on:

- FPH - Bleep 5252 or ext 134571
- WPH - Bleep 4820 or ext 154435
- HWD – 07776633562 (or bleep 4820 if no response)

Outside these times for urgent advice the owning medical team can contact the on-call anaesthetist on:

- FPH - Bleep 5002 or 5330 FPH
- HWD & WPH - 07768463877

When contacting the pain team or anaesthetist please ensure the patient's own medical team have reviewed and optimised the analgesia and that you have the MRN number at hand.

11.7 Non-pharmacological pain management can be considered in some scenarios if not contraindicated and safe to do so. Options include;

Acupuncture
TENS
Massage
Exercise
CBT
Mindfulness

Patients can be guided to gain support from SCI charities such as Back up and SIA who provide support and resources for those living with pain.

12. Nutritional Support

13.1 Good nutrition is essential for all patients with a spinal cord injury to ensure weight control, promote bowel opening and reduce possible complications such as urinary tract infections and pressure sores. The nutrition plan for each patient will be influenced by the level of spinal cord injury. An individual with a high spinal cord injury is likely to require long term feeding via a gastrostomy tube (either a Radiologically Inserted Gastrostomy (RIG) or Percutaneous Endoscopic Gastrostomy (PEG)).

13.2 Refer the patient to the Dietitians on Epic at the initial nutrition screening post admission. Under the 'Orders' tab place a new order for 'Inpatient consult to Dietetics'. Provide as much information as possible in order that the referral is accepted by the Dietetic team (poorly completed or inappropriate referrals may be rejected).

13.3 For a patient requiring longer term feeding the Dietitian will liaise with the Nutrition Support Nurses to arrange a PEG/RIG assessment. The medical/surgical team responsible for the patient can also make a referral directly to the Nutrition Support Nurses on Epic. Under the 'Orders' tab place a new order for 'Inpatient Consult to Nutrition Nursing'. Request PEG/RIG assessment and provide further information in the comments section as to the reason for the request.

13.4 The Dietitian will provide a full assessment and the nutrition plan for each patient will be individual according to a number of factors including the level of spinal cord injury, comorbidities and body mass index. Energy requirements may be reduced in this patient group and controlling weight, maintaining skin integrity and aiding regular bowel opening will be key aims of the dietetic plan.

13.5 SLT regularly liaise with the Dietetic team regarding non oral and oral feeding management recommendations. Nutritional Support is the remit of the Dietetic service.

REHABILITATION

As set out in the Standards for Specialist Rehabilitation of Spinal Cord Injury Guidelines (MASCIP, 2022) patients should have 15 hours of rehabilitation per week (including MDT appointments, goal planning, case conferences and education). It has been agreed locally that our teams should aim to deliver 1 hour of rehabilitation per day Monday to Friday.

13. Therapy Input

15.1 All patients should be assessed by Physiotherapy and Occupational Therapy within 24 hours of admission and referred to other therapy staff within a suitable time frame.

15.2 Goal setting and a MDT meeting should be arranged within one week of admission and therapy role should be identified at this point.

15.3 The roles of the therapy team should include:

a) Upper and lower limb range of movement and strength assessment, treatment and recommendations including splinting, casting, orthoses, exercises and positioning
b) Assessment, treatment and recommendations for management of spasticity
c) Assessment and recommendations for 24 hour positioning
d) Assessment, treatment and recommendations for upper limb management
e) Assessment, treatment and recommendations for maximising potential for transfers and bed mobility
f) Assessment, treatment and recommendations for maximising potential ambulation
g) Assessment, treatment and recommendations for personal activities of daily living including feeding, drinking, washing, grooming, dressing, toileting etc
h) Seating assessment and recommendations including appropriate provision of wheelchair, postural management in sitting and pressure care in sitting
i) Communication and assistive technology referral should be made where appropriate
j) Home and/or discharge environment assessed and recommendations made including equipment provision or referral
k) Assessment and recommendations made for therapy follow up
l) Patient education programme should be initiated and supported until discharge

14. Initial Mobilisation

15.1 All patients should be on bed rest at up to 30 degree incline/bed tilt until they are medically stable and their spinal column stability is achieved.

15.4 At all times the mean arterial pressure should be kept above 80mmHg and systolic pressure above 90mmHg

15.5 Mobilisation could begin when the patient is medically and physiologically stable. Mobilisation should occur in a graduated manner with close monitoring and clear documentation of blood pressure and neurology both before and after the mobilisation. This may be by gradual inclination of the bed or use of a tilt table

15.6 The initial mobilisation should be carried out by an appropriately trained Physiotherapist

15.7 If concerns with blood pressure or deterioration in neurology are apparent the procedure should be halted, patient returned to a flat bed and the process repeated again after a few days

15.8 Appropriate management for postural hypotension should be considered including pharmacological, abdominal binders or prolonging recumbent rehabilitation

15. Position and Range of Movement Programme

19.1 Contractures can occur in patients with paraplegia or tetraplegia. Reducing contractures requires a coordinated approach of multi-disciplinary management that

considers both a contracture's neural and non-neural elements. The approach should include:

19.2 Positioning.

a. Choice of positioning should be based upon.

i. Presence of pressure injuries

ii. Pain

iii. Existing or potential contractures

iv. Ability to feed or socialise

v. Invasive lines

b. The following positions may be used.

i. Half crucifix– Side lying with the lowermost shoulder in 90 degrees flexion (where able) and the arm supported. Hips and knees should be supported to be in a neutral position. Care must be taken to position the shoulder carefully.

ii. Supine lying, frog leg position

iii. Long sitting

iv. Full side lying, high and knee flexion position

v. Sitting upright in an appropriate chair

19.3 Passive or active range of movement exercises.

a. Provide a programme of passive, active or active assisted range of movement exercises. Encourage active movement and independence with stretches where possible (NICE 2022).

b. Focus on areas where contractures are likely to occur and where loss of range would impact upon functional ability (Harvey 2016).

19.4 Splinting.

a. Splints can be considered as part of the 24-hour postural management plan and used where the patient has or is at risk of contracture.

b. When considering using splints, the following needs to be considered and discussed as a multi-disciplinary team:

i. Identified benefit and goals

ii. Skin condition

iii. Clear plan to apply, remove and monitor splint use

iv. Choice of pre-fabricated or custom made splint

v. Patient compliance

vi. Pain and discomfort

vii. Ability to be reviewed and a clear escalation plan for patients and carers, should issues arise.

viii. Less restrictive options (ie, positioning) (College of Occupational Therapists and Association of Chartered Physiotherapists in Neurology, 2015)

c. If a tenodesis grip may be required and therefore a sustained wrist extension stretch may not be beneficial (NICE, 2022).

d. Splinting plan. As with positioning guidance, a clear timetable needs to be created, and ownership of splint application/removal given to either the patient or those treating the patient. All splints should be worn for short periods at first (ie, 30 minutes), then increased gradually. Splint use should be discontinued when:

i. There is evidence of pressure areas from splint use. Any redness appearing from the splint should fade on removal.

ii. Pain on wearing

iii. Increase in active movement, splint no longer required and would restrict functional use

iv. Fixed contracture

v. Discharge to a destination where splint application/removal and monitoring cannot be supported.

(College of Occupational Therapists and Association of Chartered Physiotherapists in Neurology, 2015)

16. Spasticity Management

16.1 Spasticity is a common comorbidity of SCI that is characterized by velocity dependent tone and spasms manifested by uninhibited reflex activity of muscles below the level of injury (Billington et al, 2022).

16.2 It is most common in patients diagnosed with ASIA grades B through D at the cervical level.

16.3 Spasticity is not always problematic and many individuals can use their spasticity to be more efficient in their activities of daily living such as transfers and truncal stability. However, it can negatively impact an individuals ability to perform basic functional tasks, inhibit self-care and cause pain which can influence independence and quality of life. Spasticity presence and severity can vary throughout the day and can be trigger by many factors in those with a SCI.

16.4 It is important to differentiate between spasticity, spasms, clonus and stiffness to be able to find the most appropriate treatment options.

Assessment of Spasticity

16.5 Outcome measures recommended to assess spasticity include; Modified Ashworth Scale and Penn Spasm Frequency Scale. Please see Outcome Measures Section for further details.

16.6 When assessing spasms, it is important to understand when the spasms are occurring, how often, what position the patient is in and whether they impact sleep.

16.7 The London Spinal Cord Injury Centre recommend that elbow and knee flexion/extension should be routinely assessed, other joints and planes may be assessed if required.

Therapeutic Management

16.8 Spasticity should be addressed when it is detrimental to the patient, causing issues such as pain, functional or positional limitations or muscle contracture (Billington et al, 2022)

16.9 Early interventions for preventing and treating spasticity post spinal cord injury are recommended (Stamps et al, 2022)

16.10 Patients should be assessed and treated on an individual basis and should be referred to the neurology outliers team or specialist spinal physiotherapist for expertise in this area. Where required advice can be sought from the specialist spinal cord injury centre, Stanmore.

16.11 Spasms and spasticity can be triggered by many factors. Please see table below for aggravating and alleviating factors.

Aggravating Factors	Alleviating Factors
Immobility or remaining too long in one position	Slow passive movements and stretches performed regularly
Pain (fracture, muscle overuse injury, pressure sore, kidney stone, bladder infection, appendicitis)	Standing and weight bearing
Full bladder or bowel	Rhythmical trunk side flexion and extension combine with trunk torsion
Constipation	Physical activity and treatment, including stretching and bending
Infections such as UTI, ingrown toenail	Appropriate positioning in bed/chair
Anxiety or Stress	Pain management
Temperature changes in the environment	Bladder and bowel management
Bed or wheelchair positioning with not enough hip and flexion flexion	Stress management
DVT	Deep breathing and relaxation
Fever	Cold/Ice
Contractures	
Tight-fitting clothes or urinary leg bag straps	
Uncomfortable orthotics	

16.12 When managing spasticity and spasms the first line treatment should be trigger management. To be able to determine the triggers and put in place a management plan a thorough assessment will need to have been completed.

16.13 Treatment options may include:

Management options	
Self-management	Individuals should be educated on: How recognise and prevent factors that may aggravate spasticity and spasms How to carry out a daily stretching programme How to use spasticity function
Weight bearing	Tilt table or standing frame includes benefits such as; Greater stretch in standing than manual stretch A prolonged stretch of the plantar flexor muscles in standing causes a reduction in spasticity in the lower limbs
Positioning	Positioning in supine or in the wheelchair needs to be carefully managed to ensure to maintain muscle length. Adequate positioning whilst seated helps to reduce fatigue, thus decreasing spasticity. Positions should be changed regularly throughout the day.
Passive Range of Movement	Joint by joint passive range of movement should be performed daily.
Electrical Stimulation	Functional electrical stimulation (FES) may help to reduce spasticity. NMES
Splinting	Plamar-dorsal splint may be recommended when there is increased tone in the fingers or wrist. Night/resting splint can be used to keep the hand in a functional position with the wrist and fingers slightly flexed.
Pharmacological Management	Baclofen, Tizanidine, gabapentin, pregabalin and Botulinum toxin may be

	considered. Please seek advice from the pharmacist.
Surgical Management	Z-plasty or tenotomies may be considered to lengthen muscles if other management options are not successful.

