Management of Non-Invasive Ventilation (NIV) in Acute Hypercapnic Respiratory Failure at LRI

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<tr>
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<th>Policy and Guideline Committee</th>
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<td>Emma McDonald/Maddie Hartley</td>
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<td>Critical Care Outreach Team</td>
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REVIEW DATES AND DETAILS OF CHANGES MADE DURING THE REVIEW

V1 – reviewed November 2013 – Policy updated into new Trust template

KEY WORDS

Non-Invasive Ventilation, NIV, Hypercapnoea, Type 2 Respiratory Failure
SUMMARY

This policy document is intended as guidance for staff commencing Non-Invasive Ventilation at the Leicester Royal Infirmary, for the management of hypercapneic respiratory failure. This policy will document required education for all disciplines in preparation for commencement of NIV and areas of safety to deliver the intervention. Staff responsibilities regarding commencement management and reporting of audits will also be addressed.

1 INTRODUCTION

1.1 This document provides guidelines, for the management of Non-Invasive Ventilation (NIV) in Acute Acidotic Hypercapnic Respiratory Failure, this includes patients with Exacerbation of Chronic Obstructive Pulmonary Disease (COPD) that is not responding to maximal medical therapy. It is for a specific group of patients with single system failure in whom NIV is intended as a short-term treatment and provides a three-step approach to identification, monitoring and transfer of patients requiring Non-Invasive Ventilation (see appendix 1).

1.2 NIV is the delivery of mechanical pressure to support the patient’s inspiratory effort via either a full face mask or nasal mask.

1.3 A glossary of terminology and all abbreviations used within this guidance can be found in Appendix 1.

2 POLICY AIMS

2.1 The standards in this policy aim to rationalise the implementation and management of NIV therapies implemented on the Acute Medical Unit (AMU) and Emergency Department (ED) at the Leicester Royal Infirmary (LRI).

2.2 This policy outlines:
   a) The point of need for NIV and patient inclusion criteria
   b) Training and competencies required to prescribe, commence and manage NIV
   c) Requirements for safe delivery of NIV on AMU and ED at LRI
   d) Guidance for management of patients requiring NIV for greater than 48 hours

3 POLICY SCOPE

3.1 This policy applies to doctors, nurses and physiotherapists working in AMU and ED at the LRI. Critical Care Outreach nurses and Out-of-hours Nurse Practitioners acting in support are also included.

3.2 Patients must be nursed by staff with the appropriate skills and knowledge to deliver safe NIV. Nurses within ED Resus and AMU ward 16 Acute Care Bay (ACB) are required to complete the NIV teaching package (available in e-learning form) and receive training from the Education and Practice Development team in the respective environment.

3.3 Patients receiving NIV must be nursed in areas of close observation identified in ED and AMU. This is inclusive of Resus department in ED and Ward 16 ACB on AMU only. In those patients where NIV is not the ceiling of therapy, an Intensive Care referral should be made. Patients who require NIV at the Leicester General Hospital are to contact outreach and be escalated to critical care.

3.4 Where necessary, nurses should be supported by medical staff, Critical Care Outreach/Out-of-hours Nurse Practitioners/Physiotherapists and other allied health professionals trained in the delivery of NIV.

3.5 This policy applies to adult patients suffering hypercapneic respiratory failure only. Inclusion criteria should be reviewed for each patient prior to NIV commencement, to deem if the therapy is appropriate (see appendix 2).
3.6 NIV can only be prescribed by those healthcare professionals (Doctor, Outreach Nurse, Out-of-hours Nurse Practitioner, Senior Physiotherapist) deemed competent to prescribe it (see appendix 3).

3.7 The emphasis at all times should be transfer of the patient once stable to the Glenfield Hospital for ongoing management by respiratory specialists where required (see appendix 4 for transfer check sheet)

4 DEFINITIONS

**Non-invasive ventilation** - NIV (often interchanged with the abbreviation NIPPV) allows for bi-level positive pressure ventilation to be applied throughout the whole of the respiratory cycle whilst breathing spontaneously and without any conduit access to the airways. Application of inspiratory positive airway pressure (IPAP) and expiratory positive airway pressure (EPAP) decreases the work of breathing thereby improving alveolar ventilation and facilitating oxygenation without raising PaCO$_2$.

