Royal National Orthopaedic Hospital

Clinical innovations scheme 2012/13: Acute clinical outreach for ventilator dependent spinal cord injury

Final Report September 2013

Purpose of this document:

- To provide qualitative and quantitative analysis and feedback to the Royal National Orthopaedic Hospital (RNOH) Board and Executive Team on the progress made since October 2012 by the acute clinical outreach service for ventilator dependent spinal cord injury (SCI). The existing outreach service has expanded to allow for the ventilator specific aspects of this project.

- To demonstrate how the innovation scheme has been used to promote clinical excellence in a complex group of patients that tertiary hospitals and Major Trauma Centres find difficult to manage. This has included dissemination and implementation of National Weaning Guidelines (Reference 1), largely developed by RNOH staff, to promote consistency in the approach to specific weaning requirements in this patient group.

- To place the innovation scheme within the context of Spinal Cord Injury Centre (SCIC) service development in its role as a Regional Centre for London and the South East of England. The Ventilator Outreach Service has evolved from the SCI Outreach Service which has developed within the last three years to provide staff education and clinical assessment of newly injured patients across London and the South East. The Ventilator Service, as part of the Outreach Service, has formed the link between the RNOH and linked Major Trauma Centres at The Royal London and St George’s Hospitals, specialist respiratory units and specialist nursing homes caring for ventilator dependent patients in a “hub and spoke” type model, providing a future service that is much more efficient, integrated and cost effective. It is planned that the Ventilator Service, as part of the larger Outreach Service, will help establish a partner SCIC in South London to help start to meet the unmet demand for specialist SCI care in South London, Sussex and Surrey.
Title of proposal: Acute clinical outreach for ventilator dependent spinal cord injury

1. Summary of project:

This project has:

- Improved timely access to specialist care.
- Enhanced chances of weaning from ventilator support at referring hospitals.
- Reduced overall length of hospital stay in ventilator dependent SCI patients.
- Increased activity and number of cases admitted per year.
- Allowed implementation of National Weaning Guidelines (Reference 1) to enhance chances of weaning from ventilator assistance in the first 2-3 months after injury.
- The Ventilator Service, as part of the SCIC Outreach Service, has increased the percentage of newly injured patients seen within seven working days. The SCIC Outreach Service met its 2012/13 fourth quarter CQUIN target to see more than 90% of traumatic spinal cord injury patients within seven working days of injury.
- Enhanced the scope and expertise of the LSCIC Outreach Service.
- Provided clinical expertise for a particularly complex group of patients that tertiary Intensive Therapy Units (ITUs) and specialist hospitals find challenging to manage.

This clinical innovation has extended and enhanced the work of the existing LSCIC clinical Outreach Service to develop a focussed, dedicated, clinical service, working with the London Trauma Network (LTN) and beyond to improve the clinical care of ventilator dependent SCI patients.

Staffing of Ventilator Outreach Service:
- Respiratory Practitioner (0.6 WTE).
- ITU Consultant (0.2 WTE).
- Administration Support (1.0 WTE) - works with entire Outreach Service.
2. How does the innovation project compare with existing solutions/methods?

The London Spinal Cord Injury Centre (LSCIC) at the RNOH is one of only eight in England designated to receive and treat spinal cord injured patients. The aim is to admit all patients as soon as possible following their injury, but patients with cervical or upper thoracic injuries frequently require prolonged ventilator support in the admitting Trauma Centre ITU to compensate for respiratory muscle weakness. A small percentage of patients will require long term ventilation.

There are many problems with the care pathway for newly injured patients, including delayed referral to a specialist SCIC, inadequate weaning, delayed admission to a SCIC and avoidable complications such as pressure ulcers. At any one time, LSCIC is staffed to admit a maximum of two ventilated patients and discharge planning is complex and time consuming.

Patients on ventilation in a Trauma Centre will be classified as Critical Care, even if no other organs are compromised. Patients on ventilation in a SCIC occupy high dependency beds and are banded accordingly, but they are not (in most circumstances) classified as Critical Care. Transferring them rapidly to a SCIC therefore brings about a ‘whole-system’ cost saving. Due to improvements in paramedic care, many more people with high level injuries now survive the early hours following injury, but the capacity of the SCICs to admit ventilated patients has not increased sufficiently to meet demand. Two of the eight SCICs in England are currently unable to support ventilated patients.