16.14 Re-assessment of the management plan should regularly take place to ensure that the treatment plan is having the desired effect. If pharmacological management is being utilised then it is important that the medics, pharmacist and therapists are working together to consider appropriate timings and dosage of medications.

17. FES/NMES in SCI patients

17.1 Functional electrical stimulation (FES) & Neuromuscular Electrical Stimulation (NMES) are therapeutic techniques used in the rehabilitation of patients with SCI. NMES / FES involves the application of electrical impulses to stimulate muscle contractions in individuals with paralysis or significant muscle weakness due to SCI.
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17.2 NMES is a repeated therapeutic treatment which is completed for the purpose of exercise of the muscles & has a carryover effect.

17.3 FES is completed for the purpose of a functional activity, such as stimulating the muscles to reduce foot drop for the function of walking. Therefore, its effects are beneficial at the time of use.

17.4 The key benefits for FES/NMES in SCI include reducing spasticity, increasing range of movement and muscle strength, increase stamina/ fatigue resistance of muscles, increase sensory awareness, reduce pain, facilitating voluntary movement and support return of function. It can also be used preventatively against secondary effects such as contractures.

17.5 The use of FES is particularly valuable in enabling some patients to perform functional tasks such as reaching and grasping objects, standing, and even walking, depending on the level and severity of the injury. It can also improve the psychological well-being of patients by enabling them to regain some level of independence and control over their bodies.

17.6 Treatment should be offered as soon as possible and within the first 6 months of recovery post injury to provide better potential for neuroplasticity and reduces risk of 'learnt non-use'.

17.7 The effectiveness of FES varies depending on the individual's specific condition, the timing of intervention, and the intensity of the therapy. It is often used in conjunction with other rehabilitation methods to maximise the potential for recovery.

17.8 NMES/ FES is not suitable for all SCI patients and is generally deemed not appropriate for those with a lower motor neuron lesion (a spinal injury beyond the level of T12). However, those with incomplete nerve lesions may demonstrate some response to NMES.

17.9 It is not a suitable treatment method for those with fixed contractures.

17.10 The risk of autonomic dysreflexia should be considered if using NMES/FES in patient with an injury at T6 level or above.

18. Upper Limb Management

18.1. The incidence of shoulder pain is estimated to be between 30-60% of patients with paraplegia and tetraplegia (Bossuyt et al., 2017) Patients should be asked about shoulder pain from the initial assessment and at regular intervals throughout their admission. When pain is reported at rest or while moving, a thorough assessment should be undertaken.

18.2. Initial shoulder assessment should include

i) Full subjective history
ii) Joint range into shoulder flexion, extension, abduction, internal rotation and external rotation. Elbow range and cervical spine range (where permitted to do so) should also be assessed
iii) Muscle activity including joints listed above in addition to shoulder elevation, depression, retraction and protraction. Note areas of imbalance and quality of movement.
iv) Muscle length
v) Sensation
vi) Presence of increased tone
vii) Presence of subluxation including direction and extent

18.3. A multi-disciplinary strategy management strategy for shoulder pain should include:

i) Medication management including use of analgesia
ii) Passive range of movement exercises for those with no active movement
iii) Active or active assisted exercises, focusing on those areas with reduced muscle activity
iv) Passive or active stretching, focusing on un-opposed muscle groups
v) Bed and chair positioning, to promote prolonged passive stretches.
vi) Wheelchair review
vii) Shoulder protection including advice to nursing staff and family on moving and handling or reduction in symptomatic activities.
viii) Education regarding shoulder care, exacerbating movements, rest. (Mulroy et al., 2020, Van Straaten et al., 2017)

18.4. With shoulder pain that does not respond to initial management, further strategies may be required. These could include:

i) Consideration of oral spasticity medications following assessment by neurological physiotherapist or occupational therapist. For focal spasticity, referral to the spasticity clinic may be required (To refer, create order for “FPH Stroke Medicine” within Epic, please make the free text instruction "for WPH or FPH spasticity clinic for BOTOX" clear.)
ii) Shoulder supports, provided with specific advice on aims of use, when to wear and how it will be reviewed.
iii) Neuromuscular electrical stimulation (using with caution in SCI above T6 due to risk of autonomic dysreflexia)
iv) Discussion with orthopaedic team regarding further intervention for subacromial pain syndrome or frozen shoulder if either is present.
v) In later stage patients, consideration of further investigation for heterotrophic ossification. (Lakra et al., 2023)

18.5. Dependent oedema of the hands and arms is a common complication of tetraplegic injuries resulting from reduced activity and dependent positioning. Early management can include:

i) Positioning of the hands in an elevated position using pillows
ii) Lymphatic massage
iii) Oedema gloves or oedema taping for hand oedema. Long-arm oedema gloves can be useful for hand and elbow swelling. (NICE, 2022) The wear of both gloves and long-arm gloves should be built up slowly as skin tolerates, then removed overnight.
iv) Passive and active movements of all joints within the available range
v) Consideration of the use of vibration therapy

19. Occupational Therapy Assessment

19.1 Occupational Therapists will provide a thorough assessment of upper limb function, posture and mobility, seating requirements and wheelchair assessment (including assessment of pressure relieving equipment), functional activities and will work closely with the MDT to provide education and rehabilitation to SCI patients.

19.2 Occupational Therapists will explore adaptive equipment and technology and will consider the individual's home environment as part of discharge planning where appropriate. Signposting to local community support services (i.e. Spinal Injuries Association) will also be completed as part of holistic intervention.

19.3 Referrals should be made to Occupational Therapy at the point of admission (via EPIC) to ensure timely intervention is provided.

19.4 Timely Interventions are vital for those with a spinal cord injury due to the vulnerability of complications. Timely interventions in therapy will help to ensure optimal functional outcomes.

19.5 Checklists are available to guide timely interventions for:
Injuries of C1-C5 (please see Appendix 4)
Injuries of C6-C8 (please see Appendix 5)
Injuries of T1-T12 (please see Appendix 6)

20. Function and Activities of Daily Living

26.1 Functional Outcomes expected:

	Respiratory	Function	Bed mobility and transfers	Mobility	Standing/Gait
C1-3	Ventilator dependent via tracheostomy Assisted cough	Verbally independent Independent swallow 24 hour care required Fully assisted pressure relief Assistive technologies (voice/switch)	Assistance of 2 for bed mobility Hoist for transfers	Electric wheelchair via lip/chin/head control	Tilt table Standing bed
C4	Nocturnal ventilation May require assisted cough	As above for C1-C3	As above for C1-C3	As above for C1-C3	As above for C1-3
C5	Independent breathing May require assisted cough Limited respiratory reserve	24 hour care required With adapted aids can carry out feeding, drinking and grooming activities Independent with touch screen technology Assisted pressure relief	As above for C1-C4	Power wheelchair with joystick control	High support electric standing frame
C6	Independent breathing Self-assisted assisted cough Limited respiratory reserve	Day time care may be required Independent grooming, showering with environmental adaptations and equipment	Roll in bed Long sit from side lying Reliance on electronically controlled bed Independent transfer across level surfaces using board	Light weight wheelchair Consider electrically powered wheelchair or power assisted for ease of mobility	High support electric standing frame

		Independent dressing of upper body, assistance required for lower body Independent with feeding and drinking Independent self-catheterisation Assistance with bowel management Independent pressure relief and skin checks			
C7	Independent breathing Self assisted/assisted cough Limited respiratory reserve	Independent self-care with equipment in accessible environment (fatigue dependent) Independent bladder/bowel management Assistance with domestic activities	Independently bed mobility Independent transfers with board/without board	Manual wheelchair and advanced wheelchair skills	Electric standing frame Owestry standing frame
C8-T1	Independent breathing Self-assisted cough Limited respiratory reserve	Independent self-care with equipment in accessible environment Independent in preparing hot drinks and snacks Assistance with heavy domestic tasks	Fully independent Assisted floor to wheelchair transfers	Manual wheelchair and advanced wheelchair skills	Electric standing frame Owestry standing frame
T2-T6	Independent breathing	Independent in self-care Assistance with heavy domestic tasks	Fully independent Independent floor to wheelchair transfers	Manual wheelchair and advanced wheelchair skills	Independent in standing frame Orthotic ambulation
T7-T12	Independent breathing	Independent in self-care Assistance with heavy domestic tasks	Fully independent Independent floor to wheelchair transfers	Manual wheelchair and advanced wheelchair skills	Use of callipers with walking aids

		Improved trunk control facilitating static and dynamic sitting balance			Two point gait for higher levels or 'walkabout' system 4 point gait may possible May achieve stairs and on/off floor
L1-L2	Independent breathing	Independent in self-care Assistance with heavy domestic tasks	Fully independent	Manual wheelchair and advanced wheelchair skills	Ambulation with splints and crutches 4 point gait Stairs Independent on/off floor
L3-4	Independent breathing	Independent in self-care Assistance with heavy domestic tasks	Fully Independent	Manual wheelchair for convenience, energy conservation, outdoor mobility or sports	Ambulation with AFOs and walking aids Sit to stand with upper limb assistance Static activities in standing e.g. grooming Flexed gait pattern Positive trendelenberg
L5	Independent breathing	Independent in self-care and domestic tasks	Fully independent	-	Ambulation with minimal appliances
S1-S2	Independent breathing	Independent in self-care and domestic tasks	Fully independent	-	Independent ambulation Independent dynamic activities in standing
S3-S5	Independent breathing	Disruption to bladder, bowel and sexual function	Fully independent	-	Independent

21. Seating Assessment and Wheelchair Provision

18.1 There should be clearance and documentation from the medical team prior to sitting a patient. The documentation should include any precautions/restrictions for example if a collar or brace is required.