NIV also assists in unloading the respiratory muscles by reducing the trans-diaphragmatic pressure, pressure time index of respiratory muscles and diaphragmatic electromyographic activity this leads to alteration in breathing pattern with an increase in tidal volume, decrease in respiratory rate and increase in minute volume whilst assisting in overcoming intrinsic peep.

In addition NIV facilitates in resetting the respiratory centre ventilatory response to PaCO$_2$.

5 ROLES AND RESPONSIBILITIES

5.1 Executive Lead

The Medical Director is Executive Lead for this Policy and has appointed a Senior Lead Clinician to act on their behalf. The Senior Lead Clinician Rachel Evans is responsible for:

a) Providing an advisory, training and monitoring role on all aspects of NIV usage in acute hypercapnoeic respiratory failure

5.2 Named lead consultants within ED and AMU and Head of Nursing are responsible for:

a) Ensuring this policy is disseminated and implemented within their Clinical Management Group (CMG)

b) Identifying a ‘sub lead’ to support the implementation, training and monitoring of this policy and guidelines (see section 7)

c) Ensure staff have the opportunity to attend training as necessary in line with service need and as identified in their annual appraisal

d) Ensure staff are aware of NIV audit process and are comfortable with its commencement, implementation and submission.

5.3 Consultant in charge of the Patient:

a) Has overall responsibility for the care of the patient

b) Provide advice and support to their medical team if concerns or issues are raised regarding training needs or competence

c) Ensure any incidences regarding pleural aspiration or chest drains are reported through Datix

5.4 Outreach Specialist Nurse:

a) Provide support and guidance with commencement, implementation and ongoing management of NIV
b) In the case of patients receiving NIV who would be deemed suitable for ITU support, act as liaison with ITU to keep informed

c) Specialist Nurse within the Outreach team to collate audit data and present results yearly to medical director, NIV lead consultants (ED and AMU), LRI Outreach Lead Consultant and Outreach team.

5.5 Nursing Staff are responsible for:

Ensuring the care of patients requiring NIV usage in acute hypercapnoeic respiratory failure is provided in line with this policy and its associated guidelines.

5.6 All staff undertaking the commencement of NIV or providing care for patients receiving NIV are responsible for:

a) Ensuring they are compliant with the standards set out in this policy and associated guidelines

b) Work within their own competence and act on any identified training needs

c) Gain consent from patients (except in the event of a life threatening emergency)

d) To report all incidents involving NIV (including near miss events) via the DATIX incident reporting system

5.7 Staff commencing therapy

a) NIV must only be prescribed by Healthcare Professionals (Doctor, Outreach nurse/Out-of-hours Practitioner, Senior Physiotherapist). This prescription must be documented in the patient medical notes.

b) Prior to commencement, it is the responsibility of the clinician initiating NIV to discuss therapy implications with senior members of the parent team and negotiate transfer to an area of safety (ED resus/WD 16 ACB). It is the responsibility of the clinician instigating NIV to remain with the patient while an area of safety becomes available.

c) Those prescribing NIV are required to complete all applicable parts of the NIV audit proforma (see appendix 4)

6 POLICY STATEMENTS AND PROCEDURES

6.1 Indications for NIV implementation

6.1.1 Patients may be suitable for NIV if they have known or suspected COPD and all of the following features of Acute Hypercapnoeic Respiratory Failure:

a) Arterial pH 7.25-7.35 with PaCO2 > 6.0

b) Arterial pH < 7.25 with PaCO2 > 6.0 who are not for escalation to critical care. Consideration should be given to discussing resuscitation status of the patient

c) Arterial pH < 7.25 with PaCO2 > 6.0 who are for escalation to critical care. Review by critical care (SpR or above)/Respiratory Physician should be sought at time of NIV commencement

6.1.2 For non-COPD patients advice should be sought regarding use of NIV prior to its commencement

6.1.3 All patients requiring NIV at the LRI site should be referred to the Critical Care Outreach team

6.1.4 Patients requiring NIV therapy should receive this therapy at the point of need regardless of location. Upon stabilisation, steps should be taken to transfer the patient to a clinical area familiar with NIV usage (ED Resus/Ward 16 ACB)
6.2 Other indications for NIV therapy