Receiving hospitals tend to lack the experience and skills to undertake weaning. Delaying weaning can result in the opportunity being missed, and the patient will remain on ventilation for life, with devastating consequences for quality of life. The SCICs therefore need to be enabling patients to be weaned as quickly as possible in the receiving hospital. Successful weaning at the Trauma Centre will increase the chance of timely admission to a SCIC and therefore reduce overall length of stay.

A 2010 audit of ventilated SCI patients (Reference 2) referred to the three SCICs in the South of England (RNOH, Stoke Mandeville, Salisbury) captured 30 patients with an age range of 22-88 years. 29% of patients admitted to a SCIC had pressure ulcers and overall 41% had developed avoidable secondary complications. This reflects the challenge of caring for these patients in non-specialist centres and highlights the potential benefits of early specialist outreach intervention.

The importance of weaning from ventilator assistance:

- It is an unfortunate fact that SCICs have limited resources to accept ventilated patients. Guidelines developed by Dr Rik Fox, Consultant Anaesthetist at the RNOH, as part of RISCI (Reference 1) are intended to aid the ventilator weaning process to enable faster transfer out of ITUs in referring hospitals.
- SCI patients undergo physiological changes but weaning from the requirement for ventilation is achievable in the majority of cases if it is addressed correctly from the outset.
- The weaning technique advocated by SCICs 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 for life and there are processes by which verbal independence and, in some, safe swallowing
should be achieved.

- The RISCI Guidelines were approved in 2012 by the National Spinal Cord Injury Strategy Board and the Intensive Care Society.
- The clinical work of the Ventilator Outreach Service is underpinned by the RISCI Guidelines which are disseminated to ITUs at Trauma Centres.
- The main important clinical differences for SCI weaning compared to traditional ITU weaning is summarised as:
  a) the patient is supine (as opposed to sitting).
  b) they require a low PEEP with higher inspiratory pressures (as opposed to lung protective ventilation parameters).
  c) they achieve time off the ventilator (as opposed to reducing pressure incrementally).
  d) they are required to achieve this with their tracheostomy cuff deflated and a speaking valve in place to aid communication and aid intrinsic PEEP.
This weaning method is seen as a progressive inspiratory muscle-training programme to compensate for the sudden and catastrophic loss of the respiratory musculature.

The historical problems accessing a SCIC are demonstrated in this case example from early 2012, prior to the establishment of the Ventilator Outreach Service. The financial costs are an estimate based on NHS Audit and Analysis Unit data from a 2010 Audit on ventilator dependent SCI care undertaken between the three SCICs in the South of England (Reference 2) and highlights the significant financial cost of ventilated patients:

**Case Study: Before Establishment of Ventilator Outreach Service**

**SB** 55 yr male C4 Tetraplegia
Admitted to local ITU day of injury for ventilation. Tracheostomy inserted Day 9. Surgically stabilised Day 24. Remained in referring trust’s ITU for a total of 178 days with recurrent respiratory infection and was very slow to wean. Transferred to LSCIC where he underwent specialist rehabilitation for a further 149 days and then was discharged with a full care package to a nursing home with ongoing requirements for his tracheostomy due to persistent swallowing difficulties and aspiration.

Based on the 2010 Audit data estimated costs are:
178 days at admitting hospital @ £1022/day (this 2010 figure was provided by the NHS Audit and Analysis Unit)
Costs prior to admission to SCIC £181,916

149 days at LSCIC @ £480/day
Costs at LSCIC: £71,520

Estimated total cost of hospitalisation: £253,436

The development of dedicated ventilator outreach components to the Outreach Service has for the first time allowed a systematic, reliable, robust system to promote a care model of “rehabilitation from day 1 of injury”, focussing specifically on respiratory management and weaning protocols and also maintaining overall health and avoiding complications such as pressure ulcers. Neither of the other two SCICs in the South of England offer focussed input specifically on respiratory and ventilation management.
3. Please describe how this proposal has been (a) delivered and is (b) sustainable (including exit plan after funding)

