Title Progressive Care for Long Term Ventilation and Specialist Weaning

Author SE Wales Network Manager & Lead Clinician

Date of meeting

Action Required

Purpose
The purpose of this paper is to describe the findings from the audit of Long Term Ventilated patients admitted to or remaining on Critical Care Units undertaken by the Critical Care Networks and to propose a clinical service model for consideration within Wales.

Background
The 2nd Strategic Framework for Critical Care, published under Ministerial letter EH/ML/008/08 includes the requirements for Networks, working with Trusts, HCW and LHBs to

“Develop and implement a service specification and regionalised service for patients requiring specialist weaning and progressive care for long term ventilation to improve patient care and cost effectiveness”

The need for such a service in Wales was also recognised in the Welsh Assembly Government Neuroscience review published during 2008.

All critical care units can identify individual patients who have remained (and in many cases still remain) in a critical care bed. Many of these patients have experienced spinal cord injuries and although they are ventilatory dependent, they are often not “critically ill” and from governance perspective could be considered as inappropriately placed.

Not only are critical care beds amongst the most costly resource within a secondary care service, but more importantly this presents a clinical risk to the patients concerned and may limit access for other critically ill patients.

In some cases, patients with delayed weaning have been referred to specialist units in England (eg Lane Fox Unit, Guys & St Thomas Hospital, London) as locally services do not have the specialist resource. Research undertaken by the Networks has identified that there are no specialist units on the English/Welsh border and therefore a development within Wales may also provide an opportunity to generate income.
English NHS Modernisation Agency “Critical Care Programme”
The NHS Modernisation Agency “Critical Care Programme – Weaning & Long Term Ventilation” report¹ recognises that

- “The majority of patients who require invasive mechanical ventilatory support either wean successfully or die during their Critical Care admission. However a small, but significant, subgroup require either a prolonged Critical Care stay in order to wean, or may become ventilator dependent”
- Long term ventilated patients are major resource users with Critical Care

The report recommended:-

1. Delayed Weaning - A specialist Non-invasive ventilation service to which patients who suffer delayed weaning can be referred to be established in a small number of NHS Trusts
2. Failed weaning, long term ventilatory support & NIV - A service for the provision of long term invasive and non invasive support and for patients who have failed weaning
3. Acute respiratory failure and the use of NIV – an NIV service established in each acute Trust.

The Lane Fox Respiratory Unit in London is an example of service provision within England which is a national referral centre supporting weaning for patients who remain ventilator dependent following critical illness.

Local Patient Example
In September 2008, a patient from SE Wales was transferred to the Lane Fox unit after spending 118 days in ICU with single organ respiratory failure. HCW authorised a 2 week placement through an Individual Patient Agreement at £1895 per day. The patient spent 23 days in Lane Fox and was then transferred back to Wales where he spent 1 day in a local HDU after which he was discharged to the ward for 30 days and then discharged home. Total cost in the region of £43.5k

AUDIT OF LONG TERM VENTILATED PATIENTS
In order to identify the numbers of long term ventilated patients across Wales, the Critical Care networks undertook an audit to identify the number of single organ (respiratory) dependent patients who remain on a critical care unit. Information was requested for 2 years from 1st August 2006 to 31st July 2008. (Audit tool attached as Appendix 1)

For the purpose of the audit, a definition of Ventilatory dependence was identified as:-

- the need for invasive ventilatory support in order to prevent or treat respiratory failure. Requirement for a minimum of 6 hours per day, persisting for more than 3 weeks. For the purpose of the audit, patients should only be recorded once they are single organ (respiratory) support for more than 30 days.

The audit identified

- 92 Long Term Ventilated patients across Wales (1st August 2006 to 31st July 2008).
- 37 patients South East Wales Network
- 32 Patients Mid & West Network (but Singleton on providing 1 year data)
- 28 patients North Wales
Critical Care Beds & LTV Patients

• Total of 7044 days total Length of stay in Critical Care units
• 5909 Level 3 days in critical care

Data Quality issues were identified as:-

• Singleton Hospital was only able to provide 1 year data from Dec 07
• Many units identified the patient’s full length of stay in critical care and did not report only their critical care days once single organ support for 30 days more. It is therefore recognised that the total days Length of stay will include days appropriate for critical care.
• A retrospective audit was difficult to complete providing comprehensive information on the clinical reasons for the patients ventilator dependency
COST IMPLICATIONS
It is widely recognised that Critical care beds are the most expensive resource within an acute hospital and therefore the impact of patients with delayed weaning or long term ventilation will be significant.

