Weaning guidelines for Spinal Cord Injured patients in Critical Care Units

Introduction

- It is an unfortunate fact that Spinal Cord Injury Centres have limited resources to accept ventilated patients. These guidelines are intended to aid the ventilator weaning process to enable faster transfer out of critical care areas.
- Spinal cord injured patients undergo physiological changes with time which tend to enable weaning in the majority.
- The weaning technique advocated by Spinal Cord Injury Centres is simple but needs to be followed rigorously to achieve ventilator independence efficiently. Weaning to complete ventilator independence can take up to several months.
- A few patients will remain ventilator dependant and there are processes by which verbal independence and in some, safe swallowing should be achieved.
- These guidelines are aimed primarily at adults.

Background pathophysiology

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

Lumbar cord injuries will lose some expiratory abdominal activity.

Thoracic cord injuries will additionally lose intercostal activity and will frequently be complicated by rib fractures and pulmonary contusions. Haemothoraces may be present secondary to the thoracic spine fractures.

Low cervical cord injuries will have lost all intercostal activity.

High cervical injuries may also lose diaphragmatic and scalene activity. Ventilatory failure is rapid in these circumstances.
Autonomic disruption following on from cord injuries causes excessive bronchial secretions and a tendency to bronchoconstriction.

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

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.

It is occasionally possible using aggressive physiotherapy techniques and non invasive ventilation to support patients until pulmonary compliance improves to the point that unsupported ventilation is possible, but more commonly ventilatory failure occurs from minutes to days post injury requiring intubation and ventilation.

The physiological processes by which weaning becomes feasible include:

- **Resolution of cord oedema.** It is common for the neurological level to improve slightly with time which may allow use of previously paralysed respiratory muscles.

- **Resolution of pulmonary pathology.** Pulmonary compliance needs to be as normal as possible for successful weaning.

- **Development of spasticity.** Return of intercostal tone reduces chest wall compliance and improves ventilatory mechanics.

- **Retraining of remaining functioning respiratory muscles.**
Tracheostomy

Once intubated we recommend early tracheostomy as successful early extubation is rare.

Tracheostomy simplifies weaning, abolishes the need for sedation, improves communication and enables efficient secretion clearance.

There is no preference for percutaneous over surgical tracheostomy except with unstable cervical fractures where a surgical technique may cause less vertebral movement.

Tube changes for those patients requiring long term tracheostomies may be easier following surgical tracheostomy.

- 8 mm internal diameter tubes are optimal in adults.
- Removable inner cannulae are recommended in the early stages.
- Subglottic suction tubes may be of considerable benefit.
- There is no evidence of benefit for fenestrated tubes but there is evidence that they are associated with overgranulation.
Pre requisites for weaning:

- Good pulmonary compliance : 50 ml/cm H2O or greater
- FiO2 < 0.4
- PEEP preferably around 5 cm H2O
- Awake and cooperative. Minimal opiates. Preferably no delirium
- No active sepsis
- Some evidence of spontaneous respiratory activity.
  - **Ventilator triggering does not necessarily imply useful activity.**
    - Many patients will appear to pass spontaneous breathing trials early following injury, but rapidly develop respiratory fatigue requiring re-ventilation.

- Involved staff. Weaning proceeds more efficiently if a team of interested staff take control of the process.

Initial testing.

The premise for weaning is that some respiratory activity is present but weak, and a degree of respiratory muscle retraining is required.

The easiest and most reproducible measure of lung function for this is the vital capacity (VC). In the presence of low flows and low volumes a mechanical Wrights spirometer tends to perform better than electronic spirometers.

The vital capacity manoeuvre needs to be made by a cooperative patient completely free from ventilatory support. If still on relatively high PEEP a few breaths before the measurement is performed is advised.

A vital capacity as low as 150 mls is considered adequate to start weaning. A vital capacity approaching 1000ml predicts straightforward weaning.

With cord injuries at C4 and above, if there is doubt as to whether diaphragm activity is present, apnoea testing under sedation may be performed. This may show accessory muscle activity (Nasalis, sternomastoid) when the PaCO2 rises above 6 Kpa without diaphragmatic activity if the cord injury involves the phrenic nerves. This does not necessarily imply permanent ventilator dependence but requires retesting at a later date.
Weaning principle

Based on the initial vital capacity measurement all ventilatory support is removed for a specified time and then re-instituted for a rest period. The common term for this is ventilator free breathing (VFB).

Suggested VFB times based on VC are:

1. If VC is less than 250 mls, start with 5 minutes VFB.
2. If VC is less than 500 mls, start with 15 minutes VFB.
3. If VC is greater than 750 mls, start with 30 minutes VFB

(Southport SCI unit)

- The on-ventilator rest period should be at least 1-2 hours. Trials of VFB can be repeated during day time hours, as appropriate to patient status.
- Weaning progression is achieved by increasing VFB time by specified amounts dependant on the previous day’s results.
- It is important that the patient is not fatigued which can be estimated by re-measuring the VC at the end of the VFB period. If it is less that 70% of the pre weaning VC then either the rest period should be extended or the VFB time reduced.

For Example:

If a patient with a VC of 200 mls successfully achieves 3 episodes of 5 minutes VFB with 2 hour rest periods on day 1, with an end VFB VC of 180 mls, then increase the VFB time by 20% (to 6 mins) for day 2. If day 2 is satisfactory increase by 20% (8 mins) for day 3.

The initial aim is for VFB up to 18 hours during daytime, but for ventilation at night, as spinal cord injured patients can have significant REM sleep hypoventilation. To assess safe VFB overnight requires either PaCO2 or TcCO2 monitoring.

Adjuncts to weaning.

- Biochemistry and nutrition should be addressed. It is recommended that cervical cord injured patients and potential slow weaners have gastrostomies inserted.
- Regular salbutamol nebulisation may improve respiratory muscle function.
• VFB periods should be performed supine, not sitting. There is a drop of up to 20% in VC from supine to sitting, so VFB periods will be better tolerated supine. Secretion clearance should be performed prior to VFB periods. Tenacious sputum may be treated with oral/PEG carbocysteine or nebulised acetylcysteine.

• There is some evidence that during rest ventilation periods, high tidal volume ventilation whilst maintaining normocarbia accelerates weaning as it may reduce atelectasis.
Tracheostomy cuff deflation.

For all spinal cord injured 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.

Cuff deflation can be achieved either on or off ventilation. Not only does this enable speech but also reduces microaspiration, restores laryngeal and pharyngeal reflexes leading to resumption of safe swallowing.

Off ventilator cuff deflation during VFB for fast weaners should be considered. If a subglottic suction tracheostomy is in place then this should be aspirated, otherwise a tracheal suction catheter placed to catch pooled saliva as it passes the deflating cuff. When deflated a speaking valve should be used, (if there is sufficient insufflation leak – if not consider downsizing) preferably a Passy Muir as they have favourable mechanics for spontaneously breathing low volume patients.

The use of a speaking valve introduces an element of PEEP which may improve respiratory mechanics and reduce the development of atelectasis.

On ventilator cuff deflation should be considered for slow weaners. Ventilator settings should be adjusted to allow for the resultant leak, either increases in IPAP or inspiratory time. Many ventilators will alarm continuously with this degree of leak so a change to simpler, domicillary type device can be considered – contact your Spinal Cord Injury Centre to ask what machine they use.

Many patients develop increased leaks when asleep, requiring partial or full cuff inflation in order to achieve adequate ventilation.

Optimal practice is to change cuffed for uncuffed tubes wherever possible when cuffs can be deflated for 24 hours.

Swallowing.

Attempts at swallowing with an inflated tracheostomy cuff are never safe. It is advisable to wait until cuff deflation is achieved and enlist the advice of a speech and language therapist.

Post weaning maintenance

Patients who have successfully weaned or who are ventilator free during the day are still at risk of respiratory decompensation.
Functional residual capacity and inspiratory muscle strength continue at a reduced level.