(a) Delivery

This proposal has been clinically deliverable as it was a natural extension of the LSCIC Clinical Outreach Service which came into being in 2011 and currently comprises a part-time nursing coordinator, occupational therapy and physiotherapy input. This team has made significant progress in establishing reliable clinical and educational links with the London Major Trauma Centres (Royal London Hospital, St Mary’s Hospital, St George’s Hospital, and Kings College Hospital). It has become apparent that ventilated patients, even in small numbers, cause significant problems in tertiary ITUs with patients spending an unnecessarily long time waiting transfer to a SCIC. Newly injured ventilated patients are now seen in intensive care by the Ventilator Outreach Service. The costs of this innovation are summarised below:

Staffing of Ventilator Outreach Service:
- Respiratory practitioner (0.6 WTE).
- ITU Consultant (0.2 TWE).
- Administration Support (1.0WTE).

Equipment
- Spirometer.

(b) Activity and Results

Appendix 1 shows the activity and some data of number of days from injury for the six month period starting October 2012 through to the end of March 2013. The Ventilator Outreach Service was set up and was fully functioning by the end of November 2012.

Data is available for eight patients that were visited and advised by the Ventilator Outreach Service. These eight patients were admitted to the RNOH. A further four patients received visits from the Ventilator Outreach Service and they were subsequently admitted to other SCICs. All ventilator patients had more than one outreach visit, the range being from two to five visits. In addition to the visits, the Ventilator Outreach Service followed up and advised the referring teams regarding their patients with regular telephone and e-mail contacts with advice on each individual’s progression.

This preliminary data collection exercise has demonstrated that there is a trend towards improved waiting times and reduced lengths of stay in this small group of complicated patients. There is also a trend towards a reduction in ITU days in referring trusts, which inevitably has a significant impact on whole healthcare costs.

Since the start of the 2013/14 financial year in April, there have been a further 14 patients visited and managed by the Ventilator Outreach Service. Data from these patients regarding the impact of the Ventilator Outreach Service is being collected and at a later date could be used to compare the outcomes of these patients with those at the start of the service and they could also be compared with historical data that is being collected by Dr Rik Fox and Dr Paul Gunning.
Appendix 2 is an example of the comprehensive report produced after each assessment. This covers all the main systems affected by spinal cord injury (eg bowel, bladder, autonomic dysreflexia) and detailed advice on respiratory management and weaning.

The Outreach Service has an important role in promoting high standards of care for newly injured SCI patients. It has organised a number of training sessions at referring hospitals and also regional training days at the RNOH for Trauma Centre staff. These cover both general spinal cord issues and specific training on respiratory management and weaning.

Appendix 3 is an example timetable for one of the two courses run this year on respiratory management in SCI, which has captured 60 staff from Major Trauma Centres and Major Trauma Units.

The feedback in the evaluations of all those that attended the respiratory courses was that 100% of the delegates rated the course as either excellent (75%) or good (25%) and stated that they found the content useful to their practice and 100% of their learning aims and objectives were met.

(c) Sustainability

The idea for outreach has been formulated and implemented in conjunction with SCI Commissioners. The original implementation plan included ‘start up costs’ via CQUIN payments to be followed by funding through a tariff with a payment for each individual visit. However, this is not yet in place due to a number of factors including reorganisation of National Specialist Commissioning and a lack of costing data to inform the National SCI tariff. Hence, at the current time, the original intention of a tariff for the 2013/14 financial year is not in place and outreach will run again in 2013/14 as a CQUIN target and we will continue to work with Commissioners and the National Clinical Reference Group to try and implement a tariff system for 2014/15. The CQUIN for 2013/14 is more challenging than the previous year with a target that patients will be seen within five days of referral.
4. How has this project improved quality (patient experience and/or clinical quality) AND efficiency?

Quality:
• Timely input at original referring hospital from specialist SCI clinical team with ventilator expertise.
• Start rehabilitation from Day 1 including discharge planning.
• Establish close clinical and educational links between LSCIC and referring hospitals and specialist nursing homes, specifically for ventilator care.
• Early implementation of the RISCI Weaning Guidelines.
• Appendix 4 summarises feedback from two sets of relatives, each seen on several occasions on ITU at their referring hospital. Both patients were eventually admitted to LSCIC.
• Appendix 5 summarises qualitative feedback from healthcare professionals from two London Major Trauma Centres.