18.2 Please ensure therapeutic intervention is considered on an individual basis.

18.3 Postural assessment should be completed to guide the type of wheelchair required.

18.4 Wheelchair selection guidance from The Royal National Orthopaedic Hospital, Stanmore based on level of injury:

C1 – 4	• Tilt-in-space wheelchair/semi-recliner with seat wedge • Headrest • Ergonomic, height adjustable armrests/tray • Spinal alignment and lateral support • Progress to tilt-in-space power wheelchair with head control system
C5	• Same features as C1-4 • Progress to tilt-in-space power wheelchair with 'T'-bar hand controls and wrist supports • May be able to trial self-propelling with wrist supports and power assist wheels. Need to consider impact on upper limbs. NB – power assisted provision is not available through statutory services.
C6 – 8	• Self-propelling wheelchair with static tilt-in-space via frame adjustment/ recline through back-posts/modular backrest and seat wedge • Height adjustable armrests • Tetra-grip hand-rims to aid pushing • Postural stability through modular backrest +/- laterals (may manage Tension Adjustable Upholstery) • Consider headrest provision especially in acute/early rehabilitation • Progress to lightweight adjustable wheelchair with set-up of frame to promote optimal pushing efficiency and protection of the upper limbs • If a lightweight wheelchair is not available limit mobility to protect upper limbs • Trial power wheelchair and/or power-assisted wheels for choice
T1-12	• Same features as C6-8 but will progress quicker.
S1- CES	• Same features as C6-8 but will start with tension adjustable backrest

18.5 Pressure distribution should be maximised to prevent pressure sores.

18.6 Pressure cushions should be utilised where appropriate. Vicair cushions are the recommended pressure cushion of choice for Frimley Health.

22. Standing Programme

20.1 'Standing' may be offered to the patient as one mode of facilitating SCI management and can start within an acute admission.

20.2 Individuals should be assessed for standing by the physiotherapist as soon as physiologically stable and it is practically possible following SCI with MDT agreement.

20.3 All patients with a SCI should be individually assessed for potential benefits and potential problems to standing. This will ensure standing is carried out in an appropriate manner with appropriate observations.

Benefits to Standing	Precautions to Standing
Reduction in muscle tone Increase in range of movement Improved efficiency and regularity if bowel function Improved quality of life Improved bone health Postural control Strengthening of anti-gravity muscles Improvements in cardiovascular function Improvements in respiratory function Improvements in skin condition	Bone demineralisation and risk of lower limb fracture Orthostatic collapse and symptoms of low blood pressure Symptoms of autonomic dysreflexia Pain Increase in muscle spasms and spasticity

20.4 Specific goals should be identified for the individual based on the initial assessment and on-going evaluation. Suitable outcome measures should be used.

20.5 Patients should be measured for and fitted with an abdominal binder and long TED stockings prior to commencing a standing programme.

20.6 Standing should take place three or more times a week.

20.7 Standing should take place for thirty to sixty minutes each time.

20.8 Standing programmes should be carried out by therapists with the appropriate and relevant training.

20.9 Please see Clinical Guideline for Standing Adults Following Spinal Cord Injury, 2019 for full guideline

23. Speech and Language Assessment

19.1 For SCI patients that are presenting with a swallow deficit, the following can be offered:

a. Bedside assessment of swallowing conducted by SLT
b. Instrumental procedures. Note, these procedures are only referred to by SLT.
c. Fibreoptic Endoscopy Evaluation of Swallowing- this is an invasive procedure completed at bedside by SLT
d. Videofluoroscopy- this is a radiological procedure completed in radiology in an SLT clinic with assistance from a Radiographer

24. Can the patient make their needs known?

20.1 For SCI patients that are presenting with a communication deficit, the following can be offered:

a. Communication screen guided SLT with appropriate management including use of low tech aids such as alphabet and picture communication boards. Aids sourced from SLT and/or ICU Rehab trolley.
b. Assessment by SLT and PT for consideration of Above Cuff Vocalisation (ACV) for tracheostomy patients that cannot tolerate cuff down. Please see ACV Guidelines for further information.
c. Assessment of one way speaking valve to liberate voice for tracheostomy patients.

d. SLT/PT to refer to ASPIRE for assessment and consideration of high tech communication aids including eye gaze. 5. In terms of funding assistive technology this should be looked at on a case by case basis by the MDT however some options to consider are:
   i. Aspire Law Emergency Grant https://www.aspirelaw.co.uk/fundform/
   ii. ASPIRE: https://www.aspire.org.uk/
   iii. Back Up: https://www.backuptrust.org.uk/
   iv. SIA (Spinal injuries Association): https://spinal.co.uk/

20.2 Ensure the patient has access to an appropriate call bell that they can access with their level of movement

25. Holistic Management

21.1 A 'This is me' booklet should be considered and if appropriate completed for each patient as soon as possible to help professionals build a better understanding of who the person really is and provide care delivered to their individual needs.

21.2 Daily timetables may be helpful to structure a patients' day, please see examples in Appendix 2

21.3 Consider working with patients' families and/or pets with their consent to enhance rehabilitation

21.4 Taking the patient outside

Patient on critical care

a) Patients with an expected length of stay of greater than 2 days on critical care should be considered for transfer to an outside environment. There are many benefits to patients being transferred outdoors including reduced anxiety and stress and reduction in common psychological conditions which can develop as a response to a prolonged stay in critical care.

b) Each patient should be considered on an individual basis and the Intensive Care Society 'Transfer of Critically Ill Patient Outdoors' or local guidance should be followed.

21.5 Patient on the ward

Should be discussed and agreed with the Nurse in charge looking after the patient. Risk assessment should be completed as appropriate.

26. Patient Education

22.1 The London Spinal Cord Injury Centre (LSCIC) have developed a patient education programme. The aim of the education programme is to assist the patient in becoming verbally or physically independent.

22.2 The education programme can be introduced to the patient once the patient has had a diagnosis and prognosis meeting

22.3 The patient will be supported by their nursing and therapy team to read through this information. If the patient has any questions, they should raise them with the multi-disciplinary team who will sign post to the appropriate person for support and advice.

22.4 It is recommended that prior to any day leave, weekend leave or social outings with family that patients have completed the following education topics: bladder, bowel, skin, and autonomic dysreflexia (for those with injuries above T6) of the education booklet. Please see discharge planning section for further information on day/weekend leave.

23. Psychological, Emotional and Peer Support

23.1 The consequence of a SCI may impact an individual's independence, lifestyle, relationships, social roles, career and finances. These changes may result in a loss of self-worth, changes in self-identify, high levels of distress and a sense of vulnerability as well as low levels of life satisfaction. The adjustment and adaption to a SCI will vary from person to person and can take time. It may be normal for a patient's emotional responses to include; numbness, anxiety, hopelessness, confusion, anger, frustration and guilt. The MDT caring for a patient with a SCI can help to manage psychological distress by being empathetic and understanding and ensuring excellent communication skills.

23.2 For support with psychological wellbeing in the first instance advice may be sought from staff within Frimley Health who are Level 1 psychological first aid trained in management of patients with a SCI.

23.3 If concerns are raised regarding a patients psychological health, it should be highlighted to the medical team who can make appropriate onward referrals and consider anti-depressants if required.

23.4 Frimley Health does not currently have any formal psychological/psychiatric resources attached to the Spinal Injury Pathway. However, patients that are admitted to ICU will likely follow the Comprehensive Critical Care Rehabilitation and Follow-up pathway, which involves some psychological support and monitoring.

23.5 Those patients that are admitted to wards, without going through ICU, have access to Psychiatric Liaison services via the normal referral process. They may also be able to access charity organisational support through such agencies as Back Up Trust and Spinal Injuries Association. In addition, long-term ward-based patients may be able to access some community mental health services, such as Talking Therapies counselling preformed via remote access. However, the involvement of these agencies will require the identification of need and referral via ward staff on an "as needed" basis as there is no current mental health screening pathway.

23.6 BackUp Trust

If feels helpful, this Charity can be accessed by patients/staff/family members at any stage of the newly injured patients' journey, e.g. whilst still on the general wards: Back Up Spinal Cord Injury Charity (backuptrust.org.uk) General helpline number: 020 8875 1805. They have regional/local volunteers who they can link people in with, should this be required.

Sometimes it is the family members / loved ones who will have questions first, particularly in the early days, and the BackUp Trust provide information, advice and support to anyone who needs it. They also have a Relatives' Form that family friends and adult relatives can complete themselves to refer themselves for support. Healthcare professionals/ward staff can also complete the form on someone's behalf. https://forms.office.com/Pages/ResponsePage.aspx?id=XA7wJAso4kCmSYD2yGb6--LVBncgYWFGlKdMSlVFgmJUOUhSMktBN1hPSVdTTjZMRUdYM0FQMUJLMiQlQCN0PWcu Or else email: family.support@backuptrust.org.uk. They can advise on the needs of child relatives too.

For contact details of SCI charities please see Appendix 3

23.7 Spinal Injuries Association

https://spinal.co.uk/ Support line: 0800 980 0501 (during busy phases, there may be a delay in response times and they will ask people to leave a message and get back to you which may not be that same day as they are not an emergency service).

This charity have a nationwide campaign to enable hospitals to get the right support, and can even arrange to speak to healthcare professionals at general hospitals directly about management of the highly specialist aspects of spinal injury care: bladder, bowel, skin. They have specialist nurses who work in outreach and will call people back to answer queries and give advice.

23.8 Important to be guided by every individual who will understandably have their own ways needs and ways of responding to situations. For some people, the above specialist support services can be really beneficial, for others it feels too soon and too early to be linked in. As always, be guided by the person and take things at the pace that feels right for them. The above services are useful for staff in general hospitals, and family members too and so even if too early for the patients, useful to know the above.

23.9 Patients with spinal injuries admitted to ICU are, in most cases, likely to come under the Comprehensive CCRP pathway. Please refer to the Critical Care Rehabilitation and Follow Up specification for more information or referral criteria and pathway.

24. Communication with the Patient, Family and MDT

It is vital that uniform messages are communicated to the patient and family from all members of the MDT

Patient/Family

24.1 Maintain open and regular communication with the patient and their family regarding the patient's condition, treatment plan, and prognosis.

24.2 Patients should be given the opportunity to have a diagnosis and prognosis meeting with their spinal consultant and other appropriate medical staff involved in their care

24.3 It is recommended that patients are shown their scans to help with understanding of their injury

24.4 It is recommended that patients are given a prognosis and have the opportunity to ask any questions about their future

24.5 Signpost patient and family to SCI charities as appropriate. Please see Appendix 3 for list of SCI charities

MDT

24.6 MDT meetings should be arranged as appropriate for the individual patient and team caring for the patient. Recommended frequency once per week.