WHC (2007) 056 issued in July 2007 included the requirement for NHS Trusts to provide critical care bed day costs as part of the Financial Information Strategy Development Programme (FISDP) for 2006-7. The costings were formally published during February 2008 and this exercise has been repeated for 2007-8 critical care cost per bed day with joint work being undertaken by the South East Wales Network and the WAG Financial Information Services strategy team to provide guidance and clarity to improve consistency and quality of the costing information.

In 2006-7 the All Wales Cost per patient day was identified as:-
- £828 for Adult HDU
- £1,564 for Adult ICU
- £1,167 for combined ICU/HDU

Whilst recognising that the 7044 total bed days identified through the audit is like to be an over estimation, using the All Wales Adult ICU (Level 3) and HDU (Level 2) cost per bed day, the cost to the service would be in the region of:-

5909 Level 3 days @ £1564 = £9,241,676
1135 Level 2 & lower days @ £828 = £939,780
TOTAL COST = £10,181,456

The 2007-8 critical care bed day costs are due to be published by WAG in January 2009 and it is envisaged that the All Wales average cost will increase, therefore increasing the above calculation.

ADULT LONG TERM VENTILATION CLINICAL SERVICE MODEL

It is clear that a gap in service provision in Wales is:-

Prior to the establishment of Critical Care Networks in Wales, Health Commission Wales had facilitated a multi disciplinary Long Term Ventilation Working Group engaging Physicians, Critical Care Intensivists, Commissioners and Patient/Carer representatives across Wales in the development of Clinical Standards and a Clinical Service Model. The LTV Working group was able to take a wider view than critical care networks and the work encompassed both critical care aspects and long term ventilation community care.

Definitions
The HCW LTV working group agreed to continue to use the definition used on the Adult Survey August 2003 (derived from the definition used for the paediatric LTV
survey 2002, amended to exclude those supported by continuous positive airway pressure or CPAP):

‘Stable Welsh patients aged 18 or over, on invasive ventilation via tracheostomy or on non-invasive ventilation where it is anticipated that long term ventilation will be required for longer than three months.’

Dependencies:

- **Level 1:** Invasive, highly dependant (eg high spinal cord injury, 24 hr ventilation and complex medical needs);
- **Level 2:** Invasive, dependant (may not require 24hr ventilation, or may have less mobility and medical needs);
- **Level 3:** Non-invasive, dependant (either using NIV during day and night, or using at night only with complex medical needs or lack of independence such as neuromuscular disease. May not be stable for 24 hours off ventilation);
- **Level 4:** Non-invasive, non-dependant (usually only uses during sleep, would usually remain stable for 24 hours without the ventilation).

**Service Model**

The HCW LTV working group considered a number of structures that required both the necessary infrastructure to be safe and sustainable, and with the right degree of flexibility that is responsive to the needs of patients, carers and the professionals. Critical mass of population, clinical professions and service infrastructure needs to be balanced with affordability.

The final agreed model involved the development of supraregional specialist centres, which link with regional Level 3 and 4 NIV services. This is presented in diagram 1 below.

Diagram 1. Supraregional and regional structure of LTV services.
Role and function
The supraregional centres will be the focal management point for all patients requiring level 1 and 2 LTV. This will support a clinical corridor from hospital to home with the appropriate infrastructure to provide:
- Clinical management of acute and exacerbation episodes of LTV patients;
- specialist weaning services;
- clinical optimisation of LTV patients to enable effective discharge;
- To provide education and training across primary, community and secondary care.

Structure
A core clinical team will provide the leadership for the service:
- 1 wte Consultant anaesthetist / intensivist with an interest in LTV;
- 1 wte Consultant Respiratory Physician with an interest in LTV;
- 1 wte Nurse Consultant with specialist training in LTV;
- 0.5 wte Clinical Psychologist.

The ‘Hub’ will be a discrete unit equipped and staff to the level equivalent of a high dependency unit as appropriate for this patient cohort. There will be the need for 2-3 beds per million population.