Efficiency:
• Improve chances of weaning and reduce overall length of stay on ITU, earlier admission to rehab, shorter overall rehabilitation admission and therefore overall reduced total length of hospital stay.
• More efficient use of referring hospital and RNOH clinical resources by reducing ITU stay, reducing length of time on ventilation, reducing length of rehab stay and reducing overall length of hospital admission.
• Increase activity and number of cases admitted per year. This will increase financial activity in line with forthcoming national packages of care, a method of payment by results.

The case study below illustrates how patients can benefit from the expertise of the LSCIC and ITU staff at the RNOH in successfully weaning and decannulating (ie removal of tracheostomy) that was not achieved when the patient was on ITU at a Major Trauma Centre:

Case Study: after establishment of Ventilator Outreach Service

PP 20 yr male C5 Complete Tetraplegia inpatient St Mary’s Hospital ITU. Surgically stabilised day 3. Initial LSCIC Outreach visit day 4. Developed respiratory failure on day 7 requiring ventilation. Developed a hospital acquired pneumonia and CDiff in stool. Tracheostomy inserted on day 18. He had a further Outreach visit on day 32 for bowel management and to assess his suitability to wean from his ventilation. Discussions between the Respiratory Outreach Practitioner and the Consultant in ITU led to a change in his ventilation in order to start ventilator free breathing (VFB) as soon as able. Physiotherapists were taught effective secretion clearance techniques to address the evident hyper secretion. On day 39 he was visited again by the Ventilator Outreach Service including a respiratory physio, consultant anaesthetist and a speech and language therapist. FVC’s were taken and a trial of Ventilator Free Breathing (RISCI Weaning protocol) was started. This was then progressed over the next few days over the phone. On day 44 he was transferred to the ITU at the LSCIC, RNOH. He remained in ITU for a further 12 days before being transferred to the LSCIC. He weaned after approximately 8 weeks from his injury, which is line with published UK results (Reference 3).
This complex, high cost case illustrates the early benefits of the Ventilator Outreach Service:

- Early assessment of patient.
- Close clinical working between Trauma Centre and RNOH.
- Multiple outreach visits.
- Appropriate and successful weaning advice based on RISCI guidelines.
- Continuity of care: the patient has been cared for by the same team during his transition from Trauma Centre to the RNOH.
- Reduced overall length of stay and reduced overall NHS costs.

This further case study shows how establishing links for collaborative working with the Major Trauma Centres has allowed for the patient to be weaned more quickly and efficiently and access a rehabilitation bed at the LSCIC through achieving both weaning and decannulation at the referring trust.

Case Study: after links have been made with the referring Neurosurgical Intensive Care Unit by the established Ventilator Outreach Service:

**LH** 60 yr old male C5 Complete Tetraplegia and an Inpatient at St George’s Hospital NICU.

- Surgically stabilised Day 2. Tracheostomy Day 3. Referred Day 3. Outreach Visit Day 4. He was intubated and fully ventilated via his tracheostomy. He required alcohol withdrawal medication for the first seven days post injury as well as twice daily physiotherapy chest clearance. He was optimised to start the weaning process on Day 16. He was weaned from ventilation by Day 27. By Day 29 he was decannulated from his tracheostomy. He was then at the top of the rehabilitation waiting list rather than on the respiratory waiting list as he no longer required respiratory support. On Day 32 he was transferred into a rehabilitation bed in the LSCIC. LH weaned within four weeks of his injury, which is better than published UK results (Reference 3).

The table below compares the two male patients in the case studies above who benefited from clinical assessment and advice on weaning from the Ventilator Outreach Service:

<table>
<thead>
<tr>
<th></th>
<th>PP</th>
<th>LH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20</td>
<td>61</td>
</tr>
<tr>
<td>Date of injury</td>
<td>10.11.2012</td>
<td>14.07.2013</td>
</tr>
<tr>
<td>Level of injury</td>
<td>C5 Complete SCI</td>
<td>C5 Complete SCI</td>
</tr>
<tr>
<td>Date of ventilation</td>
<td>17.11.2012</td>
<td>17.07.2013</td>
</tr>
<tr>
<td>Injury to wean (days)</td>
<td>39</td>
<td>16</td>
</tr>
<tr>
<td>Injury to off ventilation</td>
<td>63</td>
<td>27</td>
</tr>
<tr>
<td>Injury to decannulation from tracheostomy</td>
<td>65</td>
<td>29</td>
</tr>
<tr>
<td>Actual length of ventilator weaning</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>ITU length of stay / admission to LSCIC</td>
<td>61</td>
<td>32</td>
</tr>
<tr>
<td>Number of outreach visits</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Number of outreach contacts: emails / calls</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