Intermittent IPPB or manual hyperinflation are of benefit in reducing atelectasis.

**Further information**

All UK Spinal Cord Injury Centres have someone with an interest in respiratory management. Contacts can be found at [www.risci.org.uk](http://www.risci.org.uk)

*RISCI is a multi-disciplinary group concerned with standards of care provided for spinal cord injured patients requiring respiratory support before and during admission to a Spinal Cord Injury Centre, and after discharge.*

Version control

<table>
<thead>
<tr>
<th>Rf/KH JR TT amended</th>
<th>9th May 2012</th>
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</thead>
<tbody>
<tr>
<td>Formatted for NSCISB</td>
<td>10th May 2012</td>
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</table>
Circulation
Neurogenic (spinal) shock is the body's response to the sudden loss of sympathetic control.
It occurs in cervical and high thoracic lesions (above T6). Incomplete injuries may not display these signs. Due to lack of vasomotor control significant hypotension results.
Bradycardia occurs as a result of unopposed effects of the vagus nerve. A systolic blood pressure of 90 may be normal in these patients. Monitoring of fluid balance in patients with spinal cord injury is essential. Remember, however, that hypovolaemic shock may be present and other injuries may escape detection in the cord injured patient with sensory deprivation. In the acute phase, if other significant injuries are present, a CVP line may be of assistance.

Observation

HYPOTENSION

Action
☐ Nurse patient supine
☐ Monitor BP
☐ Maintain a systolic BP of 90-100mmHg and a urinary output of 30mls or above per hour
☐ Administer IV fluids
☐ NB Do not over-infuse. This may precipitate cardiac failure and pulmonary oedema.
☐ In rare instances Inotropes may be necessary to maintain a stable BP.
☐ A CVP line may be indicated

BRADYCARDIA

Action
☐ ECG monitoring
☐ Extreme bradycardia can result in cardiac syncope. If heart rate drops below, and remains below, 40 beats per minute Atropine 0.3-0.6mg may be given as IV bolus if the patient is cardio-vascularly unwell or unstable.
☐ NB An abnormal vaso-vagal response can occur through stimulation such as rapid changes in body positioning, i.e. log rolling too quickly, tracheal suctioning, passing an N.G. tube etc.
☐ In patients with tracheostomy, during suctioning, stimulation of vagal afferents can result in a marked vagal response, bradycardia and consequent hypoxia. Bagging with 100% O2 pre and post tracheal suction is a useful manoeuvre to minimise these effects.
☐ Problematic bradycardia usually resolves over a few days. Pacemakers can cause management complications in the long term (e.g. MRI scanning, electrical stimulation treatments) and should be avoided where possible.
☐ There is a high incidence of cardiac contusion in patients with thoracic injuries with a potential for arrhythmias.
**Autonomic Dysreflexia**

Patients with a lesion at or above T6 are prone to autonomic hyper-reflexia (dysreflexia).

Common precipitants include blocked catheters or rectal examination, instrumentation and operation – thus a general anaesthetic is still necessary for spinal patients even if they have no apparent sensation.

A stimulus causes reflex sympathetic over-activity below level of cord lesion, leading to vasoconstriction and systemic hypertension. The hypertension stimulates the carotid and aortic baroreceptors leading to increased vagal tone and bradycardia. Peripheral vasodilatation, which would normally relieve the hypertension, cannot occur because of the injured cord. **Blood Pressure continues to rise until cause removed. Danger – can result in intracranial haemorrhage**
Fig 1. Management of patients with autonomic dysreflexia (AD).

Symptoms or signs of AD
(eg pounding headache, flushing, sweating or blotching skin above injury level; pale, cold, goosebumps below)

Check blood pressure
- Confirm diagnosis (blood pressure greater than 200/100 or 20–40 mmHg higher than normal)

Sit the patient up – avoid lying down

For patients with catheter:
- empty leg bag and note volume
- check tubing not blocked/kinked
- if catheter blocked remove and re-catheterise using lubricant containing lidocaine

For patients without catheter:
- if bladder distended and patient unable to pass urine insert catheter using lubricant containing lidocaine

If bladder distension excluded – gently examine per rectum
For faecal mass in rectum:
- gently insert gloved finger covered in lidocaine jelly into rectum and remove faecal mass

If symptoms persist or cause is unknown
Give nifedipine or glyceryl trinitrate (GTN). In adults, place sublingually:
- the contents of a 10 mg sublingual nifedipine capsule or
- 1–2 GTN tablets. Repeat dose can be given after 20 minutes, if symptoms persist.

If blood pressure remains high, then an IV hypotensive may be required:
- hydralazine 20 mg iv slowly or
- diazoxide 20 mg bolus.
Continue to search for cause and monitor blood pressure.

May require management on high dependency unit if problem persists.
Contact a spinal cord injury centre for further advice (see Appendix 4).

From Chronic spinal cord injury: management of patients in acute hospital settings.
NATIONALGUIDELINES (RCP, BSRM, MASCIP, BASCIS) February 2008.
Muscle Function Grading

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>total paralysis</td>
</tr>
<tr>
<td>1</td>
<td>palpable or visible contraction</td>
</tr>
<tr>
<td>2</td>
<td>active movement, full range of motion (ROM) with gravity eliminated</td>
</tr>
<tr>
<td>3</td>
<td>active movement, full ROM against gravity</td>
</tr>
<tr>
<td>4</td>
<td>active movement, full ROM against gravity and moderate resistance in a muscle specific position</td>
</tr>
<tr>
<td>5</td>
<td>(normal) active movement, full ROM against gravity and full resistance in a functional muscle position expected from an otherwise unimpaired person</td>
</tr>
<tr>
<td>5*</td>
<td>(normal) active movement, full ROM against gravity and sufficient resistance to be considered normal if identified inhibiting factors (i.e. pain, disuse) were not present</td>
</tr>
<tr>
<td>NT</td>
<td>not testable (i.e. due to immobilization, severe pain such that the patient cannot be graded, amputation of limb, or contracture of &gt; 50% of the normal ROM)</td>
</tr>
</tbody>
</table>

When to Test Non-Key Muscles:

In a patient with an apparent AIS B classification, non-key muscle functions more than 3 levels below the motor level on each side should be tested to most accurately classify the injury (differentiate between AIS B and C).

<table>
<thead>
<tr>
<th>Movement</th>
<th>Root level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulder: Flexion, extension, abduction, adduction, internal and external rotation</td>
<td>C5</td>
</tr>
<tr>
<td>Elbow: Pronation</td>
<td>C6</td>
</tr>
<tr>
<td>Wrist: Flexion</td>
<td>C7</td>
</tr>
<tr>
<td>Finger: Flexion at proximal joint, extension.</td>
<td>C7</td>
</tr>
<tr>
<td>Thumb: Opposition, adduction and abduction perpendicular to palm</td>
<td>C8</td>
</tr>
<tr>
<td>Finger: Abduction of the index finger</td>
<td>T1</td>
</tr>
<tr>
<td>Hip: Adduction</td>
<td>L2</td>
</tr>
<tr>
<td>Hip: External rotation</td>
<td>L3</td>
</tr>
<tr>
<td>Hip: Extension, abduction, internal rotation</td>
<td>L4</td>
</tr>
<tr>
<td>Knee: Flexion</td>
<td>L4</td>
</tr>
<tr>
<td>Ankle: Inversion and eversion</td>
<td></td>
</tr>
<tr>
<td>Toe: MP and IP extension</td>
<td></td>
</tr>
<tr>
<td>Hallux and Toe: DIP and PIP flexion and abduction</td>
<td>L5</td>
</tr>
<tr>
<td>Hallux: Adduction</td>
<td>S1</td>
</tr>
</tbody>
</table>

ASIA Impairment Scale (AIS)

A = Complete. No sensory or motor function is preserved in the sacral segments S4-5.

B = Sensory Incomplete. Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-5 (light touch or pin prick at S4-5 or deep anal pressure) AND no motor function is preserved more than three levels below the motor level on either side of the body.