Factors that may affect the bed numbers and utilisation include:
- a successful domiciliary programme may reduce both frequency and duration;
- The longer-term improvement in morbidity and mortality may increase ‘later life’ requirements for increased frequency and duration;
- Increased prevalence of patients requiring LTV due to successful clinical management may increase volume of demand.

The spoke will be a domiciliary multidisciplinary team consisting of nurse specialists, physiotherapists, occupational therapists and clinical psychology.

A team structure is recommended to provide a sustainable, 24/7 365 days service across South Wales. The Nurse Consultant post as the linkage into the core clinical team will undertake the co-ordination of these two teams:
- Band 5, 6 & 7 Grade Nurses
- Snr Physiotherapist
- Physiotherapist
- Occupational Therapist

In South Wales, two such teams would be required to provide specialist LTV services for this complex group of patients as part of the patients’ wider, non-specialist care packages. This will enable an expeditious and safe discharge to a patients normal domiciliary arrangements.

In North Wales, one team would be required.
Standards of service for different dependency patients
The HCW LTV Working Group developed the following Standards and Dependency levels and whilst the Critical Care impact is at Levels 1 and 2 (Invasive Ventilation), Levels 3 and 4 have been included to show the full range of work from the HCW LTV Working Group

**STANDARDS, DEPENDENCY LEVELS 1 AND 2: INVASIVE VENTILATION**

| Level 1 patient | 24 hour dependent tracheostomy ventilation |
| Level 2 patient | less than 24 hour tracheostomy ventilation |

Identification and initial assessment

**LOCATION - EMERGENCY PATIENTS**
There should be two weaning centres set up one in South Wales, one in North Wales. Intensive care patients with difficulty in weaning from ventilation should be referred to a weaning centre with expertise for long-term ventilation

OR

Invasive ventilation patients may set up from a tertiary centre for spinal cord injuries (For some areas this may be a centre outside Wales for example Stockport in Cheshire) Transfer to the weaning centre should be arranged as long as links are maintained with specialist SCI advice.

The criteria for transfer are: ……………….. (EW/MS) variation on **Once the patient is stable, on less than 40% oxygen with single organ failure:**

When transfer is agreed this should occur within 72 hours.

Once the patient has been assessed and is unable to be weaned and decides to go for long-term ventilation the clock for time to discharge begins.

**LOCATION - PLANNED PATIENTS**
There may be patients with progressive neuromuscular conditions, or upper airway problems where initiation of invasive ventilation may take place in a more controlled manner. They may need to move from non-invasive to invasive ventilation because of ‘bulbar’ problems, causing difficulty in protecting the airway. In such cases a multi-disciplinary review may help identify those individuals or families who are most able to cope with the life changes such treatment may make. Sufficient time and information should be given to enable an informed decision to be made by the individual, taking into account the capabilities of any family members. This should take place in a centre with experience, equipment and personnel dealing with level 1, 2 and 3 patients. It may be possible to address environment issues before commencing invasive ventilation.

Weaning Centre: these will have the following expertise:
- Consultant Anaesthetist/ Intensivist with special interest in Home Ventilation
- Consultant Respiratory Physician with special interest in Home Ventilation
- Consultant Nurse for Home Ventilation
- Consultant Neurologist
- Other relevant speciality eg ENT
- Rehabilitation medicine- including technical expertise on wheelchairs, communication systems
- Social Service input
- Professions allied to medicine
• Psychologist input (level 1- patient and family)

TARGET for discharge- within 8 weeks of agreed need for long-term ventilation assessed by the weaning centre.

Initiation of treatment and preparation for discharge.

1. Multi disciplinary team assessment of care needs. This will vary from complete dependency (level 1) to possible day-time independence, walking, only needing invasive ventilation for sleep (level 2).
2. Review home for suitability, need for adaptation- door widths, electrical supply, wheelchair access, hygiene facilities.
3. Inform Health Commission Wales and Local Health Board of need for care package.
4. Trial equipment for home use: in general the simplest and most robust ventilator with alarms and battery capability to allow mobility- then provide funding agency with break down of all equipment costs.

Links established to
• Family
• GP- if possible encourage contact while in weaning centre
• District Nurse
• Continuing Care Manager for locality
• Local Care Agency
• Housing services if alterations to council housing or move required
• Any disease specific support groups

Level 1 patient: Once funding routes have been agreed recruit a Team leader to train and supervise carers to look after the patient. This should be a nurse with a minimum of 2 years ITU experience and preferably also experience of home ventilation and good teaching skills. This post holder would also take on co-ordinating of discharge process. The Specialist nurse/ Consultant nurse for LTV would support and help with teaching of the care team.