**Appendix 6** shows the weaning plan that was agreed between the Ventilator Outreach Service and the NICU team at St George’s Hospital regarding **LH**.

The innovative early specialist care provided to patient LH has provided several areas of improvement compared to the outcome we would have predicted prior to the establishment of the Ventilator Outreach Service: less time on ventilation, quicker
wean and decannulation, less time on ITU and significantly less whole system NHS costs. NHS England Commissioners have recently indicated that the current cost for an ITU bed day is in excess of £2,000. The 2nd case illustrated here (LH) had an ITU length of stay 29 days less than the 1st patient and a rough estimate of projected costs savings for this type of patients could be 30 days x £2,000 = £60,000 per patient cost savings due to efficient wean, decannulation and discharge from intensive care.
5. Conclusion and proposed way forward

The 2012/13 innovation has been utilised to successfully implement a new service, unique within the NHS, to promote best practice in an extremely complex group of patients. New national guidelines have underpinned a consistent and systematic approach to weaning which improves life quality, expectancy and facilitates admission to SCICs.

The Ventilator Outreach Service has 'strategic fit' for the RNOH by providing a 'hub' of specialist respiratory care within a 'hub and spoke' model that incorporates tertiary hospital Trauma Centres and specialist nursing homes. This has created a network within London and the Southeast of hospital and community based services to provide care for ventilator dependent patients.

The Ventilator Service have complemented the work of the larger Outreach Service to meet CQUIN and quality dashboard requirements, which aim to both improve quality of care and cost effective use of clinical NHS services.

The Outreach Service provides a rolling education programme to staff in MTCs and the Ventilator Service supplement this with specific training and education on respiratory care.

The next logical step forward for the concept of 'outreach’ is to establish a South London SCIC which would make ‘outreach’ redundant by ensuring that patients were admitted to a SCIC as soon as possible after injury. The Outreach Service (including the Ventilator Outreach Service) offers a vehicle to develop a partner SCIC by providing clinical input, staff training and governance to a partner SCIC. At the current time, a proposal for a partnership between the RNOH and the Royal Hospital for Neuro-Disability (RHN) in Putney to develop a South London SCIC is under development. Key to this proposal is utilisation of a 16 bedded ventilator unit at the RHN to admit SCI patients with appropriate clinical input, training and governance provided by the LSCIC Ventilator Outreach Service. This proposal would require permanent establishment and growth of the Ventilator Outreach Service to incorporate additional Occupational Therapy and Speech and Language Therapy members.

The collective experience of the RNOH with this complex group of patients and the work of the Ventilator Outreach Service will form the basis of a clinical and health economics research project to be undertaken over the next four months in conjunction with Dr Rik Fox, Consultant Anaesthetist and Dr Paul Gunning, Clinical Lead for ITU. This will be a retrospective analysis of patients with spinal cord injury admitted through ITU on a ventilator, and will explore whether the Weaning Guidelines and the Outreach Service has made an appreciable difference to length of stay on critical care units with an economic evaluation thereof.
References:


2) Audit of Spinal Cord Injured, Ventilator Dependent Patients Referred to a Spinal Cord Injury Centre in the South of England. NHS Audit and Analysis Unit 2010


Jan Gawronski
Consultant in Rehabilitation Medicine
London Spinal Cord Injury Centre
RNOH
Appendix 1

Table to show data collected for eight patients admitted to the LSCIC/RNOH for average lengths in days of total length of hospitalisation, days from Spinal Cord Injury to starting ventilator weaning and days from Spinal Cord Injury to achieving self ventilating. All eight patients received input from the new Ventilator Outreach Service between October 2012 and the end of March 2013. There is also comparison from the first quarter to the second quarter.