C = Motor Incomplete. Motor function is preserved at the most caudal sacral segments for voluntary anal contraction (VAC) OR the patient meets the criteria for sensory incomplete status (sensory function preserved at the most caudal sacral segments (S4-S5) by LT, PP or DAP), and has some sparing of motor function more than three levels below the ipsilateral motor level on either side of the body. (This includes key or non-key muscle functions to determine motor incomplete status.) For AIS C – less than half of key muscle functions below the single NLI have a muscle grade ≥ 3.

D = Motor Incomplete. Motor incomplete status as defined above, with at least half (half or more) of key muscle functions below the single NLI having a muscle grade ≥ 3.

E = Normal. If sensation and motor function as tested with the ISNCSCI are graded as normal in all segments, and the patient had prior deficits, then the AIS grade is E. Someone without an initial SCI does not receive an AIS grade.

Using ND: To document the sensory, motor and NLI levels, the ASIA Impairment Scale grade, and/or the zone of partial preservation (ZPP) when they are unable to be determined based on the examination results.

International Standards for Neurological Classification of Spinal Cord Injury

Steps in Classification

1. Determine sensory levels for right and left sides. The sensory level is the most caudal, intact dermatome for both pin-prick and light touch sensation.

2. Determine motor levels for right and left sides. Defined by the lowest key muscle function that has a grade of at least 3 (on supine testing), providing the key muscle functions represented by segments above that level are judged to be intact (graded as a 5). Note: in regions where there is no myotome to test, the motor level is presumed to be the same as the sensory level, if testable motor function above that level is also normal.

3. Determine the neurological level of injury (NLI) This refers to the most caudal segment of the cord with intact sensation and antigravity (3 or more) muscle function strength, provided that there is normal (intact) sensory and motor function rostrally respectively. The NLI is the most cephalad of the sensory and motor levels determined in steps 1 and 2.

4. Determine whether the injury is Complete or Incomplete. (i.e. absence or presence of sacral sparing) If voluntary anal contraction = No AND all S4-5 sensory scores = 0 AND deep anal pressure = No, then injury is Complete. Otherwise, injury is Incomplete.

5. Determine ASIA Impairment Scale (AIS) Grade:

   Is injury Complete? If YES, AIS=A and can record ZPP (lowest dermatome or myotome on each side with some preservation)
   
   Is injury Motor Complete? If YES, AIS=B
   
   Are at least half (half or more) of the key muscles below the neurological level of injury graded 3 or better?
   
   AIS=C
   
   AIS=D

If sensation and motor function is normal in all segments, AIS=E. Note: AIS E is used in follow-up testing when an individual with a documented SCI has recovered normal function. If at initial testing no deficits are found, the individual is neurologically intact; the ASIA Impairment Scale does not apply.
Salisbury NHS
NHS Foundation Trust

Using a Catheter Valve (1 of 2)

What is a Catheter Valve?

A catheter valve is a tap-like device, which fits into the end of your catheter (urethral or suprapubic). This can then be attached to a urinary drainage bag so that the valve lies between the end of the catheter and the drainage bag. The tap may be switched on or off to drain urine from the bladder or to stop drainage.

The majority of patients who have a long-term catheter now use catheter valves. It is generally felt that the bladder should not be kept empty at all times, as it has been shown that this reduces bladder capacity and tone.

The aims of using a catheter valve are:-
- To get your bladder used to holding a volume of urine again.
- To improve the capacity of your bladder.
- To get your bladder to hold between 300-500mls of urine.
- To have faster flow of urine to aid drainage of bladder debris.
- To have the catheter valve closed off all day, and for you to drain your bladder 4-5 times per day by opening the valve for a couple of minutes (or until drainage stops).

Due to the risk of urine leakage, and the risk of autonomic dysreflexia, it is suggested that you follow the regime below. You may need to discuss with your Consultant whether you need to take medication (such as Detrusitol, Solifenacin or Oxybutynin) to reduce the chance of urinary leakage.

<table>
<thead>
<tr>
<th>Days</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days 1 &amp; 2</td>
<td>Close the valve off for 30 minutes three times a day i.e. to stop the catheter from draining. After 30 minutes open the valve and leave the catheter to drain freely.</td>
</tr>
<tr>
<td>Days 3 &amp; 4</td>
<td>Close the valve off for 1 hour 3 times a day.</td>
</tr>
<tr>
<td>Days 5 &amp; 6</td>
<td>Close the valve off for 1 hour 30 minutes 3 times a day.</td>
</tr>
<tr>
<td>Days 7 &amp; 8</td>
<td>Close the valve off for 2 hours 3 times a day.</td>
</tr>
<tr>
<td>Days 9 &amp; 10</td>
<td>Close the valve off for 2 hours 30 minutes 3 times a day.</td>
</tr>
<tr>
<td>Days 11 &amp; 12</td>
<td>Close the valve off for 3 hours 3 times a day.</td>
</tr>
<tr>
<td>Days 13 &amp; 14</td>
<td>Close the valve off for 3 hours 30 minutes 3 times a day.</td>
</tr>
<tr>
<td>Days 15 &amp; 16</td>
<td>Close the valve off for 4 hours 3 times a day.</td>
</tr>
<tr>
<td>Days 17 &amp; 18</td>
<td>Close the valve off for 4 hours 30 minutes twice a day.</td>
</tr>
<tr>
<td>Days 19 &amp; 20</td>
<td>Close the valve off for 5 hours twice a day.</td>
</tr>
</tbody>
</table>

Contact: The Spinal Centre
Tel: 01722 429291
Using a Catheter Valve (2 of 2)

Overnight you can leave the catheter on free drainage. If you get leakage of urine at any stage, drop back down a stage, and build the time back up again.

NB: Open the catheter valve before bowel care, as this will minimise leakage around your catheter (bypassing).

Remember that the aim is to get your bladder to hold between 300-500mls of urine. If you are drinking at least 3 litres per day, you should not need to increase the time the valve is turned off. If, however, you are not drinking enough, it may be necessary to continue to increase the time the valve is closed off.

NB: You should not consider using a catheter valve if you tend to become easily or severely dysreflexic and you live alone.

Changing the Catheter Valve

You should change the catheter valve every 5 - 7 days, preferably at the same time that you replace your leg bag. Wash your hands first and then empty your bladder by opening the tap. When urinary drainage has finished you may remove the valve and replace it with a new one.

Living with a Catheter Valve

- You may bathe or shower as usual
- You should drink at least 3 litres per day if you have an indwelling catheter (urethral or suprapubic).
- You may choose to use a catheter valve without a urinary drainage bag, by regularly opening the valve over a toilet/jug or similar receptacle to drain the bladder. A leg strap can be used to support the catheter tubing and catheter valve
- Catheter valves, leg straps and urinary drainage bags are available on prescription.
- Dispose of catheter valves in your rubbish. Do not burn the valves.

For more information or help

Please contact any of the following if you have any questions or if you encounter problems.