24.7 MDT meeting should include review of:

- Spinal stability and precautions
- Spasticity Management
- Musculoskeletal Interventions
- Pain management
- Autonomic dysreflexia management
- Autonomic dysfunction including cardiac and blood pressure modulation
- Respiratory and Ventilatory Management
- Continence

Discharge planning

25. Goal Setting

25.1 Goal setting should be completed with patient, family and all MDT members

25.2 Within the goal setting meeting, a management plan should be agreed where it is identified the role of each MDT members

25.3 Goals should be agreed and set at the earliest opportunity ideally within 1 week of admission and reviewed on a weekly basis thereafter

25.4 Use SCIM to guide setting appropriate functional goals

25.5 Goals should be available for patients to always see, for example in eyesight on white board, orientation board or written down

26. Outcome Measures

26.1 The American Spinal Injury Association (ASIA) Impairment Scale

a. The American Spinal Injury Association (ASIA) Impairment Scale is used to determine the extent of a SCI using the following categories:

   i. A = Complete: No sensory or motor function is preserved in sacral segments S4-S5
   ii. B = Incomplete: Sensory, but not motor, function is preserved below the neurologic level and extends through sacral segments S4-S5
   iii. C = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade of less than 3
   iv. D = Incomplete: Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have a muscle grade that is greater than or equal to 3
   v. E = Normal: Sensory and motor functions are normal

b. The ASIA Impairment Scale should be completed within 48 hours of diagnosis of SCI.

c. An ISNCSCI (ASIA) chart should be completed prior to and following any surgical intervention, at 6 weeks and/or any change in circumstances.

d. The ASIA can be completed by the therapy or medical team with appropriate training.

e. The medical team are responsible for completing and documenting the S4/5 motor and sensory function (deep anal pressure & voluntary anal contraction).

f. The ASIA should be scored in one go and the person signing it should be present for all the testing to ensure it is done consistently.

g. To gain reliable results from the ASIA assessment the patient needs to be able to engage for approximately 1 hour and be able to effectively communicate with the therapist/medical practitioner completing the assessment.

Find the ASIA Impairment scale here

Find the documents to support completion of the ASIA impairment scale here; key sensory points and motor examination guide

26.2 The Spinal Cord Independence Measure version III (SCIM III)

a. The Spinal Cord Independence Measure version III (SCIM III) is a validated outcome used to evaluate disability and functional changes in persons with SCI. The outcome measure addresses three specific areas of function in patients with spinal cord injuries including self-care, respiration and sphincter management and mobility.
b. It is recommended that the SCIM III is completed within 72 hours of rehabilitation starting and repeated when the patient's rehabilitation has plateaued, or the patient is being discharged from hospital.
c. The SCIM III is completed by a clinician, ideally through direct observation of the individual completing the tasks listed, however patient report can be used if direct observation is not possible.
d. The SCIM III may take between 30-45 minutes to complete.
e. The findings from the SCIM III should be used to guide clinicians in determining treatment goals and objectives for the patient.
f. SCIM III proforma can be found on EPIC – click on outcome measures / SCIM
g. SCIM-SR

    i. SCIM-SR can be used to help the patient identify their needs. Ideally this should be done within the same timeframe as the SCIM III

26.3 The Montreal Cognitive Assessment (MoCA)

a. The Montreal Cognitive Assessment (MoCA) is a validated and highly sensitive tool for early detection of mild cognitive impairment. The assessment accurately assesses short memory, visuospatial abilities, executive functions, attention, concentration and working memory, language and orientation to time and place.
b. The MoCA should be completed by a healthcare professional who is appropriately trained.
c. Link to MoCA

26.4 The Intensive Care Physiological Assessment (IPAT)

a. The IPAT tool is validated to detect psychological stress on an Intensive Care Unit and alert staff to the need for psychological support.
b. The IPAT is completed by the ICU nurse or Critical Care Rehabilitation and Follow Up Service (CCRFS) MDT when the patient has a GCS 15/15 or pre-ICU discharge.
c. If the patient scores 7-10, psychological first aid and emotional support will be given by ward staff. This should include information on delirium and what to expect, listening to their worries and concerns, providing reassurance and kindness and normalising that it is normal and understandable to feel scared, worried anxious and low. Ward staff should encourage self-compassion.
d. If the patient scores 11 or above, they are referred to the ICU/CCRFS clinical psychologist for further psychological screening

Modified Ashworth Scale (MAS)

The MAS measures spasticity in individuals with lesions to the central nervous system

The assessment is used to measure the increase in muscle tone.

The MAS assigns a grade of spasticity from a 0-4 ordinal scale. Six-point ordinal scale for grading resistance encountered during passive movement stretching at increasing velocity

- 0 = no increase in muscle tone
- 1 = slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion (ROM) when the affected part(s) is moved in flexion or extension
- 1+ = slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
- 2 = more marked increase in muscle tone through most of the ROM, but the affected part(s) is easily moved
- 3 = considerable increase in muscle tone; passive movement is difficult
- 4 = affected part(s) rigid in flexion or extension

The MAS has adequate reliability for assessing lower-extremity spasticity in patients with SCI

The assessment takes approximately 5 mins to complete.

Penn Spasm Frequency Scale (PSFS)

The PSFS is self-report measure of the frequency of muscle spasms

It is commonly used to quantify spasticity

It contains two parts: spasm frequency and spasm severity:

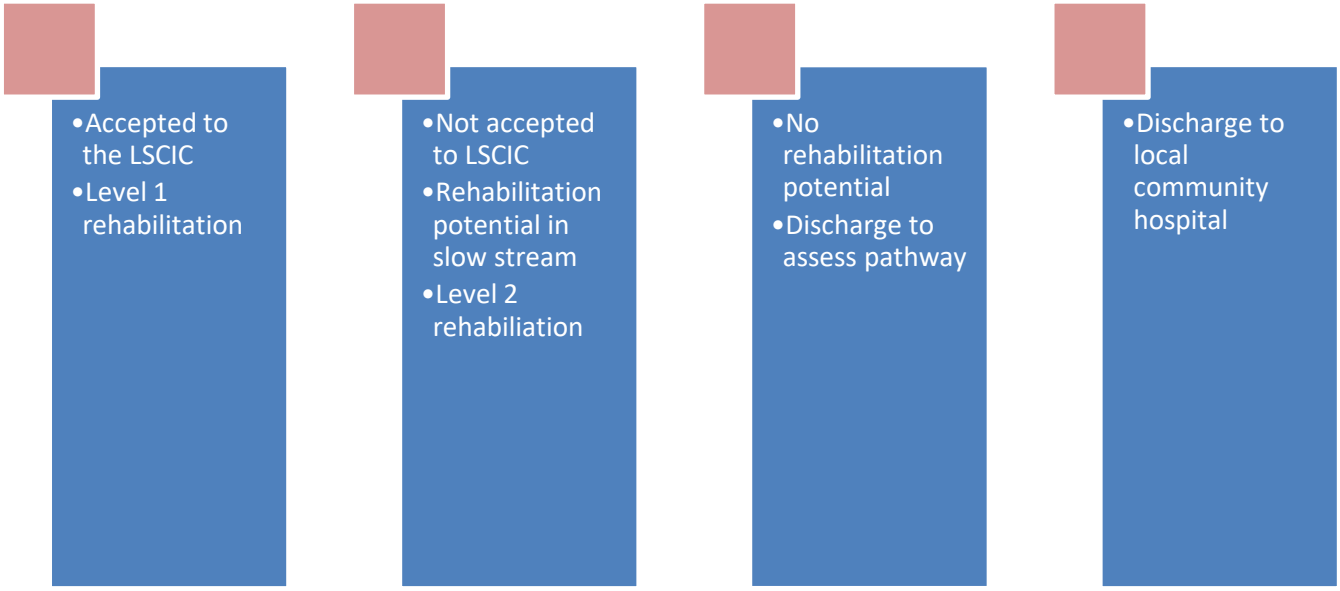
- spasm frequency:
  - 0 = no spasms
  - 1 = one or a few spasms per day
  - 2 = between 1 and 5 spasms per day
  - 3 = between 5 and <10 spasms per day
  - 4 = 10 or more spasms per day or continuous contraction
- spasm severity:
  - mild (1)
  - moderate (2)
  - severe (3)

27. Social Support

27.1 There are several SCI charities who will provide support for both the patient and their family at all stages of recovery following a SCI. Some of these charities have been mentioned in previous sections of the guideline.
27.2 Patients and their family should be advised of these charities at an appropriate time during their recovery period
27.3 The charities include Spinal Injuries Association (SIA), ASPIRE and BackUp Trust
27.4 See Appendix 3 for other Spinal Cord Injury Charities and for further details on the charities listed above

28. Discharge Planning

28.1 All patients should be discussed at a MDT meeting with or reviewed by LSCIC, Stanmore to understand prognosis and potential for rehabilitation.
28.2 Discharge pathway should be agreed with the local MDT and LSCIC, Stanmore
28.3 There are different pathways for discharge from the acute hospital:
28.4 For information on each discharge pathway see Appendix 7



28.5 On discharge a multidisciplinary summary should be completed and sent to referring consultant, GP and AHPs involved in care.
28.6 Patients should be referred as required (with consent) for support from SCI charities including SIA, Back-up and Aspire (Appendix 3 for further details)

28.7 Day Leave

Should it be possible for a patient to go on day leave/weekend leave or social outings with family members the patient would need to have been educated in and have a full understanding of their bladder, bowel, skin and autonomic dysreflexia (for those with injuries above T6) needs and regimes.

To support a patient to achieve this please refer to Patient Education Section

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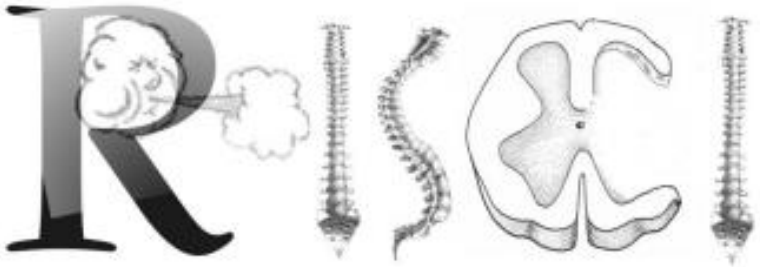
Appendix 1 – RISCI, Weaning Guidelines for Adult Spinal Cord Injured Patients in Critical Care Units

RISCI
Respiratory Information for Spinal Cord Injury
UK & Ireland



Weaning Guidelines for Adult Spinal Cord Injured Patients in Critical Care Units

RISCI is a multi-disciplinary group concerned with the management of spinal cord injured patients requiring respiratory support.

This document has been developed alongside the 'RISCI Ventilation Strategies in Tetraplegia' document.