<table>
<thead>
<tr>
<th></th>
<th>Injury to Discharge from SCIC</th>
<th>Injury to Start of Weaning</th>
<th>Injury to Self Ventilating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (Days)</td>
<td>179</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>Range</td>
<td>134-261</td>
<td>3-40</td>
<td>11-59</td>
</tr>
<tr>
<td>First Quarter Average</td>
<td>208</td>
<td>34</td>
<td>57</td>
</tr>
<tr>
<td>Second Quarter Average</td>
<td>150</td>
<td>18</td>
<td>37</td>
</tr>
</tbody>
</table>
Appendix 2

An example of the comprehensive report produced after each assessment by the Outreach Service. This covers all the main systems affected by spinal cord injury (eg bowel, bladder, autonomic dysreflexia) and detailed advice on respiratory management and weaning.

Provided to St Helier’s University Hospital Critical Care Unit

PRESSURE/ SKIN CARE: M should be nursed predominantly in SIDE LYING PLEASE, with 2-4 hourly turns. NO upright sitting due to her labile BP and limit supine other than what is required for nursing or therapy needs.

ANXIETY: M is very anxious with any changes and requires a lot of reassurance, for example when changing her from cuff up nocturnal ventilation to cuff down Ventilator Free Breathing. M has limited control of her environment and care. It is good to encourage her to verbalise what her care needs are to try to start to let her regain some control of her situation.

RESPIRATORY:
- Currently M requires 12 hours nocturnal ventilation 11 IPAP / 5 PEEP to achieve ETv at approximately 500ml for prevention of atelectasis, cuff up. Use the ETv as your guide. Please do not be tempted to wean the night time pressures as this is what rests the weak inspiratory musculature. As she establishes her ability to do more in the day and maintain her FVC then it would be time to start to reduce the length of time she has nocturnal ventilation.
- When she comes off the ventilation in the morning, BEFORE you take the cuff down, please measure her Forced Vital Capacity (FVC). Use the Wrights spirometer with a filter via a catheter mount and encourage her to do her ‘biggest breath in’ and measure the longest expiration that she can manage, verbally encourage her to ‘keep going’ with the exhalation. Take the best of three attempts as her FVC. Her FVC needs to be re-measured as you put the cuff up in the evening in order to return to nocturnal ventilation. A drop of greater than 30% of the morning value means that she has inspiratory muscle fatigue - please let me know if this happens.
- 12 hours cuff down + Passy Muir Speaking Valve (PMSV) Ventilator Free Breathing (VFB) with humidified O2 as required via the trache mask.
- Morning chest clearance treatment with the physio + very gentle percussion (Left side only) + deep suction with a size 12 Catheter as required. Be cautious of any assisted coughs due to her internal injuries sustained in the fall. A very gentle counter pressure at her upper abdominal whilst she is coughing may be trialled by the therapists with caution. Please wear protective eyewear for suctioning.
- Repeat physiotherapy chest clearance side to side in the afternoon session as you are putting her abdominal binder on for sitting practice if she is up to trying sitting up.

REHABILITATION: As demonstrated, M needs to try to start sitting up in bed before even contemplating sitting out of bed. The goal should be to try to sit her up for up to a 30 minutes maximum as upright as she can manage. This should only be carried out once a day with the therapists. Use the Abdominal Binder and the profile setting on the bed. Aim for a head up legs position and please relieve her shoulders from becoming compressed in the bed, use the tilt on the bed with BP monitoring and checking if she is symptomatic. When she becomes symptomatic, lay her flat, ask the nurse to check her skin for you and position in left or right tilt supine lying. If she
can not tolerate going up very far or for very long it may be worth asking the medical staff to prescribe Ephedrine 30 minutes before you try to counteract her labile BP and allow her to sit up more. When sitting in bed is more established this is a good position for SLT to combine assessing her swallow, or for the therapists to work on antigravity biceps work.

**SWALLOW:** Please encourage the nursing staff (in addition to focused SLT therapy) to encourage M to do ‘saliva swallows’ when her cuff is down and she is doing Ventilator Free Breathing. Oral suction via the yankeur only if needed for larger sputum passing up to the mouth.