Avon Ward - 01722 336262  ext. 2447
Tamar Ward - 01722 336262  ext. 2445
Pressure Clinic - 01722 429291
Community Liaison - 01722 429130

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Salisbury District Hospital, Salisbury, Wiltshire SP2 8UU
www.salisbury.nhs.uk

Contact: The Spinal Centre
Tel: 01722 429291
**SOUTHWEST NEUROSURGERY CENTRE**  
**ACUTE SPINAL INJURY BOWEL CARE GUIDANCE**

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**Determine level of Acute spinal cord injury**

- **C1 – T12 Reflex Bowel**
- **T12 and below Flaccid bowel**

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<table>
<thead>
<tr>
<th>Reflex Bowel Function</th>
<th>Areflexic (flaccid) Bowel Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily or alternative days</td>
<td>Once or more daily</td>
</tr>
<tr>
<td><em>(Aim for Bristol Scale 4 stool)</em> Stimulant laxative 8-12 hours before planned care if necessary</td>
<td><em>(Aim for Bristol Scale 3 stool)</em> Stimulant laxative 8-12 hours before planned care if necessary</td>
</tr>
<tr>
<td>Gastrocolic reflex</td>
<td>Gastrocolic reflex</td>
</tr>
<tr>
<td>Rectal stimulant suppository/microenema</td>
<td>Abdominal massage</td>
</tr>
<tr>
<td>Abdominal massage</td>
<td>Digital removal of faeces</td>
</tr>
<tr>
<td>Digital rectal stimulation</td>
<td>Single digital check to ensure rectum is empty 5-10 minutes after last stool passed</td>
</tr>
<tr>
<td>Digital removal of faeces if reflex evacuation incomplete</td>
<td></td>
</tr>
<tr>
<td>Single digital check to ensure rectum is empty 5-10 minutes after last stool passed</td>
<td></td>
</tr>
<tr>
<td>Medications to adjust stool consistency (e.g. Movicol or Laxido, Lactulose or Senna) should be taken regularly if needed</td>
<td></td>
</tr>
</tbody>
</table>

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- Laxatives should only be considered as a short term measure
- Patient should be adequately hydrated with a balanced diet
- Explain to patient and gain verbal consent. Ensure privacy and dignity is maintained at all times
- Bowel care should be conducted even if the rectum is empty on initial checking
- Allow at least 20 minutes for the prescribed mild rectal stimulant to work
- Conduct at a time that aids gastrocolic reflux and does not impact rehabilitation
- Observe for signs of Autonomic dysreflexia (spinal shock) e.g. raised BP/HR, excessive sweating - report immediately to team

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**PLEASE NOTE PATIENTS WITH NO NEUROLOGICAL DEFICITS DO NOT REQUIRE STIMULATION OR SUPPOSITORIES**

For further advice please refer to guidelines for Neurogenic bowel dysfunction / spinal link nurse / Physio Acute Neuro Rehab Team (bleep 0884 or 0579) / Moorgate Ward 52944 / Acute Neuro Rehab Consultant 89152

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*Poster produced: by The Medical Photography Department, Plymouth Hospitals NHS Trust. May 2013*
Appendix 7

30 degree tilt or Log-roll positioning of pillows for pressure relief

A minimum of 3 pillows required

Place the opening of the log-roll pillow towards the head of the bed
To minimise the material near the sacral area.
Appendix 7

Fold the pillow length ways

Smooth out the wrinkles in the pillow case
Roll the patient towards you and then a second person can place the pillows as shown and then roll the patient back onto the pillows.

Ensure the heels are free from the pillows and the mattress. Ensure the log-roll pillow is above the natal cleft and supporting the back and shoulders.
## APPLICATION OF A ONE-PIECE COLLAR

The need to apply a properly sized and fitted hard cervical collar as an aid to spinal protection should always be considered whenever there is evidence or suspicion of actual or potential cervical spinal trauma or spinal cord injury. Cervical collars should only be fitted by suitably qualified and authorised healthcare professional or rescue first aider in accordance with manufacturer’s guidelines and locally established practice guidelines. Due to the potential for hidden spinal metabolic disease or deformity the fitting of a hard cervical collar in a patient aged more than 55 years should be approached with some caution lest it cause or compound a cervical injury.

### Instructions

1. In order to maintain a secure position after fitting, collars must be fitted against bare skin. Clothing may need to be moved aside or cut away in order to facilitate this. Jewellery and earrings must be removed before fitting of collar. Check sensory and motor function and positional awareness in all four limbs before application.

2. Explain to the patient what is happening and why. A suitably qualified and experienced health care worker first measures the patient’s neck against anatomical landmarks (picture 1) and then adjusts the collar to the appropriate size against a visual scale in accordance with the manufacturer’s instructions and the collar design.

3. Prior to the fitting of any collar manual head holding must be in place. Fingers must be positioned to encompass as much of the patient’s head as possible but without obscuring the ears so that patient can hear explanations and instructions throughout the procedure.

4. With the patient’s head secured, the 1st assistant – team leader gently feeds the back piece of the collar into position, pressing the collar into the mattress surface to prevent friction with the patient’s skin.

5. The 2nd assistant assists as necessary to manoeuvre the collar back into its correct position.

6. The front of the collar is now brought round into position and the velcro strap fastening is secured. Most collars incorporate cutaway panels to ensure visualisation of underlying skin, anatomical structures, dressings etc.

7. Check sensory and motor function and positional awareness in all four limbs again after application in comparison with pre-application assessment.

8. Check sizing and fitting of collar for security and patient comfort and make any adjustments prior to any further patient movement.

9. Carer holding head now moves hands down to patient’s shoulders maintaining tactile contact with collar surface throughout.

10. Fingers move inwards behind back of collar to encompass collar back and forearms move inwards to secure patient’s head against lateral movements. Manual head hold can now be released unless further movement of patient is required.

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APPLICATION OF A TWO-PIECE COLLAR

The application of a properly sized and fitted two-piece cervical collar is usually undertaken within hospital environments as an aid to continued spinal protection in patients with actual or suspected cervical spinal or spinal cord injury. Two-piece collars usually replace extrication collars within the first 48 hours of admission. All models of two-piece cervical collars should only be fitted by suitably qualified and authorised healthcare professional in accordance with manufacturer’s guidelines and locally established practice guidelines. Due to the potential for hidden spinal metabolic disease or deformity the fitting of a two-piece cervical collar in a patient aged more than 55 years should be approached with some caution lest it cause or compound a cervical injury.

1. Cervical Collar Sizing Guide
   Reproduced with kind permission of Aspen Medical Products.

2. Explain to the patient what is happening and why. A suitably qualified and authorised healthcare professional first measures the patient’s neck against anatomical landmarks using a sizing guide provided by the collar manufacturer (see picture 1) and then selects the most appropriate collar in accordance with the manufacturers instructions and the collar design. This collar is also available with a size adjustable front piece.

3. Prior to the fitting of any collar manual head holding must be in place. Fingers must be positioned to encompass as much of the patient’s head as possible but without obscuring the ears so that patient can hear explanations and instructions throughout the procedure.

4. With the patient’s head secured, the 1st assistant – team leader gently feeds the back piece of the collar into position, pressing it into the mattress to prevent friction with the patient’s skin. The 2nd assistant assists as necessary to manoeuvre the collar back into its correct position.

5. The front-piece of the collar is then brought into position by an assistant who brings the collar piece up and under the chin in a straight line. Curling and flexing of the collar piece before fitting ensures a more comfortable fit.

6. The velcro fastenings are then secured. Check sensory and motor function and positional awareness in all four limbs again after application in comparison with pre-application assessment.

7. Picture depicts position of hands during a logroll to facilitate removal of collar back for visualisation or examination of underlying skin or posterior cervical spine. This model of collar has a small window to allow for ventilation but also useful for examining status of any underlying surgical wound or dressing.

8. Head holding as at end position of adapted ATLS logrolling (see ATLS and Tetra logroll). Hand positioning is same whether patient presents with or without collar in situ. This picture also shows an alternative and smaller size of back piece provided for this model of collar and designed to reduce incidence of collar-derived occipital pressure ulcers, particularly within critical care environments.
ADAPTED ATLS HEAD HOLD FOR ACTUAL OR POTENTIAL CERVICAL SPINAL INJURY

Advanced trauma life support manual and training stipulate a standardized approach to head holding in the event of actual or suspected spinal injury. The healthcare worker responsible for head holding is designated as the Team Leader and directs all patient movement. However, the degree of lateral flexion experienced by the Team Leader during logrolling is excessive and this represents an adaptation of the current technique as recommended by American College of Surgeons’ Committee on Trauma (ACS). (2008) Advanced Trauma Life Support Manual for Physicians (8th edition). American College of Surgeons Press, Chicago.