Contents

1. Introduction

i. Patients with Spinal Cord Injury (SCI) have specific needs with regards to weaning from mechanical ventilation [1,2,3].

ii. The weaning technique advocated by Spinal Cord Injury Centres (SCIC) is simple but needs to be followed rigorously by the Intensive Care Multi-Disciplinary Team (MDT) to achieve ventilator independence efficiently [4].

iii. A number of patients will remain ventilator dependent [5] and require careful management to optimise their quality of life in liaison with the linked SCIC.

2. Background Pathophysiology

i. Respiratory dysfunction immediately following SCI is due to flaccid paralysis of the respiratory muscles, both inspiratory and expiratory. The degree of dysfunction is directly related to the level of cord injury.

ii. High cervical injuries may lose diaphragmatic and accessory muscle activity. They will lose all intercostal and abdominal activity: ventilatory failure is rapid in these circumstances.

iii. Early tracheostomy is recommended, as successful early extubation is rare. Tracheostomy simplifies weaning, abolishes the need for sedation, improves communication and enables efficient secretion clearance [6,7].

iv. Low cervical cord injuries may have lost all intercostal and abdominal activity but will have activation of their diaphragm and accessory muscles of breathing.

v. Thoracic cord injuries will lose some degree of intercostal and abdominal activity and can be complicated by rib fractures and pulmonary contusions. Haemothoraces may be present secondary to the thoracic spine fractures.

vi. Respiratory failure results from ineffective ventilation due to compromised respiratory muscles acting on a flaccid rib cage. This is exacerbated by intrapulmonary compliance changes and an inability to spontaneously clear secretions.

vii. Some respiratory afferent information is lost; patients may not feel dyspnoeic or become tachypnoeic when failing.

viii. Autonomic disruption as a result of SCI causes excessive bronchial secretions and a tendency to bronchoconstriction [8,9].

3. Weaning Principle

i. Based on the patient's initial Forced Vital Capacity (FVC) measurement, all ventilatory support is removed for a specified time period, after which the SCI patient is returned to ventilatory support at the same pressures[10] for a rest period of two hours. The common term for this is Ventilator Free Breathing (VFB).

ii. Evidence has shown that ventilating patients with higher tidal volumes is safe[11] and reduces the time taken to wean patients from ventilation[12]. It is suggested that ventilation of around 10-15mls/kg is used. There is some evidence that during 'rest' ventilation periods, high tidal volume ventilation whilst maintaining normocarbia accelerates weaning as it may reduce atelectasis[12].

4. On-Ventilation Tracheostomy Cuff Deflation

i. For all SCI patients the ability to communicate is paramount to rehabilitation and reintegration. Being in a critical care unit for considerable amounts of time without easy communication is, at best, frustrating and can contribute to psychological morbidity [13].

ii. Ventilator settings should be adjusted to allow for the resultant leak, through either increases in inspiratory pressure or inspiratory time. Many ventilators will alarm continuously with this degree of leak so a change to a simpler, domiciliary type device can be considered.

iii. On-ventilator cuff deflation is advised prior to commencing VFB. Initially the aim is for cuff deflation during the daytime, up to 12 hours, before progressing to full-time cuff deflation. Cuff deflation reduces micro-aspiration, and restores laryngeal and pharyngeal reflexes, which will optimise conditions for the resumption of safe swallowing [14].

5. Swallowing

Swallowing with the cuff inflated is not always advocated in SCI. Assessment by a Speech and Language Therapist (SLT) is vital to reduce the risk of aspiration and pulmonary complications, which could impact on weaning. SLTs can provide upper airway & swallow assessment via the use of Fibreoptic Endoscopic Evaluation of Swallowing (FEES). The use of FEES allows teams to assess secretion management, oedema, potential laryngeal pathology and risk of silent aspiration. The use of FEES can expedite return to safe oral intake and allows for targeted treatment approaches to be instigated [15,16,17].

6. Pre-requisites for VFB Weaning

- Weaning proceeds more efficiently with a consistent MDT approach [2,4].
- Awake and co-operative
- Free from active chest infection
- $FiO_2 \leq 0.4$
- PEEP $\leq 8cmH_20$
- Regular effective chest management including secretion clearance
- Evidence of spontaneous respiratory activity through bedside assessment (N.B. ventilator triggering does not necessarily imply useful activity)

7. Weaning Progression

The following table shows the pathway for patients of different levels of injury to wean from invasive ventilation via tracheostomy airway management. Flexibility with increasing or decreasing these increments is encouraged. However, this must be based on clinical judgement, the Neurological Level of Injury (NLI) and whether they have a complete or incomplete SCI. If the patient tires or develops complications, halt the weaning process. When the patient meets the pre-requisites to wean again, resume the wean at the level achieved the day prior to becoming unwell.

NLI	C3-5		C6 and below	
FVC	Initial FVC < 1.0L		Initial FVC >1.0L	
Day	VFB period	Total VFB time/day (mins/hours)	VFB period	Total VFB time/day (hours)
1	5-10 mins x 4	20-40 mins	15 mins x 4	1
2	10-15 mins x 4	40-60 mins	30 mins x 4	2
3	15-20 mins x 4	60-80 mins	45 mins x 4	3
4	30 mins x 4	2	1 hour x 4	4
5	45 mins x 4	3	2 hours x 3	6
6	1 hour x 4	4	4 x 2	8
7	1.5 hours x 4	6	6 x 2	12
8	2 x 4	8	10	10
9	3 x 3	9	12	12
10	4 x 2	8	14	
11	5 x 2	10		
12	6 x 2	12		
13	8	8		
14	10	10		
15	12	12		
For overnight progression see Section 9				

RISCI Ventilator Free Breathing Guideline

Achieve cuff deflation aiming for 12 hours/day

Pre-requisites for VFB Wean are met

SCI C2-C5

Measure FVC and repeat use to monitor progress and identify fatigue

↓

Day 1
Step 1: Begin VFB with trache mask and O_2 (speaking valve will help maintain PEEP) X 5 minutes, fully supervised

↓

Step 2: Return to ventilator MAINTAIN VENTILATION PARAMETERS THROUGHOUT WEANING PROCESS (10-15mls/kg) for 2 hours

↓

Step 3: If no signs of fatigue, Repeat VFB x 4 sessions of 5 minutes with 2 hours rest between each VFB session

↓

Day 2
Repeat steps 1-3 with VFB x 4 sessions of 10 minutes with 2 hours rest between each VFB session

↓

Progression of VFB
20 minutes, 30 minutes, 45 minutes, 1 hour, 1.5 hours, 2 hours, 3 hours, 4 hours, 5 hours, 6 hours, 8 hours, 10 hours, 12 hours
The number of VFB periods per day will reduce as the length of time VFB increases

SCI C6 and below

Measure FVC and repeat use to monitor progress and identify fatigue

↓

Day 1
Step 1: Begin VFB with trache mask and O_2 (speaking valve will help maintain PEEP) X 15 minutes, fully supervised

↓

Step 2: Return to ventilator MAINTAIN VENTILATION PARAMETERS THROUGHOUT WEANING PROCESS (10-15mls/kg) for 2 hours

↓

Step 3: If no signs of fatigue, Repeat VFB x 4 sessions of 15 minutes with 2 hours rest between each VFB session

↓

Day 2
Repeat steps 1-3 with VFB x 4 sessions of 30 minutes with 2 hours rest between each VFB session

↓

Progression
1 hour, 2 hours, 4 hours, 6 hours, 10 hours, 12-14 hours
The number of VFB periods per day will reduce as the length of time VFB increases

8. Other Factors in Ventilatory Weaning in Spinal Cord Injury

i. Biochemistry and nutrition should be addressed. It is recommended that cervical cord-injured patients have gastrostomies inserted instead of naso-gastric tubes [14].
ii. Regular salbutamol nebulisation may improve respiratory function [18,19,20].
iii. VFB should be performed in supine or flat side lying, not sitting. There is a drop of up to 20% in VC from supine to sitting [21,22,23] associated with the mechanics of the diaphragm and the paralysed abdomen, so VFB is better tolerated in supine.
iv. Scrupulous attention should be paid to secretion clearance to reduce work of breathing. It should be undertaken prophylactically throughout the day, throughout the entire weaning process and prior to any VFB attempt [4,24].
v. Tenacious sputum may be treated with carbocysteine and/or nebulised acetylcysteine orally or via gastrostomy [25].
vi. Experience shows that ventilator weaning is expedited if the patient solely focuses on this and that plans to mobilise the patient are addressed after the ventilator weaning process has been completed.

9. Post-Wean Checks and Maintenance

The aim is for VFB up to 18 hours during the daytime, but with ventilation at night, as SCI patients can have significant REM sleep hypoventilation and obstructive sleep apnoea [26]. To assess safe VFB overnight requires either an early morning blood gas or transcutaneous CO_2 monitoring. Consideration of the use of non-invasive ventilation to assist with sleep disordered breathing and as an adjunct to augment lung volumes is advised. Use of a prophylactic cough assist device is beneficial to further assist with lung and chest wall compliance and lung volumes.

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Revised from original by Kate Roberts and Sophie Nawarksi. FINALISED JUNE 2023	

Appendix 2 – Example daily Timetable for patient on critical care, weaning from mechanical ventilation

Frimley Health NHS
NHS Foundation Trust

DAILY Routine Time Table EXAMPLE

Patient Name
Hospital Number

0800	Handover/Bed side safety checks
0815	Bowel Care as per care plan
0845	Wash and Podus boot ON
0930	Physiotherapy *Cough Assist* VFB -Wean
10:00	Rest on ventilator
1100	Turn and position Podus boot OFF
1230	*Cough Assist* (For bed side nurse to perform) and Mouth Care VFB - Wean
1300	Rest on ventilator Turn and position Podus boot OFF
	REST TIME
1500	Turn and position Podus boot ON
1515	Physiotherapy Cough Assist VFB – Wean
1545	Rest on ventilator
1700	Turn and position Podus boot OFF Mouth Care
1900	Turn and position Podus boot ON
2100	Turn and position Podus boot OFF *Cough Assist* (For bedside nurse to perform) and Mouth Care
0100	Turn and position Podus boot ON
0500	Turn and position Podus boot OFF

Positions- see ~~images~~

PLEASE NOTE: Supine position with blocks for 30-60 minutes only

Patient should NOT be sat up more than 30 degrees as will negatively affect ventilation.

- Right side lie (Podus boot on left foot)
- Left side lie (Podus boot right foot)
- Supine with both Podus Boots and blocks replacing Miami J

Reviewed on Date

To be reviewed every *Monday* by ....