**BOWEL MANAGEMENT:** Please refer to the MASCIP guidelines that I left in the medical notes. In the presence of reflex bowel and to establish a bowel regime, we recommend glycerine suppositories in the morning and flushing her NG with 100ml of warm water followed by sitting the patient up to 30 degrees (can be side lying or 30 degree sitting) to allow gravity to take effect and then perform Digital Rectal Stimulation (DRS) and Digital Removal of Faeces (DRF) until her bowel is empty and no further reflex emptying into the rectum is detected. It is very important to manage her bowel in this way so as to establish a regime to prevent further complications of Autonomic Dysreflexia from an impacted bowel. If her bowel opens spontaneously we recommend performing a PR check in order to ensure that the bowel has fully emptied.

**BLADDER MANAGEMENT:** I did not manage to check her catheter type, but if she requires a change we recommend the use of a long-term sillastic type one.

**AUTONOMIC DYSREFLEXIA:** This is an exaggerated response of the sympathetic nervous system to a continual painful or noxious stimulus. It is a Medical Emergency and can lead to a Myocardial Infarction (MI) or stroke leading to death, if left untreated. M is at risk of this as it can occur in Spinal Cord Injured patients with disruption to the cord above the level of T6. It is commonly caused by bladder distention from blocked or kinked catheter tubing or it may manifest from persistent bowel impaction, or it may be due to a painful pressure sore or joint. The cardinal sign is a sudden rise of the patients BP from their normal, so in a Tetraplegic the rise could be from 100/60 to 130/90. The patient sometimes shows redness or flushing above the level of their lesion or sometimes not, often the patient will feel suddenly unwell. If this happens this should be considered. The treatment is to sit the patient up, monitor the BP and give sublingual Nifedipine 10mg. Please refer to the attached document to put in M notes and alert all the staff to be aware of autonomic dysreflexia.

*Sophie Nawarski Respiratory Specialist OUTREACH*  
*London Spinal Cord Injury Unit 12/04/13*
## Timetable for training day organised by the Ventilator Outreach Service

### Royal National Orthopaedic Hospital

Respiratory Study Day - Acute Spinal Cord Injury  
Seminar Room 3, Teaching Centre – RNOH, Stanmore  
Thursday, 06th June 2013

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30</td>
<td>Registration</td>
<td></td>
</tr>
</tbody>
</table>
| 09.00  | Meet and greet  
Agree aims and objectives                                                | Pauline Robertson  
Spinal Outreach Coordinator                                               |
| 09.30  | SCI – The Scale of the problem                                         | Jan Gawronski  
Consultant in Rehab Medicine                                               |
| 09.45  | ASIA Charting – What is it, why its important and how to do it!        | Jan Gawronski  
Consultant in Rehab Medicine                                               |
| 10.45  | Coffee                                                                |                                                                         |
| 11.00  | Introduction to Respiratory Problems in Acute SCI                      | Rix Fox  
Consultant Anaesthetist                                                  |
| 11.45  | Physiotherapy management in Acute SCI                                  | Sophie Nawarski  
Spinal Physiotherapist                                                     |
| 12.45  | Speech and Language Therapy – Swallowing and Speech Issues             | Jackie McRae  
SLT                                                                    |
| 13.30  | Lunch                                                                 |                                                                         |
| 14.15  | RISCI /Ventilator free breathing and choice of tracheostomy tubes     | Rik Fox and Sophie Nawarski                                              |
|       | Cardiovascular issues                                                 |                                                                         |
| 14.45  | Acute Nursing management                                              | Pauline Robertson  
Spinal Outreach Coordinator                                               |
| 15.15  | Occupational Therapy in the Acute phase                               | Rebecca Curtis  
Spinal Outreach Occupational Therapist                                   |
| 15.45  | Summary, discussion and evaluation                                     | Team                                                                   |
| 16.15  | Close of day                                                           |                                                                         |
Appendix 4

Feedback from relatives

1) Feedback from a patient’s relative seen on several occasions at St Mary’s Trauma Centre (the patient was eventually admitted to LSCIC). They rated the Outreach visits as having an extremely positive impact on their family:

‘St Mary’s followed your advice on the weaning process. They began bowel management. They stopped trying to get him out of bed into a wheelchair too soon. An excellent service that gave me [mum] a huge amount of support. [Pt] remembers very little about your visits but he was reassured about life and support in a spinal injury unit. Thank you.’