1. Explain to the patient what is happening and why. A suitably qualified and experienced health care worker will be designated as Team Leader. The Team Leader positions self at top of trolley / bed, placing hands either side of patient’s head. With fingers spread wide, slides both hands downwards so the thumb rests either below the jaw or above the clavicle and the fingers are spread behind the neck encompassing C7. If sandbags / headblocks are present an assistant removes them, one at a time and the Team Leader brings each hand into position individually. Forearms are then brought together either side at the back of the head.

2. Prior to rolling the patient, care must be taken to position the bed height at optimum level to reduce excessive forward trunk flexion of the Team Leader. Patient is then rolled on the command of the Team Leader. To accommodate this roll, Team Leader is forced to lean laterally. Note fingers crossed behind cervical spine as described above.

3. In order to maintain a comfortable head hold during the logroll, the Team Leader releases top hand and maintaining contact with the skin throughout, moves hands slowly to the top of the patient’s head with fingers spread wide. They should then adjust base of body and legs to a more comfortable and sustainable position.

4. Shows adapted ATLS head hold from the opposite side showing alignment nose – chin – sternum. A chair can be made available for the Team Leader to sit down during prolonged holding to enable the elbows to be rested on a pillow. The Team Leader must be aware that they are allowed to return the patient to the supine position if they feel the strain of maintaining the turn becomes excessive and beyond their limitations. In patients with broad shoulders, a pillow or pad can be used to support the Team Leader’s underlying arm but it must be of the correct depth to maintain spinal alignment.
ACUTE TETRAPLEGIC SPINAL LOGROLL – Method 1

During an acute tetraplegic logroll the patient’s head and vertebral column must be kept in alignment when rolling from supine to side lying and vice versa. During this manoeuvre the alignment of the vertebral column and the body as a whole is maintained through the manual support provided by the turning team.

(1st assistant – Team leader & acute head hold in accordance with adapted ATLS procedure; 2nd assistant – shoulder level; 3rd assistant – hip level; 4th assistant – lower leg level; 5th assistant – operating the bed controls, supporting arms, checking patient’s skin, placing pillows in situ etc)

Logrolling on a trolley in the Emergency Department or within a ward setting on a normal hospital bed or tilt and turn bed is essential to enable examination of the back and necessary for relieving pressure on the skin, hygiene, bowel care and postural chest drainage. The following technique is applicable in all clinical settings.

1. 1st assistant positions hands. First hand at hip level alongside the 2nd assistant, and second hand underneath furthest thigh.
2. Team leader undertakes acute initial head hold in accordance with adapted ATLS procedure. 5th assistant passively positions patient’s arms across chest but above diaphragm. This is important as the arms are paralysed and may fall down causing injury to the shoulder joint.
3. 2nd assistant reaches over patient. First hand on shoulder and second hand on top of hip. 5th assistant supports patient’s arm during this action.
4. 3rd assistant positions hands. First hand at hip level alongside the 2nd assistant, and second hand underneath furthest thigh.
5. 4th assistant positions hands. First hand under the knee of the furthest leg, and second hand below the ankle of the same leg.
6. Close up of hand positions – ensure all parties are in contact with the patient’s natural skeletal landmarks and not just adipose tissue.

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Team insert pillows under both arms and legs for patient comfort and alignment. Legs are positioned to prevent hyperextension of the knees, a bed end is placed in situ and additional pillows placed at the end of the bed to support the patient’s feet in neutral to prevent foot drop. The heels are left ‘floating’ free from pressure to prevent skin breakdown (not illustrated).

Team leader undertakes acute initial head hold in accordance with adapted ATLS procedure. 2nd assistant provides contact guard against inappropriate patient movement, 3rd assistant positions pillow between to maintain hip abduction.

2nd and 3rd assistant provide contact guard against inappropriate movement of the patient during mechanical turning of the bed. Team leader gives the command when all the team are in position to commence the turning of the bed.

4th assistant checks inclinometer fitted to the bed and stops the bed at the required degree of tilt.

Team insert pillows under both arms and legs for patient comfort and alignment.

Legs are positioned to prevent hyperextension of the knees, a bed end is placed in situ and additional pillows placed at the end of the bed to support the patient’s feet in neutral to prevent foot drop. The heels are left ‘floating’ free from pressure to prevent skin breakdown (not illustrated).

MECHANISED TURN FOR POSTURAL CHANGE

The availability of a mechanical turning bed can enhance the experience of turning in alignment for patients with actual or suspected spinal injury. This is particularly beneficial for tetraplegic patients, patients with multiple trauma and acute chest complications, as well as for patients whose size causes a significant risk for staff during routine manual turning.

1st assistant – Team leader & acute head hold in accordance with adapted ATLS procedure; 2nd assistant – shoulder level; 3rd assistant – hip level; 4th assistant – operating the bed controls, supporting arms, checking patient’s skin, placing pillows in situ etc.

The SIA Academy is the training arm of the Spinal Injuries Association which promotes training, education, social research, Spinal Cord Injury awareness and best practice in living with spinal cord injury.
Logrolling within a ward setting is necessary for relieving pressure on the skin, hygiene and bowel care.

With patient supported in a logroll one pillow is positioned to support the patient’s back. Two pillows are positioned to support the upper leg in a side-lying position.

Positioning of hands is important and utilises natural skeletal landmarks for security of hold and patient comfort. 1st assistant reaches over patient. First hand on shoulder and second hand on top of hip. 2nd assistant positions hands. First hand at hip level alongside 1st assistant and second hand underneath furthest thigh. 3rd assistant position hands. First hand under the knee of the furthest leg, and second hand below the ankle of the same leg.

Following the logroll, the patient’s upper leg must be kept in alignment with the lower leg throughout the turn to prevent any flexion movement being relayed to the thoraco-lumbar spine. To maintain lateral alignment, the outer malleolus should be maintained at a height level with the upper trochanter.

ACUTE PARAPLEGIC SPINAL LOGROLL

Logrolling within a ward setting is necessary for relieving pressure on the skin, hygiene and bowel care.

With patient supported in a logroll one pillow is positioned to support the patient’s back. Two pillows are positioned to support the upper leg in a side-lying position.

Legs are positioned to prevent hyperextension of the knees, a bed end is placed in situ and additional pillows placed at the end of the bed to support the patient's feet in neutral to prevent foot drop. The heels are left “floating” free from pressure to prevent skin breakdown.
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**POSTURAL ALIGNMENT**

Physical landmarks are visualised to demonstrate postural alignment of the spine during turning and positioning of SCI patients.

1. During all patient movements all commands come from the team leader who also takes responsibility for monitoring the physical alignment of the patient’s spine during and after turning and transfer procedures by monitoring the alignment of body landmarks.

2. From their sight position at the patient’s head they can monitor the alignment of the nose, sternum and pubic symphysis. They can also observe lateral alignment of shoulders, ribcage, hips and legs for signs of spinal rotation. When at rest, the head should be supported to maintain mid-line position using pads or blocks.

3. The accompanying pictures illustrate correct postural alignment of SCI patients following turning and transfer procedures. Upper limbs should be supported in a position that guards against contractures of elbow, wrist and fingers until the patient is assessed for splints.

4. Legs are positioned to prevent hyperextension of the knees, a bed end is placed in situ and additional pillows placed at the end of the bed to support the patient’s feet in neutral to prevent foot drop. The heels are left “floating” free from pressure to prevent skin breakdown.
AIRWAY PROTECTION

Traumatic SCI occurs without warning and casualties often present having recently eaten or, more often, having drunk a significant amount of alcohol prior to the accident. Vomiting is common following SCI and usually occurs at the scene or during transportation to hospital. Vomiting is a particular hazard in children and those experiencing near-drowning following aquatic SCI incidents. The risk of aspiration is highest whilst the SCI patient is positioned supine as they are unable to adequately protect their own airway.

As this picture illustrates, paramedical and emergency care staff are trained in turning patients secured appropriately on spinal boards using minimum numbers of staff initially. This turning technique is enabled by first bearing down on the near side of the spinal board with one hand to induce a rolling movement before reaching across to the opposite side with the other hand to facilitate turning.