Appendix 3 – Spinal Cord Injury Charities contact details

Spinal cord injury charities

- Back up – www.backuptrust.org.uk
- Aspire – www.aspire.org.uk
- Spinal injuries association (SIA) – www.spinal.co.uk
- Spinal Injuries Scotland – www.spinalinjuriesscotland.org.uk
- **Transverse myelitis society** – www.myelitis.org.uk
- **Cauda equina UK** – caudaequinauk.org.uk
- Cavernoma – cavernoma.org.uk

These charities offer various services to people with spinal cord injury and their families, such as mentoring, benefits advice, peer support, activity courses, and many, many more!

Facebook*

- **SCI owners club** – www.facebook.com/search/top?q=sci%20owners%20club
- SCI powder room – www.facebook.com/groups/267270780136213
- SCI locker room – www.facebook.com/groups/285711738290175
- **SCI family members** – www.facebook.com/groups/319338721553015
- Parents of SCI – www.facebook.com/groups/134835720420052
- **Cauda equina** – www.facebook.com/caudaequinasa

**Please be aware that these are not facilitated by healthcare professionals or have any links to LSCIC.*

Fitness and sport

- Wheelpower fitness/sitting yoga sessions – www.wheelpower.org.uk/sport-events
- **Adapt to perform** – www.youtube.com/results?search_query=adapt+to+perform
- Wheelpower – www.wheelpower.org.uk
- **Invictus active trainer** – www.invictusactive.com/invictus-active-trainer
- Handcycling UK – www.handcycling.org.uk
- Scuba diving – scubatrust.org
- **Access adventures** – www.accessadventures.co.uk
- Sportability – www.sportability.org.uk

Appendix 4 – Timely Intervention Checklist C1-C5 provided by The London Spinal Cord Injury Centre, Stanmore

Royal National Orthopaedic Hospital NHS
NHS Trust

TIMELY INTERVENTION TETRAPLEGIC MANAGEMENT C1-C5

Timely intervention is essential when working with tetraplegic patients to maintain range of movement and optimise functional potential of the upper limbs. The following information is a guide only and is not prescriptive. Therapeutic intervention should be considered on an individual basis. Please seek further advice/clarification from your supervisor or equivalent.

Day One	
Acute	**Date completed and signature**
Read the patient's medical notes for history and identify any precautions.	
Introduce self to the patient, explain OT role and gain consent for OT intervention as per consent checklist.	
Start completion of initial interview for pre-injury data.	
Upper Limb	
Complete an initial assessment of the upper limbs (UL) including additional injuries, skin integrity, oedema, range of movement (ROM), MMT, TUAQ and evidence of spasticity. Refer to the Acute Upper Limb Management Advice Sheet.	
If oedema is present, ensure arms are elevated on pillows and joints are positioned to optimise venous return.	
Explore use of oedema garments and taping.	
Liaise with physiotherapy (PT) and nursing colleagues regarding positioning charts.	
Clinically reason if splinting is needed e.g. unopposed biceps and manual muscle testing (MMT) less than grade 3 for wrists, fingers and thumb joints. Position elbows in extension and fabricate 'keep me' hand rolls.	
Posture and Mobility	
Consider seating requirements for patient's dimensions and level of injury; see advice sheets on Wheelchair, Backrest and Cushion selection.	
Consider ventilation equipment that will need to be supported in wheelchair set-up. Read Spinal Cord Injury Management and Rehabilitation, Sisto et al, 2009, **Chapter 4** (Respiratory Treatment and Equipment).	
Prepare mobility and seating equipment for mobilisation.	
Seek documentation of spinal stability with permission to mobilise patient into a wheelchair.	
Environment	
Consider provision of overhead mirror and/or prism glasses or reading stand to assist with orientation and access to environment	

Day Two/Three	
Upper Limb	
Fabrication of maintenance splints with photographic donning chart and wearing times regime.	
Progress oedema management if necessary (gloves, vibration, retrograde massage, taping).	
Day Four/Five	
Upper Limb	
Finish upper limb splint fabrication.	
Week One	
Continue with passive range of movement (PROM) and active range of movement (AROM) UL regime.	
Carry out formal MMT assessment and PROM.	
Formally assess and document range of movement.	
Monitor for malalignment, tone and unopposed activity.	
Posture and Mobility	
When documented in medical notes, mobilise patient and orientate to surroundings; see Acute Mobilisation advice sheet.	
Assess postural presentation in wheelchair. Consider the use of a TLSO brace and neck collar to aid patient stability in the wheelchair if not already prescribed.	
Identify assistance required for patient to complete pressure relief.	
Community Services	
Inform patient of the Wheelchair Service (WCS) role, gain consent for referral and make same.	
Week Two	
Upper Limb	
Continue with PROM and AROM UL regime.	
Continue with oedema management.	
Instigate an active UL rehabilitation programme • Stabilising de-innervated joints through splinting/orthoses • Use of vibration for sensory stimulation, oedema management and ease of delivering passive range of movement • Use of de – weighting aids, active/facilitated movements for function and active exercise regime • Use of ES for activation of muscles; **seek medical clearance for use first.** • Explore potential to carry out functional activities/electronic assistive technologies wit/without aids • Explore use of MULE, Saeboflex, remedial activities for progression of function • Refer patient to UL Group and OTT as required	
Posture and Mobility	
Ensure postural alignment is maintained.	
Optimise method of independent mobility and identify from stock. Liaise with Medical Physics Technician (MPT) for assistance with set up.	

Week Three	
Upper Limb	
Explore functional potential within limits of injury and/or opportunities for function (feeding, drinking, writing, grooming, communication aids).	
Consider use of compensatory strategies and/or systems to promote function.	
Posture and Mobility	
Ensure postural alignment is maintained.	
Functional Activities	
Continue to explore functional potential.	
Assistive Technology	
Discuss Environmental Control Units (ECUs). Consider the use of switches to assist.	
With Aspire, explore access to computer assistive technology hard and software to optimise independent use of a computer e.g. Tracker Pro/Smartnav, Dragon Dictate Naturally Speaking/Talking Point, Integra-mouse, Apple and Android voice controls for smart phones and tablets.	
Community Services	
Liaise with WCS regarding provision for discharge.	
Inform patient of Environmental Control Service and gain consent for referral, carry out same.	
Vocation	
Discuss patient's previous employment/vocation. Complete the Vocational Opportunities Questionnaire and refer to clinic if desired.	
Week Four and Ongoing Rehab	
Upper Limb	
Continue with maintenance regime.	
Posture and Mobility	
Ensure postural alignment is maintained.	
Functional Activities	
Explore grooming activities (teeth, hair, make-up, and shaving). Continue exploring functional potential.	
Community Services	
Organise a shower-chair assessment to obtain a quotation and forward to Case Manager (CM) to pass onto COT on receipt.	
Liaise with CM regarding the outcome of the access visit, potential discharge destination and the equipment requirements to facilitate discharge.	
Vocation	
Discuss Vocational Opportunities.	
Community Access	
Liaise with CM to arrange day trips with RP's (coffee shop, lunch, shopping, cinema, football match, library etc) including use of public transport as appropriate.	
Consider overnight stay in Independent Living Assessment Unit or patient's home if available.	
Introduce to ASPIRE, Back Up and SIA services as appropriate.	
Equipment	
Consider the following in short and long-term provision: • Hoist (electric mobile or gantry ceiling track)	

• Slings with head support • Sliding sheets – for seating and bed positioning • Shower trolley or Tilt in space shower-chair • Water Genie if showering facilities not available for discharge • Over bed height and angle adjustable cantilever table • Over bed mirror • Over bed book frame • Reading stand • Mouth stick • Page Turner Hands-free drinking systems e.g. Drink Aid, Drink Up, Platypus, The Hydrant • Mobilia clamp systems • ECU and switches • Computer access equipment • Home modifications • External ramping/step lift (usual maximum weight limit is 25 stones) • Standing equipment (tilt-table or standing bed – require space and head room) • Wheelchair accessible transport vehicle • Electrically powered wheelchair and back up manual wheelchair • Portable ramps • Portable hoist to facilitate going on holiday	
Transportation	
Discuss role of Mobility Centres for assessment and trial of wheelchair accessible vehicles and refer if patient agreeable (assessment cost likely) and/or arrange for private companies to demonstrate vehicles here.	
Leisure	
Provide advice/trial the following: • Verbal direction of others to carry out activities (cooking, games) • Access to internet and social media via EATS • Gaming • Use of audio books • Learn a language • Mouth painting /computer art • Photography (with use of tripod and pressure pad under chin) • Receive massage, aromatherapy or other alternative therapies • Switch activated toys (age appropriate)	
Discharge	
Devise carer handbook on upper limb regime	
Carry out formal MMT assessment and document in discharge report appendix	
Complete Tetraplegic Upper Limb Activity Questionnaire, TUAQ and document in discharge report in Upper Limb section	
Inform patient's Wheelchair Service/relevant community services of planned discharge date.	
Refer to Intermediate Care Team/Community Rehab Team as required.	
Provide carer training as required, refer to Carer Checklist.	
Refer to Environmental Control Unit Service	

Complete relevant sections of MDT report. Must be completed at least 2 days before patient discharge.	
Complete ICP paperwork.	

Appendix 5 - Timely Intervention Checklist C6-C8 provided by The London Spinal Cord Injury Centre, Stanmore

Royal National Orthopaedic Hospital NHS
NHS Trust

TIMELY INTERVENTION TETRAPLEGIC MANAGEMENT C6-8

The following information is a guide only and is not prescriptive. Therapeutic intervention should be considered on an individual basis. Please seek further advice/clarification from your supervisor or equivalent.

Timely intervention is essential when working with tetraplegic patients to maintain range of movement and optimise functional potential of the upper limbs. The following information is a guide only and is not prescriptive. Therapeutic intervention should be considered on an individual basis. Please seek further advice/clarification from your supervisor or equivalent.

Day One	
Acute	**Date completed and signature**
Read the patient's medical notes for history and identify any precautions.	
Introduce self to the patient, explain OT role.	
Start completion of initial interview for pre-injury data.	
Upper Limb	
Complete an initial assessment of the upper limbs (UL) including additional injuries, skin integrity, oedema, range of movement (ROM), MMT, TUAQ and evidence of spasticity. Refer to the Acute Upper Limb Management Advice Sheet and competency.	
If oedema is present, ensure arms are elevated on pillows and joints are positioned to optimise venous return.	
Explore use of oedema garments.	
Liaise with physiotherapy (PT) and nursing colleagues regarding positioning charts.	
Clinically reason if splinting is needed e.g. unopposed biceps and manual muscle testing (MMT) less than grade 3 for wrists, fingers and thumb joints. Position elbows in extension with forearms pronated and fabricate 'keep me' hand rolls if unable to fabricate maintenance splints.	
Posture and Mobility	
Consider seating requirements for patient's dimensions and level of injury; see advice sheets on wheelchair, backrest and cushion selection.	
Prepare mobility and seating equipment for mobilisation.	
Seek documentation of spinal stability with permission to mobilise patient into a wheelchair.	
Day Two/Three	
Upper Limb	
Fabrication of maintenance splints with photographic donning chart and wearing times regime.	
Progress oedema management if necessary (positioning, gloves, vibration, retrograde massage, taping).	