Level 2 patient: If less input required this may involve a part time team leader or the Specialist /Consultant nurse depending on existing workload.

The aim is to create a team who can care safely for the patient in the home environment

Training of the team will be in the weaning centre. Initially the care will be by ITU staff with carers working alongside. Before discharge home the carers should be capable of caring for the patients needs alone with the input of Team leader only.

Before discharge home:
• Additional non-clinical help should be in place for hygiene and laundry if no family available. This is equally important if family are active carers.
• Respite options will also need addressing.
• Transport either by own van or by ambulance/ black cab/ community transport needs addressing
• Emergency service notification for level 1 patients- ambulance, fire service
• Utility notification- Electricity company for all patients, some patients in rural areas may need a generator if power loss is frequent. Gas and telephone also for level 1 patients.
• Information to be given to Doctor’s deputising service so that appropriate response is made in case of out of hours non-respiratory problems.
• Mechanical back up for maintenance and repair of ventilators and other equipment- this could be within the hospital, or an outside agency, or with the manufacturers.
Clear directions should be written for family and carers specifying contact numbers at different times of the day.

- Oxygen prescribed and delivered at agreed flow rate if required.
- Resuscitation status and end of life decisions (living will) should be documented.

Discharge and follow up

- When actual discharge takes place- team leader needs to be part of roster within first 24 hours and the most highly trained of the carers be there overnight.
- 24 hour telephone helpline to the weaning centre with access to consultant anaesthetist advice.
- Home visit by Specialist/ Consultant nurse within first week including blood gases.
- Further follow up reducing to fortnightly and then monthly.
- Multidisciplinary review 3 monthly reducing to 6 monthly if stable- aim for a minimum of annual GP/Consultant joint visit .

Return to hospital

- If there is a deterioration in heath (particularly related to ventilation) or a breakdown in care team the fall back position would be to return to the weaning centre.
- If there is a non-ventilation health problem this should be reviewed by the GP not simply returned to hospital without being seen.
- When setting up the contracts for carers include the flexibility for the team to care for the patient in hospital as well as at home.
STANDARDS, DEPENDENCY LEVEL 3: DEPENDENT NON-INVASIVE VENTILATION (NIV)

Level 3 patients =
   a) Dependant on ventilation as using during the day as well as at night- example end stage COPD, end stage motor neurone disease.
   b) Only using ventilation during sleep but more physically dependent eg muscular dystrophy, motor neurone disease, spinal cord injury

Stage 1: Identification and Assessment

Awareness and access
Initial identification of patients who may benefit from non-invasive ventilation:
1. Regular monitoring of those with neuromuscular disease FEV1< 1 litre- symptoms, overnight oximetry, blood gases, PI max. Aim is to prevent acute admission ending up invasively ventilated. Discuss non-invasive ventilation with patient and family before it is needed. They may also need use of physiotherapy techniques or equipment to prevent chest consolidation before NIV or alongside NIV.
2. Ensure transition out of paediatric services into adult services of those with neuromuscular disease or established long-term ventilation.
3. Regular monitoring of those with Type 2 respiratory failure from respiratory disease. If several episodes of acute NIV have been required for acute on chronic respiratory failure (without over zealous administration of oxygen) then discuss with patient any long-term options. This may not improve quality of life if patient is in late stage of disease. Variable evidence about use in those with COPD. May be used as ‘a bridge’ when patient referred for lung transplant (cystic fibrosis, bronchiectasis).
4. Referral from Sleep medicine of patients with combination of two or three of following: obstructive sleep apnoea, obesity, COPD who have shown hypoventilation through sleep studies and blood gases.
5. Step down from ITU if acutely admitted with decompensated type 2 respiratory failure (respiratory disease, chest wall deformity, obesity hypoventilation) or with inability to clear secretions and subsequent chest consolidation or pneumonia (neuromuscular disease)
6. Set up user groups so that those likely to need long-term ventilation in the future meet others who already use the treatment.