Once the patient has been removed from the spinal board, rapid logrolling by 4 health workers with an additional person needed to perform suctioning is the usual response to a vomiting SCI patient in A&E but the availability of staff can delay an immediate response or compromise spinal alignment.

Whenever a significant risk of vomiting exists it is preferable to retain the patient on a spinal board until primary screening and examinations have been completed and the patient can then be positioned on a trolley or in a bed in a lateral side-lying position to improve airway clearance. Management of the vomiting SCI patient will also include administration of an appropriate anti-emetic and gastric decompression via nasogastric tube.
ADJUSTING SKIN LOADING

At the end of a turning and positioning episode, the SCI patient has a tendency to place undue pressure upon the underlying bony surfaces and weight-bearing areas as they are unable to adjust the loading pressure upon their skin without assistance.

1. Adjusting skin loading should form part of the routine at the end of a turn or transfer. Once the patient has been aligned to the satisfaction of the team leader, the team will disperse to their other duties. However one nurse remains to perform the procedure. Adjusting skin loading is better learnt as a practical technique so this poster serves only as an illustration.

2. There is no lifting involved in this technique. The carer places both of their hands under the patient’s shoulder blade with palms uppermost and gently draws them out towards them, allowing the natural resistance of the patient’s bodyweight to create a slight traction that redistributes the surface area of the skin as the hands are withdrawn.

3. Keeping their hands in the same position the carer now moves their hands under the patients arm and hand until they move out from under the patient’s body completely.

4. The carer now moves to the patient’s lower body and places both hands palms uppermost under the patient’s buttock. Carer must ensure that they avoid any twisting or prolonged stooping of their trunk during this procedure.

5. Again moving slowly and without attempting to lift upwards, the carer begins to draw their hands along under the patient’s buttock and down the leg until they again move out from under the patient’s body completely.

6. The carer then moves to the opposite side of the bed and repeats the procedure for the other side of the patient’s body. After completion, any pillows necessary to maintain patient alignment are placed in situ, the patient made comfortable and the bed space restored.

7. The benefit of this technique is firstly that it ensures the broadest distribution of underlying skin pressure in patients who are unable adjust their position independently. Secondly, with an increasing incidence of SCI patients with incomplete sensory loss, it reduces patient discomfort during periods of enforced bed rest, reducing the number of requests by the patient to care staff for additional and unplanned turning and repositioning during the day.
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**LATERAL TRANSFER USING SCOOP STRETCHER**

Scoop stretchers were primarily designed to be used to recover patients from the floor at the scene of an accident but they have also proven a useful resource, along with spinal boards to protect the patient’s spine from lateral forces experienced during sliding transfers between flat surfaces, in accordance with manufacturer’s guidelines and locally established practice guidelines. Some models can also be combined with a flat-lifting hoist to reduce some of the physical stress experienced by the transfer team members.

1. Team assemble and team leader explains procedure and confirms all team members understand individual role in procedure. Team leader applies adapted ATLS head hold if appropriate and rest of turning team take position for logrolling patient. 5th assistant, after checking integrity of scoop stretcher, stands ready to place first half of scoop stretcher into position. If using a size-adjustable model of scoop stretcher, 5th member to ensure that stretcher is measured appropriately against the patient before turning.

2. Team leader gives command to roll and team turn patient in unison onto chosen side. In patients with cervical injury it is often preferable to turn patient on to right side to avoid inducing vaso-vagal cardiac syncope. 5th member places first half of scoop stretcher in position. Team leader gives command to return patient to supine position and checks alignment. Any necessary adjustments in position are made before team reassemble to logroll patient to the opposite side to allow 5th person to insert second half of scoop stretcher. Wherever staffing numbers and experience allow, team members should reassemble in different positions to reduce potential for repetitive strain.

3. Team leader maintains position at the head whilst trolley is removed and bed brought into position. Because this procedure only requires the patient to experience vertical ascent and descent it removes the potential for the stretcher to swing during an attempt to move the hoist and stretcher across a floor between surfaces. During hoisting the patient may experience anxiety, vertigo or nausea so the team member operating the hoist remains within the patient’s view throughout the hoist transfer and informs the patient when hoisting or lowering commences.

4. Team leader maintains position at the head throughout the lifting operation. With the patient properly positioned and aligned in the scoop stretcher, the team leader checks with the 5th member that the connecting parts of the scoop stretcher are securely locked before ordering lifting of the patient to commence. Patients with retained sensation should be told that they may feel a slight flexing of the plastic blades during hoisting, which is normal.

5. With bed now in position, the patient is lowered onto the mattress and the turning team reassembles to remove the patient from the scoop stretcher. Raised bed sides can sometimes provide patients with extra reassurance during lowering onto the mattress but should be lowered before commencing any patient turning activity.

6. Team leader maintains position at the head during lowering but as team reassembles it may be appropriate to change position with another team member to reduce the risk of postural strain. Unless it is essential to visualise the patient’s underlying skin after transfer, the patient can be removed from the scoop stretcher without further logrolling by unlocking the scoop and gently sliding each half out from under the patient in turn. The 3 members of the turning team are required to apply counter traction to the patient during removal of the scoop stretcher.
Appendix 8

| Emergency Department staff prefer wherever possible not to have trauma patients arriving on vacuum mattresses as removal requires additional logrolling of a patient in pain and with unknown injuries. In addition, the vacuum mattress is not suitable to use as a splint for patients with acute pelvic fractures unless they have other means of pelvic splinting in situ. If the fracture is unstable the patient may continue to “bleed out” on releasing the mattress and collapse.
| Positioning a patient with actual or suspected spinal injury in a vacuum mattress (not illustrated). The patient is scooped onto the mattress at the scene. And the mattress folded around their body and secured with straps. The mattress is filled with tiny silicone beads which vacuum mould to the patient when all of the air is pumped out. The mattress is then loaded onto a spinal board or scoop stretcher because it lacks a suitably rigid base. Special care is required to ensure that the head and cervical spine are properly supported throughout these operations. Once in hospital, the vacuum mattress can be used to continue to protect the patient during flat surface-to-surface transfers and the patient can even be x-rayed or scanned with the vacuum mattress in place if required.
| Removing a patient with actual or suspected spinal injury from a vacuum mattress. First apply manual cervical spinal protection whether or not a cervical collar is in situ before undoing all of the mattress straps. Do not cut any straps. Now open the air valve on the outer mattress surface to let the air reinflate the mattress. The mattress sides will now become flexible again so that they can be unwrapped from around the patient. The air is then pumped out of the mattress again providing a flat surface from which the patient can then be retrieved using a flat lifting scoop stretcher hoist.
| A flat lifting scoop stretcher hoist is the preferred transfer method. An alternative option is to use a lateral transfer board and sliding sheet to transfer a patient on a scoop stretcher between surfaces.

The vacuum mattress is the preferred device to provide spinal protection during inter-hospital transfers of critically-ill patients or those with serious trauma such as acute spinal or spinal cord injuries, in accordance with manufacturers instructions and locally established practice guidelines.

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ASSISTED COUGH

Paralysis of the abdominal muscles causes severe impairment of forced expiration. The cough mechanism will be altered in SCI patients with a neurological level of T11 and above. The higher the level of lesion the more likely the patient will require assistance with coughing. Patients with complete cervical spinal cord lesions are at greatest risk of respiratory complications. Medical advice should always be sought first before attempting assisted coughing in new SCI patients, those with chest injuries, cardiovascular disease, abdominal trauma or disease or who are pregnant.

Two-person technique: Clear verbal direction and co-ordination between the person(s) helping and the patient is essential for these techniques to be successful. Stand on either side of the bed. Each person places their hands on the upper and lower ribs of the same side with their fingers spread and pointing upwards and centrally. As the patient attempts to cough, push inwards and upwards simultaneously. This method may not be suitable for a patient who has an unstable spine because if the actions are not performed simultaneously it introduces rotation of the thorax.