Refer to OTT and arrange handover of initial UL maintenance programme.	
Check if spinal stability documented and Consultant has documented safe to mobilise. Refer to Acute mobilisation advice sheet.	
Liaise with ward staff and patient with planned time to mobilise and requirement to be dressed.	
If appropriate seat patient, assess posture, and optimise alignment in a manual wheelchair. Identify assistance required for patient to complete pressure relief.	
Document in Nursing Kardex for continued plan.	
Day Four/Five	
Posture and Mobility	
Nursing staff to lead on graded sitting out times. Seek feedback regarding skin integrity and sitting tolerance.	
Optimise seating and consider mode of mobility (self-propel or powered).	
Week One	
Continue with passive range of movement (PROM) and active range of movement (AROM) UL regime.	
OTT to continue with UL maintenance regime.	
Monitor for malalignment, tone and unopposed activity.	
OT to set up and implement rehabilitation programme in line with patient presentation.	
Posture and Mobility	
Ongoing postural review and maintain vigilance of presentation, monitoring for presentation.	
Assistive technology	
Discuss and refer to ASPIRE for input with consent to enable access to phone / laptop etc.	
Wheelchair Services	
Inform patient of the Wheelchair Service (WCS) role, gain consent for referral and make same.	
Week Two	
Upper Limb	
Continue with PROM and AROM UL regime.	
Continue with oedema management.	
Instigate an active UL rehabilitation programme, consider: • Stabilising de-innervated joints through splinting/orthoses • Use of vibration for sensory stimulation, oedema management and ease of delivering passive range of movement • Use of de – weighting aids for active/facilitated movements for function and active exercise regime. • Use of ES for activation of muscles; **seek medical clearance first.** • Explore potential to carry out functional activities/electronic assistive technologies with/without aids. • Explore use of MULE, Saeboflex, remedial activities for progression of function. • Refer patient to UL Group and OTT as required.	
Posture and Mobility	
Ensure postural alignment is maintained.	

Optimise method of independent mobility and identify from stock. Liaise with Medical Physics Technician (MPT) for assistance with set up.	
Week Three	
Upper Limb	
Explore functional potential within limits of injury and/or opportunities for function (feeding, drinking, writing, grooming, communication aids).	
Consider use of compensatory strategies and/or systems to promote function.	
Posture and Mobility	
Ensure postural alignment is maintained.	
Functional Activities	
Continue to explore functional potential.	
Assistive Technology	
Discuss Environmental Control Units (ECUs).	
Explore access to computer assistive technology and refer to Aspire.	
Community Services	
Liaise with WCS regarding provision for discharge.	
Inform patient of Environmental Control Service and gain consent for referral, carry out same.	
Vocation	
Discuss patient's previous employment/vocation. Complete the Vocational Opportunities Questionnaire and refer to clinic if desired.	
Week Four and Ongoing Rehab	
Upper Limb	
Continue with maintenance regime.	
Posture and Mobility	
Ensure postural alignment is maintained.	
Identify if a driving assessment is required and refer to local driving assessment centre.	
Functional Activities	
Explore grooming activities (teeth, hair, make-up, and shaving). Continue exploring functional potential.	
Community Services	
Organise a shower chair assessment to obtain a quotation and forward to Case Manager (CM) to pass onto COT on receipt.	
Liaise with CM regarding the outcome of the access visit, potential discharge destination and the equipment requirements to facilitate discharge.	
Vocation	
Arrange date to attend vocational opportunities clinic if appropriate.	
Refer to local Disability Employment Advisor (DEA).	
Community Access	
Liaise with CM to arrange day trips with RP's (coffee shop, lunch, shopping, cinema, football match, library etc) including use of public transport as appropriate.	
Consider overnight stay in Independent Living Assessment Unit or patient's home if available.	

Introduce to ASPIRE, Back Up and SIA services as appropriate.	
Transfers	
Liaise with PT colleagues re: unsupported sitting balance and pre-functional transfer prep.	
Dressing	
Using features of 4 point profiling bed explore bed mobility for dressing.	
Equipment	
Consider the following in short and long-term provision: • Hoist (electric mobile or gantry ceiling track) • Slings • Sliding sheets – for seating and bed positioning • Shower-chair (consider tilt in space) • Water Genie if showering facilities not available for discharge • Over bed height and angle adjustable cantilever table • ECU and switches • Computer access equipment • Home modifications • External ramping/step lift (usual maximum weight limit is 25 stones) • Standing equipment (tilt-table or standing bed – require space and head room) • Wheelchair accessible transport vehicle vs standard car if transferring • Trial of power assist wheels • Portable ramps	
Transportation	
Discuss role of Mobility Centres for assessment and trial of driving aids and refer if patient agreeable (assessment cost likely).	
Leisure	
Provide advice/trial the following: • Photography (with use of tripod and pressure pad under chin). • Electronic assistive technology for gaming. • Wheelchair sports • Skiing • Scuba diving • Flying • Holidays	
Discharge	
Devise carer handbook on upper limb regime	
Inform patient's Wheelchair Service/relevant community services of planned discharge date.	
Refer to Intermediate Care Team/Community Rehab Team as required.	
Provide carer training as required, refer to Carer Checklist.	
Refer to Environmental Control Unit Service	
Complete relevant sections of MDT report. Must be completed at least 2 days before patient discharge.	
Carry out formal MMT assessment and document in discharge report appendix	
Complete Tetraplegic Upper Limb Activity Questionnaire, TUAQ and document in discharge report in Upper Limb section	
Complete ICP paperwork.	

Appendix 6 - Timely Intervention Checklist T1-T12 provided by The London Spinal Cord Injury Centre, Stanmore

Royal National Orthopaedic Hospital NHS
NHS Trust

TIMELY INTERVENTION PARAPLEGIC MANAGEMENT T1-T12

The following information is a guide only and is not prescriptive. Therapeutic intervention should be considered on an individual basis. Please seek further advice/clarification from your supervisor or equivalent.

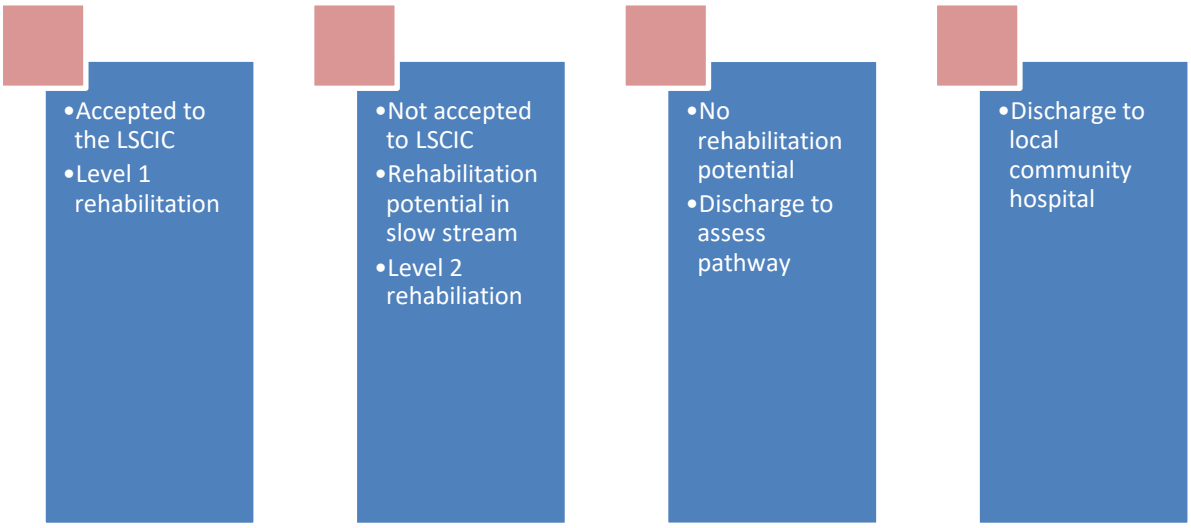
The following information is a guide only and is not prescriptive. Therapeutic intervention should be considered on an individual basis. Please seek further advice/clarification from your supervisor or equivalent.

Day One	
Acute	**Date completed and signature**
Read patient's medical notes for history and identify any precautions.	
Introduce self to patient, explain OT role and gain consent for OT intervention as per consent checklist.	
Complete initial interview for pre-injury data.	
Upper Limb	
Check for any pre-existing upper limb issues and other injuries.	
Posture and Mobility	
Consider seating requirements for patient's dimensions and level of injury; refer to advice sheets on wheelchair, backrest and cushion selection. Refer to Wheelchair Selection advice sheet for level of injury.	
Identify and set up mobility and seating equipment for mobilisation.	
Seek documentation of spinal stability in medical notes with permission to mobilise patient into a wheelchair.	
Day Two	
Posture and Mobility	
When documented in medical notes, orthosis fitted (if appropriate) mobilise patient into wheelchair and orientate to surroundings; refer to Acute Mobilisation advice sheet.	
Advise on features of wheelchair and how to use.	
Assess postural presentation in wheelchair.	
Identify assistance required for patient to complete pressure relief.	
Week One	
Community Services	
Inform patient of the Wheelchair Service (WCS) role, gain consent for referral, carry out same.	
Bed Mobility	
Practice rolling, side lying to sitting on edge of bed, supine to long sitting, positioning lower limbs in bed, lifting legs on/off bed and moving up/down bed.	
Use profiling features of bed and rails as appropriate (aim to downgrade from using bed features as skills improve.	