2) Feedback from a patient’s relative seen on several occasions at West Middlesex University Hospital (the patient was eventually admitted to LSCIC):

‘The problems the referring hospital were having with my father’s breathing and blood pressure were unusual to them. The input from the Outreach Service helped them stabilise both. We also learned what we could do as a family to help, eg in relaxing muscles, and this has helped his limbs stay in relatively good shape, and this also helped us to stay in a positive frame of mind.’

‘He was seen by the Outreach Service at a time when he was particularly unwell. I think it is important that the service sees patients early in their treatment (because I think his respiratory care was not initially well managed at the hospital where he had his surgery) and that visits are scheduled and repeated, as patients’ conditions can change a lot, and that a family member is present for them. Linking in with the Outreach Service was good for us as a family as we gained a lot of insight into my father’s condition and what we could expect in the future. I found there was a good and helpful response from the Outreach Service when I emailed them, and my mother received a phone call at home from the team, which she found helpful. Overall I think the service is excellent, we were happy to meet professional and knowledgeable practitioners, their advice was helpful and informative, and that they were willing to travel to meet my father meant a lot to us.’
Appendix 5

Qualitative feedback from Healthcare Professionals:

"I think with respiratory weaning of spinal cord injury patients it is highly beneficial to have regular visits from the Outreach Service (if possible) to set up appropriate regimes ie: ventilator free breathing, because when therapists try and lead on the ventilator free breathing the anaesthetists are not as keen. Hearing it from spinal outreach services carries more weight. Provided peer support and an opportunity to remind the acute care team, especially the doctors, about the best management for spinal cord injury patients – families also find the visit very helpful" Trauma coordinator, St George’s Hospital

“Although we are a Trauma Centre we have not had that many spinal patients since we opened. Therefore the service is great at improving the knowledge and skills of the MDT so that we can provide the best care possible for these patients. It is great that the Outreach Service has a Physio, Specialist Nurse, Consultant and Speech and Language Therapist who can support and advise each speciality. I benefitted from the Outreach visit as I was taught improved chest clearance techniques and I also extended my knowledge on ventilator weaning.” Physiotherapist, St Mary’s Hospital
Appendix 6:

Agreed weaning protocol for LH with established Link Trust at St George’s Hospital NICU:

Royal National Orthopaedic Hospital NHS Trust

Ventilator Free Breathing Weaning Plan for LH St George’s Hospital NICU July-August 2013

Ventilator Free Breathing is defined as periods off the ventilator with the tracheostomy cuff deflated + a Passy Muir Speaking Valve in place + a humidified tracheostomy mask delivering O2

Key points:
• Maintain PSV in between weaning periods at current level aim for ETv approx. 500 - 600ml.
• This is a ‘Time off Ventilator’ progressive wean therefore please do not wean PSV any further.
• He should be in Supine or Supine + L/R Tilt for all weaning attempts as his FVC is approx 15% greater and the work of breathing is reduced in supine.
• Please fully ventilate at night PSV acceptable.
• Only wean initially between the approximate hours of 0800-2000.
• Please do not be tempted to start oral trials.
• Please do not sit up in bed fully or sit out of bed during the weaning period.
• FVC measurement via Trache mount + Filter + Spirometer, record the best of three attempts.
• Initially monitor the FVC at the start of each VFB session but when established it is acceptable to monitor FVC at the start of each day and at the end of each day unless you suspect that he is failing with longer attempts of VFB.
• Please record RR and SPO2 at the start and end of each wean session.
• Only progress to each next day if FVC is the same or no less than 30% of starting value. Otherwise remain at that day’s weaning protocol and monitor.
• During longer stretches, eg 6-12 hours, he may benefit from prophylactic IPPB or MHI to assist lung volumes.

Example of how we would suggest that you progress her VFB wean:
(this programme may be amended when he has his dental procedure)

<table>
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<th>July/August</th>
<th>Time x Freq VFB wean</th>
<th>Rest period</th>
<th>hours Achieved in VFB wean</th>
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<td>1 hr</td>
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<td>1 hr 30 m</td>
<td>5 hrs</td>
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