This two person method is preferred if spinal stability is a consideration as both people are pushing bilaterally which will minimise rotation. Stand on either side of the bed. Each person places one forearm across the upper abdomen of the patient with their other hand on the upper or lower ribs of both sides of the chest. As the patient attempts to cough, push inwards simultaneously.

Single person technique: spread your hands anteriorly around the lower rib cage and upper abdomen. With your elbows extended push inwards and upwards with both arms as the patient attempts to cough. Arms must be kept extended for this technique to work effectively, it may therefore not be appropriate to use if the patient’s bed does not lower to a suitable height.
Recumbent Rehabilitation (page 1 of 2)

What is recumbent rehabilitation?

Recumbent rehabilitation means carrying out the rehabilitation activities and exercises in a recumbent position (i.e. lying on the bed). It is not the same as ‘bed rest’.

Why do I need time on recumbent rehabilitation?

‘Recumbent rehabilitation is used to prevent further damage to the spinal cord during the initial weeks after spinal cord injury.

How does it help me?

Depending on the level of injury, spinal cord damage can affect the working of the lungs, the heart and vessels. In the early days and weeks after spinal cord injury a recumbent position helps to maximise the efficiency of the lungs and heart. This helps the healing of the spinal cord and prevents further damage.

This position helps to limit the effects of changes in blood pressure and keeps a good blood supply to the spinal cord. A poor blood supply leads to a build-up of harmful chemicals at the injury site which causes further damage to the cord. A good blood supply helps to remove these chemicals and to prevent further damage.

It is also easier for the muscles involved in breathing to function in a recumbent position. This helps to maintain good oxygen levels in the blood. Inefficient breathing can lead to low oxygen levels which can cause further spinal cord damage.

After spinal cord injury patients are prone to pressure ulcers (bed sores) due to a lack of sensation and ability to control temperature. A recumbent position helps distribute pressure on the skin and better prevent pressure ulcers.

If the loss of neurological function is prevented muscle bulk can be improved with exercise. You will be given exercises to do in bed to help maintain muscle mass. This is why it is not bed rest! Maintaining muscle mass at this stage helps you later on when you start to get up or use your wheelchair.
How long do I need recumbent rehabilitation?

It takes about 6 weeks for the body’s functions to achieve a reasonable balance following spinal cord injury. During this period recumbent rehabilitation helps prevent further spinal cord damage. The duration varies from patient to patient depending on the age, level of injury and previous medical conditions.

Can I choose not to have it?

Yes. Recumbent rehabilitation is offered at the spinal treatment centre to prevent further damage to the spinal cord during the initial stage after injury. However, you can choose not to have it.

Does it cause any problems/ side effects?

It is known that prolonged bed rest in people without spinal cord injury causes loss of muscle bulk and increases the risk of blood clots.

People with spinal cord injury are already at a greater risk of blood clots due to muscle weakness and systemic effects of their injury. Therefore treatment is started to minimise this risk, soon after the spinal cord injury and there is no evidence that the risk is increased any more in people carrying out rehabilitation in recumbent position in addition to receiving treatment for the prevention of clots.

Any questions or concerns?

If you have any questions about recumbent rehabilitation please contact our outreach team who will be happy to help you.
### Gradual Mobilisation Program

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(Can be done x 2daily)
Patient Information Leaflet

You and Your Collar
Patients and Their Relatives & Carers

Derriford Hospital
Derriford Road
Plymouth
PL6 8DH
Tel: 0845 155 8155
www.plymouthhospitals.nhs.uk
The Purpose of a Collar:

- The purpose of a collar is to support the spinal column and supporting structures such as the ligaments and muscles from loads and stresses that can cause pain and movement of the neck bones.

- It maintains the bone alignment and limits the movement in your neck whilst the bones and ligaments heal.

It is very important to wear your collar as advised

You have been fitted with:
- Aspen
- Aspen Vista
- Miami J
- Miami J advanced
Appendix 11

Fitting the Aspen

1. Lying on your bed, keep your head in a “neutral” position, place your arms by your sides and keep your legs uncrossed.

2. **Pre-form the collar:** roll the back panel like a hand towel, and the front panel bend the sides in.

   ![Diagram of collar pre-forming](image)

   You can also bend the small tabs on the back panel, allowing it to form to your own body shape.

3. **Position the back panel:**
   Position the back panel under the crevice of the neck. Push down on the panel with one hand and push with the other until the back panel is centred under the neck.

   ![Diagram of back panel positioning](image)

   When in the correct position the ends of the Velcro straps should come to the same position on each side.
Fitting the Aspen

4. **Position the front panel:**
Flare sides of front panel outwards.
Place the centre of the front panel in line with the centre of the chin.

Hold firmly in place with one hand on the front. Push the sides of the front panel up over the shoulder muscles and around the neck.

5. **Attaching the front panel:**
While holding the front panel with one hand, centre the back panel and attach the Velcro straps.

Keeping your thumb hooked into the opening at the front, you can then tighten the Velcro one side at a time, ensuring you wrap the front panel around the side of the neck.
Appendix 11

Fitting the Aspen

6. **Final Checks:**
Patients chin should be flush with end of collar chin piece.

Your nose and chin should be aligned vertically Through the centre of the collar at the front.

You should be able to place a finger around the inside of the whole at the front, ensuring it is not too tight.

The back panel should be centred, check this by comparing where the ends of the Velcro straps lie. There should be no plastic parts of the collar in contact with your skin, ensure an overlap of the collar lining.

Common areas that are at risk of rubbing or pinching include the bottom of the ear, and the skin on top of the shoulders where the two halves of the collar overlap, double check these.

No more than one finger should be able to fit between your head and the collar behind you ear, if you can fit more then it is too loose.
1. **Staring Position:** Lying on a bed without any pillows, arms to both sides, shoulders down and head centrally aligned.

2. **Back Panel:** Slide the back piece behind the patient's head and centre it. Remember to push the collar into the bed in order to prevent the patient's head from moving.

3. **Front Panel:** Flare the sides of the front panel out. Slide it up the chest wall and scoop it up underneath the chin.
4. **Angle:** Angle the sides of the collar up towards the ears. This prevents skin trapping on top of the shoulders, and allows the collar to wrap closely around the neck.

5. **Sides:** While holding the front securely, curl the sides snugly around the patient's neck. Apply the Velcro strap and secure the opposite side of the collar in the same fashion. Tighten the straps alternately on each side until they are the same length.

6. **Final Checks:** Velcro straps must be aligned symmetrically and orientated “blue-on-blue” to the front adhesive sections. There should be equal amounts of excess Velcro overhanging at the front. When tight enough, you should be able to fit one finger between the collar and the patient's head.
The Aspen Vista

The Aspen Vista is a newer type of collar used within the Hospital. It is designed to allow more room in front of the neck, to make it more comfortable (especially for men).

It is a one size fits all collar, with a yellow button on the front panel. This is used to adjust the size of the front panel and will be done in hospital, it does **not** need to be adjusted by you once you are discharged home.

1. Pre-form the back ends of the side panels so they are slightly curved.

2. With your head in neutral press the back panel down onto the bed and slide it behind the patients neck.

3. The Velcro straps should be half way between the patients ear and the top of their shoulder.
Appendix 11

The Aspen Vista

4. Hold the front panel in place and attach the loop straps on each side.

5. To tighten, anchor your fingers in on the collar and peel back the loop strap on each side, tighten and reattach. Tighten the other side equally and repeat as needed to ensure a snug, symmetrical fit.

6. Check to see that the back of the chin piece is not pressing inward onto the throat. If it is you may need to re-adjust the position of the collar.
The Miami J advanced collar is an adjustable collar to create the best fit for you. Your collar will have been fitted and locked to the correct size by a trained medical professional, therefore, do not touch the adjustments.

1. Lie flat on your back without a pillow, arms down by sides, shoulders down and head centrally aligned.

2. Slide the back piece behind the patient's head and centre it. Remember to push the collar into the bed in order to prevent the patient's head from moving.
3. Slide the front up under the chin, aligning the front edge of the collar’s chin support with the front of the chin.