Posture and Mobility	
Adjust wheelchair as necessary to optimise posture, comfort and function (this will continue throughout rehabilitation).	
Week Two and Three	
Bed Mobility	
Continue to practise bed mobility activities as per Week One.	
Functional Transfers	
Identify equipment and assistance required to commence transfer practice e.g. assistance of 2, board, blocks, slide sheets.	
Practice bed to/from wheelchair transfers to identify optimal transfer method and downgrade equipment and assistance as required.	
Personal Care and Grooming	
Explore dressing on the bed in long sitting using features of profiling bed and rails as appropriate; downgrade equipment used as skills improve.	
Posture and Mobility	
Ensure postural alignment is maintained.	
Optimise method of independent mobility and identify wheelchair and pressure relieving cushion from stock. Liaise with Medical Physics Technician (MPT) for assistance with set up.	
As appropriate consider powered wheelchairs, power assisted wheels and light weight wheelchair.	
Wheelchair Skills	
Commence wheelchair skills and refer to wheelchair skills group (as appropriate).	
Refer to Back Up Wheelchair Skills (as appropriate).	
Community Services	
Liaise with WCS regarding provision for discharge.	
Vocation	
Discuss patient's previous employment/vocation. Complete the Vocational Opportunities Questionnaire and refer to clinic if consent gained.	
Week Four and Ongoing Rehab	
Posture and Mobility	
Ensure postural alignment and skin integrity is maintained, while optimising function.	
Functional Transfers	
Practice split level transfers to include wheelchair to/from shower chair and car (passenger and driver seat).	
Consider other transfers as appropriate e.g. wall mounted shower seat, sofa, toilet, bath, stair lift, independent floor to wheelchair and assisted floor to wheelchair.	
Personal Care and Grooming	
Explore grooming activities (teeth, face washing, hair, make-up, and shaving), encouraging patient to carry out at sink.	
Progress to dressing in wheelchair if appropriate.	
Explore clothes management for women carrying out SIC's	
Domestic Activities	
Practice activities e.g. cooking, washing up, loading/unloading dishwasher/washing machine/tumble dryer, ironing, vacuuming, bed making etc.	

Discuss energy conservation principles/management techniques and safety issues.	
Establish any equipment/aids required.	
Community Services	
Organise a shower chair assessment to obtain a quotation and forward to Case Manager (CM) to pass onto COT on receipt.	
Liaise with CM regarding the outcome of the access visit, potential discharge destination and the equipment requirements to facilitate discharge.	
Vocation	
Arrange to attend the Vocational Support Clinic.	
Refer to local Disability Employment Advisor (DEA).	
See separate advice sheets and carry out visits as indicated.	
Accommodation	
Carry out Home Visit as required.	
Identify equipment needs and make recommendations for adaptations to Case Manager to advise Community OT for provision.	
Driving and Transportation	
Discuss car adaptations versus wheelchair accessible vehicles.	
Arrange driving lessons/demonstration of wheelchair accessible vehicles as required.	
Community Access	
Identify need for use of public transport as appropriate. Liaise with CM's/RP's to carry out same.	
Consider overnight stay at Independent Living Assessment Unit/Home.	
Introduce to ASPIRE, Back Up and SIA services as appropriate.	
Discharge	
Inform patient's Wheelchair Service/relevant community services of planned discharge date.	
Refer to Intermediate Care Team/Community Rehab Team as required.	
Provide carer training as required, refer to Carer Checklist.	
Complete relevant sections of MDT report. Must be completed at least 2 days before patient discharge.	
Complete ICP paperwork.	

Appendix 7 – Discharge Planning



Discharge to LSCIC, Stanmore

1. If the patient is accepted for a bed at Stanmore, the patient will sit on the waiting list and be transferred when a bed becomes available.

2. If the patient is accepted they should be provided with a SCI centre information leaflet

3. Patients who have rehabilitation potential are referred for level 1 rehabilitation, for example to Stanmore and from the rehabilitation hospitals the patient can be referred straight to the CHC team for eligibility assessment - BECHC (NHS FRIMLEY ICB - D4U1Y) frimleyicb.bechc@nhs.net

4. Occupational Therapy Team are usually required to submit a completed home environment risk assessment report and the cognitive assessment -(MOCA) if appropriate to support the Specialist Spinal Centre to support the rehab referral.

5. For a patient being transferred to Stanmore a repatriation contract must be signed which states that after the patients designated length of rehabilitation if they are unable to be discharged home or to an appropriate discharge location from Stanmore they would be repatriated back to the referring hospital.

Referral Criteria for LSCIC, Stanmore

Spinal Cord Injury Centres (SCICs) provide specialised services to patients with non-progressive spinal cord injury or cauda equina injury as a result of a traumatic or non-traumatic cause.

Injuries which result from physical trauma e.g. road traffic accident, fall, penetrating injury are referred to as “traumatic” and injuries which result from disease or infection e.g. epidural abscess/haematoma, spinal cord infarct, monophasic transverse myelitis etc. are referred to as “non-traumatic”.

Conditions that are not routinely accepted for admission to an SCI centre:

Progressive neurological conditions:

Primary neoplastic disease of the spinal cord (excluding treated benign lesions)
Chronic cervical myelopathy progressively deteriorating in the absence of trauma
Demyelinating disease e.g. multiple sclerosis, neuromyelitis optica, acute disseminated encephalomyelitis etc. (except monophasic conditions)
Guillain Barre Syndrome

Non progressive conditions:
Congenital long term spinal disorder e.g. spina bifida
Patients who are unable to participate in a rehabilitation process due to:
Significant cognitive dysfunction and poor executive functioning e.g. Alzheimer's disease, vascular dementia, traumatic brain injury etc
Significant co-morbidities e.g. patients with advanced stages of heart failure, COPD, CKD, metabolic disorder etc.
Patients with functional SCI
Spinal column injury, without spinal cord injury
Active malignancy, including MSCC, with predicted low life expectancy or patients who are undergoing cancer treatment preventing them from active participation in rehabilitation at the time of acquiring a SCI.

Mental health needs

For patients with significant mental health needs, a decision not to admit to SCIC should only occur after review from the MDT including consultation with those who provide the psychological service in the SCIC and when someone's pre-existing psychological needs might compromise their safety or the safety of other patients. People with mental health needs must have equitable access to specialist spinal cord rehabilitation. Active steps should be taken to enable an admission including employment of additional 1:1 nursing observation. An action plan outlining admission needs should be provided, including a plan to meet their psychiatric needs. Where observational or psychiatric support is required beyond that available at the SCIC, this will require discussion with local teams as to how to safely manage the patient

Fit for Transfer Criteria

In preparation for patient to be transferred to LSCIC please refer to Fit for Transfer Criteria:

	FIT FOR TRANSFER CRITERIA		
1	Clinical evidence of infection/sepsis		
	Locally	Healed or healing wounds without evidence of wound infection, discharge, dehiscence	
	Systemically	No evidence of active sepsis such as low blood pressure, temp above 38.5°, low urine output (as per sepsis screening tool)	
		Not in multi-organ failure	
2	**Cardiovascular** Stable cardiovascular function not requiring cardioactive drug infusions. Patients who have pre-existing or new onset cardiovascular dysfunction, severe enough to affect their ability to engage in rehabilitation would be considered not fit for transfer. Please confirm with recent echocardiogram in these patients		
3	**Respiratory Stability** Meets local/critical care network transfer guidelines and depends on facilities within the SCIC: • Newly injured ventilator dependent via ETT/tracheostomy require critical care level 3 transfer. • Newly injured ventilated via tracheostomy who require ≥FiO_2 0.4 and/or PEEP>10 require critical care level 3 transfer. • Newly injured patient ventilator dependent via tracheostomy could be admitted to level 2 HDU/respiratory bed if well established and settled on ventilator parameters and needing less than FiO_2 0.4 to keep target SpO_2/PaO_2. • Self-ventilating patients without the requirement of a ventilator but with a tracheostomy in situ should require less than 4-6L oxygen requirement. To follow local Trust Policy prior to transfer of such patients. • Where patients are being transferred to ward based respiratory beds, the level of respiratory support required should be manageable in a non-high dependency/intensive care setting. This would include not requiring more than 3 instances of respiratory physiotherapeutic interventions a day and not being on parenteral antibiotics for treatment of a respiratory infection		
4	**Renal Stability** stable renal function, or in absence, a clear management plan in place		
5	**Mental Health** Any changes or deterioration to mental health or cognitive functioning post acceptance will require agreed management plan and review		
6	IPC – as per national guidance		
7	**Spinal Column Stability** Should have been restored and if not, clear agreed management plans and precautions relevant to SCI rehabilitation should be established		
8	Completion of SCI Rehabilitation Prescription		
9	PACS transfer complete and discharge summary (including medication chart)		

Not accepted to LSCIC, Stanmore but have rehabilitation potential

1. Patients who require level 2 rehabilitation placements will be referred via the Independent funding request ifrcasemanagement@nhs.net and if eligible will be funded for a 12 week placement.
2. At 8 weeks an assessment is completed to identify whether the patient has further rehabilitation goals or whether they require a CHC assessment. The funding can either be extended or CHC request is made for onward funding for care at home or placement.
3. Locally this may include locations such as; Bagshot Park Neurological Rehabilitation Centre, Holy Cross Hospital or The Jacobs Centre.
4. An example timetable from Bagshot Park Neurological Rehabilitation Centre may include;
   i Standing group,
   ii Upper limb
   iii Long term conditions (mindfulness and reflection)
   iv Breakfast group
   v Boxing group.
   These all run once per week and are jointly run groups between Therapies and the well-being team.

No Rehabilitation Potential

1. Patients in the acute hospital who do not have rehabilitation potential can be discharged through the local social services if remained medically stable.

2. A completed OT discharge Summary be sent to the local social services to facilitate the d/c planning and to determine the appropriate discharge pathway in a timely manner.

3. Occupational Therapist will also complete the manual handling risk assessment, the essential assistive equipment provision and the relevant referral to the community team for further interventions if safe to return home indicated.

4. This pathway will also fund a placement for up to 4 weeks and from this discharge facility the CHC process can be started if not home discharged.

5. . A referral should be sent to BECOMPLEXCARE (NHS FRIMLEY ICB - D4U1Y) frimleyicb.becomplexcare@nhs.net

Discharge to local community hospital in interim

1. Whilst waiting for a bed at another rehabilitation centre or for a care package to be put in place at home patients may be discharged to local community hospitals e.g. Farnham.
2. A weekly MDT should be set up to discuss patients progress with Lead Clinicians from acute trust/referring hospital. If appropriate Stanmore Outreach Team can be invited to attend this MDT.
3. Prior to transfer, the below should be considered to ensure the patient is fit for transfer from an acute hospital:
   Medically stable
   VTE prophylaxis management regime established
   Medication administration method established
   Autonomic dysreflexia awareness and management regime
   Assisted cough method identified and respiratory management regime in place

Swallow and speech management plan established
Bladder continence management regime established
Bowel continence management regime established
Pain pharmacological/therapuetic management regime established
Validated pressure score on discharge
Skin management regime for bed/wheelchair established
Nutritional plan established
Spasticity medical and therapeutic management regime established
Oedema management regime established

Full version control record

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This guideline has been registered with the Trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt, contact a senior colleague or expert. Caution is advised when using guidelines after the review date.
This guideline is for use in Frimley Health NHS Foundation Trust hospitals only. Any use outside this location will not be supported by the Trust and will be at the risk of the individual using it.

Version History

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Related Documents

Document Type	Document Name