LOCATION
Three regional centres (South Wales, West Wales and North Wales) with the links to the following expertise:
- Chest physician with special interest in long-term ventilation
- Anaesthetist/ intensivist with special interest in long-term ventilation
- Consultant neurologist
- Medical genetics expert
- Palliative Care
- Nurse specialists in long-term ventilation, neuromuscular disease
- Professions allied to medicine
- Respiratory physiology
- Rehabilitation medicine- including technical expertise on wheelchairs, communication systems
• Social Service input

Each regional centre should have capability for:

• Sleep studies preferably full polysomnography
• Home monitoring of blood gases or pulse oximetry and non-invasive carbon dioxide measurement—potential for clinicians to be released for home visits as well as specialist nurses.
• Ward or high dependency area (Respiratory Support Unit) with nursing staff skilled in use of non-invasive ventilation.
• Ward area able to care for physically disabled patients: electric beds, hoists, lifting aids, room to charge electric wheelchair, buzzer system for patient to be able to call for help OR additional staffing to ensure always able to summon help.
• Maintain a pool of equipment to be able to give individuals a trial of ventilation to see effect and to enable informed choice if wishes to take up the treatment. Preferably be able to offer choice of ventilation methods eg intermittent positive pressure ventilation (IPPV), pressure controlled ventilation (PCV), pressure assisted ventilation
• Finding optimum chest clearance procedures, education of patient and family, including if necessary trial of cough assist (mechanical insufflator-exsufflator) and discussion about mini-tracheostomy or full sized tracheostomy.
• Streamlined procedure for ordering equipment (eg ventilators, cough assist, batteries for use away from home) to discharge patient with if shows benefit and is compliant.
• If sufficient individuals from a different region, set up hub and spoke service, running joint clinics linking with local clinicians.

Stage 2: Initiation and preparation for discharge

Once an individual has been referred for, assessed and confirmed need for NIV a trial should take place. The effect of treatment and subjective improvement from treatment needs to be accepted by the patient before any discharge procedure is set in motion:

Target time to discharge. Start time is successful trial of non-invasive ventilation-discharge within 4 weeks if progressive disease patient who has home already adapted, or within 8 weeks if an acute change in mobility status and requiring home alterations.

1. Multidisciplinary assessment of care needs and devising support package.
   a. Discussion with patient and family about existing home environment and home review by occupational therapist if required.
   b. Social services referral. i) If patient has no family able and willing to act as carer set up safe system for care at home. This may range from patient self-caring with visiting care/ piper alarm to care package for all needs- hygiene, mobility, ventilation. This may be similar to level 1or 2 patient with a team leader. ii) If patient has family wishing to support the patient, ensure education and competency at use of ventilation in addition to any previous care roles. Ensure respite is offered/ carers assessment and regular subsequent review. Involve social worker in case can arrange ‘social support’ for washing, shopping, cleaning.
   c. Order necessary equipment: level 3a 2 ventilators, level 3b 1 or 2 machines depending on access to replacement machine. Cough assist machine, humidification and suction equipment if required. Funding routes need to be agreed. Establish clear responsibilities for ordering eg team leader if full care team
   d. Before discharge home alert GP and any community nurses already involved / to monitor for non-ventilation problems. Arrange home visit to discuss issues.
e. The individual who has high dependency must be able to summon help from another family member if he/she sleeps alone.
f. Review transport availability and any alterations required.
g. Alert electricity company and if vulnerable to power cuts consider either application for generator or supply of battery.
h. Ensure clear guidelines for mechanical problems with ventilator, contact numbers for different times of day. Ensure maintenance contract in place.
i. Oxygen prescribed and available at agreed flow rates if required.
j. Communication lines between primary and secondary care (all specialists involved) and responsibilities must be clearly defined.
k. Clear written advice should be given for use and care of equipment and care plan for routine needs and contact numbers for routine and urgent problems.
l. Ensure communication is effective between different professionals- using information folder in house and by copying letters to all involved.

Discharge and Follow up:

- Plan for minimum of telephone contact next day following discharge, plus Specialist nurse visit within 24 hours.
- Subsequent monitoring of ventilation and compliance by Specialist nurse initially with weekly visits including blood gases or monitoring of carbon dioxide and oxygen by non-invasive methods, either in out-patients or home visit.
- Once established, gradually reduce frequency of contacts to monthly then 3 monthly according to need.
- Ensure Consultant follow up (preferably multi-disciplinary team and GP) minimum 6 monthly when stable.
- Annual overnight oximetry
STANDARDS, DEPENDENCY LEVEL 4: NON-DEPENDENT NON-INVASIVE VENTILATION (NIV)

Level 4 patients= Using intermittent non-invasive ventilation at night. Will usually be stable for 1-3 nights off ventilation though may build up recurrence of carbon dioxide and symptoms.