5. Angle the sides of the collar up towards the ears. This prevents skin trapping on top of the shoulders, and allows the collar to wrap closely around the neck.

5. While holding the front securely, curl the sides snugly around the patient’s neck. Apply the Velcro strap and secure the opposite side of the collar in the same fashion. Tighten the straps alternately on each side until they are the same length.

6. Velcro straps must be aligned symmetrically and orientated “grey–on-grey” to the front adhesive sections. There should be equal amounts of excess Velcro overhanging at the front. When tight enough, you should be able to fit one finger between the collar and the patient’s head.
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The Routine of Collar Care:

- When you leave hospital you will have one hard collar and two sets of soft collar linings.

- You will need to change the soft collar linings every day.

- The set of soft lining pads that are taken off can be washed in warm soapy water and left to air dry.

- The collar can be worn in the bath or shower, and replace with the dry set once you have finished, using method as taught.

- If you have a beard it can cause friction therefore it is recommended to shave regularly whilst wearing the collar.

- By getting into a daily routine you will avoid getting any sore areas of skin around your neck, and the collar will feel more comfortable.
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Pressure Areas:

It is known that cervical collars can cause pressure sores or ulcers. Wearing a collar increases your local skin temperature and can cause excess skin perspiration in and around the area. Constant moisture can cause skin breakdown. In patients with moist skin, skin breakdown is increased 4 fold, compared to those with dry skin.

To prevent pressure ulcers the following precautions need to be taken:

1. Keep the skin clean, dry and cool.

2. Remove the collar, inspect the skin at least once a day particularly at the bony prominences. The usual pressure points are chin, clavicle, ear lobes and back of the head.

3. Maintain hygiene under the collar. Clean the skin under the collar daily, wash with warm soapy water and dry thoroughly. Do not apply powder or lotions.

4. Change pads if they become wet.

What happens if a pressure ulcer develops?
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Simple grade 1 pressure ulcers (redness, intact skin) or grade 2 ulcers (partial thickness loss of skin, shallow open blister) can be managed by your community nurse/ GP surgery by applying a skin protector or dressing. They will also be responsible for contacting your neurosurgical team ASAP should there be no improvement in the pressure ulcers or if they worsen. It may mean your collar might need adjusting or refitting.

What other complications are associated with collars?

On very rare occasion’s patients have developed temporary facial numbness/ weakness and swallowing difficulties, new pain or weakness in arms. Occasionally eating and swallowing may be compromised due to the position of head and neck. **We will try to minimise this as much as possible.** Patients may experience discomfort due to tight strap, complaints of confinement, increased perspiration because of wearing the collar.

How long will I need to wear the collar?
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This will vary depending on your personal situation and the reason why you require a collar. You will probably be given an expected duration of treatment when the collar is first fitted but this can change depending on how your injury heals.

How to prevent neck stiffness when the collar comes off?

Contractures, muscle wasting and muscle weakness are some of the problems with long term collar use. This can be overcome by muscle strengthening and stretching exercises after the removal of the collar. If you have any concerns then contact your GP for referral to see a Physiotherapist.

What if my bone does not heal?

Treatment in a collar is sufficient in the majority of fractures, however after a period of time the surgeon may decide on a surgical option if there is no evidence of bone healing.

What adaptations will I need to make whist
Appendix 11
wearing the collar?

- Using an arm chair may be easier to stand/ sit down and will put less strain on your neck
- The collar will restrict your ability to move freely and see your feet. Take care when walking and when going down the stairs
- Remove things that may cause you to fall, such as rugs and electrical cords. Use non slip bath mats, grab rails and a shower chair in your bathroom if you feel necessary. Arrange handy items so they are easy to access, everything else tidy away.
- When moving from a lying to standing position, use your arm and leg muscles to keep your body in proper alignment. Follow advice from your Physiotherapist about exercise.
- You should postpone sexual activity until your follow up appointment unless your surgeon specifies otherwise.
- You should not drive a car until out of the collar. Avoid sitting in the front seat with an airbag.

When should I call for help?
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If you experience any of the following please seek medical help.

- Severe neck pain
- Weakness, tingling or loss of feeling in your face, arms or legs
- Loss of bowel or bladder function
- Broken skin areas/ pressure sores
- If the collars breaks or is damaged in anyway.

Who should I call for help?

In the first instance contact your GP for any problems about your collar.

For patients who are under Neurosurgical team care contact - Zoe Sibbick or Ashleigh Moore Tel: 0845 155 8155 Bleep 0884 or Call Moorgate Ward on 01752 431953.

In an emergency please attend your local Emergency Department.

Further Information:

Before you leave the ward, we will ensure you are able to
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complete your own collar care, or instruct somebody who will be able to help you at home.

Any further queries should be directed to your own GP in the first instance.

You can contact Moorgate Ward if you have any questions related directly to your collar. Your questions may even be answered by reading through this information leaflet, or by reading the instructions contained with your collar packaging.

Replacement Collars:

If you require a replacement collar or pads please contact your GP who will refer you to your local Orthotics department. Please quote the collar type

........................................ when doing so.

Notes:
This leaflet is available in large print and other formats and languages.

Contact: Moorgate Ward
Tel: 08451 155 8155

Follow us on:
Twitter: https://twitter.com/derrifordhosp
Facebook: www.facebook.com/PlymouthHospitalsNHSTrust

Date issued: February 2014
For review: February 2016
Ref: C-260/Physio/AE/You and your collar v3
# Collar Management Record

Please photocopy this page: Original to notes □; copy to patient □

<table>
<thead>
<tr>
<th>Date:……………………..</th>
<th>Reason for collar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Location of fracture: ………………</td>
</tr>
<tr>
<td></td>
<td>Type of Fracture: Stable / Unstable</td>
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<table>
<thead>
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<th>Type of collar………………………………..</th>
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<tbody>
<tr>
<td></td>
<td>Size of collar…….....Fitted by………………..</td>
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<tr>
<td></td>
<td>Patient comfortable at the time of fitting: □</td>
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**In the event of a collar being changed from the original, please complete new document**

<table>
<thead>
<tr>
<th>Expected date of removal (if known):…weeks</th>
<th>Skin Condition:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1. Intact □</td>
</tr>
<tr>
<td></td>
<td>2. Prominent bony area/at risk areas □</td>
</tr>
<tr>
<td></td>
<td>3. Broken skin □</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Details:……………………………………………….</th>
<th>Information leaflets supplied:</th>
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<tbody>
<tr>
<td></td>
<td>1. Collar information handbook □</td>
</tr>
<tr>
<td></td>
<td>2. Collar user manual (if available) □</td>
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</table>

<table>
<thead>
<tr>
<th>Community nurses required Yes/No</th>
<th>Equipments provided:</th>
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<tbody>
<tr>
<td>Community nurse contact……………</td>
<td>Extra pads □</td>
</tr>
<tr>
<td></td>
<td>Extra collar □</td>
</tr>
</tbody>
</table>

**Training:** Practiced collar removal & application on the ward: (1) Patient □ (2) Relative □

<table>
<thead>
<tr>
<th>Trained by:…………………………………..………</th>
<th>Designation………………….………………………</th>
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**Expected Clinic Follow up**

<table>
<thead>
<tr>
<th>2 weeks □</th>
<th>4 weeks □</th>
<th>6 weeks □</th>
<th>8 weeks □</th>
<th>12 weeks □</th>
</tr>
</thead>
</table>

(Please note that the date of review is decided by the neurosurgical team. If the exact date of attendance to clinic is not available at the time of discharge you will be contacted by the secretary. Dates may be reviewed from time to time depending on the need and availability of staff)

**Point of contact**

For patients referred via Neurosurgical Registrars/Consultants only

Neurosurgical Physiotherapy Team – Zoe Sibbick & Ashleigh Moore Tel 0845 155 8155 Bleep 0884 (Mon-Fri 8.30-5.00) (Sat & Sun 8.30-4.00)

In an emergency contact the GP or Emergency Dept.