Stage 1: Identification and assessment

Main diagnoses: chest wall deformity, obesity hypoventilation, chronic lung disease.

Awareness and access

Centres taking on this treatment for these patients should be:
- District General Hospital with active acute non-invasive ventilation service and sufficient nursing and technical back up to monitor patients on long-term ventilation. Medical expertise: Minimum chest physician. If possible intensive care link as well.
- Sufficient patient numbers to maintain expertise - suggest minimum 50.

Referral routes

- Consultant referral from other speciality
- Individuals with Sleep apnoea +/- Obesity +/-COPD and evidence of Type 2 respiratory failure or sleep hypoventilation.
- Individuals identified via acute NIV service who have had several episodes of acute on chronic respiratory failure not due to over zealous oxygen administration who have a good quality of life and are willing to use mask ventilation long-term. These should be followed closely after acute NIV, optimising oxygen administration aiming for oxygen saturations 90%, monitoring blood gases.
- Step down from ITU

Each centre should have:
- Technical and nursing support to be able to do overnight oximetry and basic sleep studies (air flow, oximetry, snoring, limb movements, video) and monitoring of compliance and blood gases.
- Availability of bilevel ventilators as a minimum and preferably other modes such as IPPV ventilators to trial patients on. Equipment to have disconnection alarms.
- Agreed route of funding for patient’s from locality once have shown benefit and compliance with treatment.

Assessment will include:
- Full patient history and clinical examination
- Spirometry, Overnight oximetry, early morning blood gases and baseline daytime gases. Full sleep study if indicated.
- Exclusion of physical or psychological contra-indications to the use of mask ventilation.

Trial of ventilation will usually take place as an in-patient (though some centres have achieved this as an out patient) and should show objective and subjective improvement. Once patient has agreed to continue treatment clock starts for target discharge time.
Target time to discharge: 2 weeks from successful trial of ventilation (subjective and objective improvement) with patient agreeing to use the treatment.

Preparations for discharge should include:
- They or their family should be able to demonstrate competence in using equipment.
- Instructions should be written for routine care of machine and for action to be taken if mechanical problem with the ventilator.
- Maintenance and breakdown policy should be in place.
- If oxygen is required a prescription is arranged at specified rate and is in situ.
- The electricity supplier is informed of need for prompt reconnection in case of supply interruption.

Review and monitoring
- Minimum follow up telephone call next working day
- Home visit by specialist nurse and review of blood gases or monitoring of carbon dioxide and oxygen levels by non-invasive methods within 48 hours of discharge,
- Subsequent visit or clinic review within 2 weeks. Review should include inspection of masks and circuit, settings, compliance, blood gases or non-invasive monitoring of O2 and CO2.
- Subsequent follow up will vary with expertise available and any patient changes. Minimum of annual Consultant contact with overnight oximetry and review as above.
- If any family are involved in care then the review should include carer assessment.
Any changes in need should trigger further input as level 3 care pathway. This may mean referral to a larger centre.

Reference:
1. NHS Modernisation Agency – Critical Care Programme. Weaning & long term ventilation
2. WAG Financial Information Strategy – Critical Care Index Calculations for 2006-7
4. HCW Adult Long Term Ventilation Clinical Service Model
## HCW Contributors to standards and service model

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### Additional information regarding national service structures, funding and standards

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The draft standards and adult consultation document was circulated originally for comment to the following professional groups.
Circulation of draft discharge and standard documents:

- Adult Chest Physicians in Wales
- Adult Intensive Care Lead Clinicians
- Welsh Intensive Care Society
- Lead Nurses Adult Critical Care
- Adult Respiratory Nurses
- Adult Neurologists
- Paediatric Ventilation Nurse Specialist, Cardiff
- Motor neurone Nurse Specialist, Cardiff
- Consultants in Rehabilitation medicine, Rookwood Hospital, Cardiff
- Nurse Specialists for home ventilation from UK and Denmark
- Attendees of Welsh Neuromuscular Network Conference 29th September 2004