NIV may be used in the following patients if **this is to be the ceiling of therapy**. Please seek expert advice (Respiratory Physician and/or Acute Medical Consultant/Critical Care SpR/Consultant/Outreach Specialist Nurse) if NIV is to be considered in a patient with hypercapnoea and one of the following:-

- a) Life threatening hypoxaemia
- b) Severe co-morbidity
- c) Confusion/agitation/severe cognitive impairment
- d) Upper gastrointestinal surgery
- e) Copious respiratory secretions
- f) Bowel obstruction

In patients suffering hypercapnoea and any of the above for whom **NIV is not the ceiling of therapy** a Critical Care referral should be made.

6.3 Contraindications for NIV

NIV may not be suitable if any of the following present:-

- a) Facial burns/trauma/recent facial or upper airway surgery
- b) Fixed upper airway obstruction
- c) Undrained pneumothorax/haemothorax
- d) Inability to protect airway
- e) Patient moribund
- f) Acute asthmatic attack
- g) Active vomiting. NIV should be used with caution in patients at risk of vomiting

For troubleshooting guide see appendix 5

6.4 Location for NIV delivery

6.4.1 NIV therapy must be delivered in areas experienced in its management. At LRI this is ED Resus and Ward 16 ACB. In the case of patients requiring NIV for acute hypercapnoeic respiratory failure outside of these areas, transfer to the Ward 16 ACB should be a priority.

6.4.2 The emphasis at all times should be transfer of the patient once stabilised to the Glenfield Hospital site for on-going management by respiratory specialists where required. A check sheet to facilitate safe transfer to Glenfield Hospital can be found with NIV audit proforma (see appendix 6)

6.5 Specific Care for Patients Requiring NIV

6.5.1 Parameters for medical assistance/intervention must be set and clearly documented in patient records **PRIOR** to NIV commencement

6.5.2 Pre NIV baseline observations must include:

- a) Blood Pressure
- b) Pulse
- c) Respiratory Rate
- d) Oxygen saturations
- e) Percentage of oxygen delivered
6.5.3 Upon commencement of NIV therapy patients must receive 15 minute observations for first hour and hourly observations for minimum of 4 hours. Further observations must be completed as clinical condition dictates and no less than 4 hourly while NIV continues

6.5.4 All patients receiving NIV must receive continuous SpO2 monitoring until stable

6.5.5 All patients receiving NIV must receive continuous ECG monitoring until discontinuation of NIV

7 **EDUCATION AND TRAINING REQUIREMENTS**

7.1 Before commencement of NIV, the operator must meet all the required training. Each training requirement must be repeated annually to ensure competency

7.2 Training paths available include:-

7.2.1 **Emergency Department Non-Invasive Ventilation training**

Involves an e-learning theory assessment, practical demonstration and assessment in the workplace. Requires completion of a supervised practice booklet

7.2.2 **Non-Invasive Ventilation for Ward Nurses**

Involves an e-learning information package and ward based equipment competency assessment (See Appendix 7)

7.2.3 **Non-Invasive Ventilation for Doctors**

Involves an e-learning information package.

7.2.4 **Non-Invasive Ventilation for Outreach Nurses**

Involves an e-learning information package and completion of equipment and competency assessment (See Appendix 7)

7.2.4 **Non-Invasive Ventilation for Physiotherapists and Allied Health Professionals**

Completion of an equipment and skills competency package

8 **PROCESS FOR MONITORING COMPLIANCE**

8.1 The implementation of NIV in acute hypercapnoeic respiratory failure at the LRI will be subject to a continual audit with no fixed end date (see appendix 6). All patients requiring interventional NIV at the LRI site will be included.

8.2 The audit will be commenced by the clinician prescribing NIV and will remain in the patient’s notes until one of the following conclusion criteria is met:

a) Patient is transferred to Glenfield Hospital

b) Therapy is discontinued

c) Patient dies receiving therapy

Upon conclusion, NIV audit must be passed to the Critical Care Outreach Team.

8.3 It is the responsibility of the named nurse or clinician on each shift to update the audit with any relevant new information.

8.4 Audit data will be kept and compiled by the Critical Care Outreach Team. A report of all audited data will be compiled annually and presented to ED and 16ACB NIV leads by the Outreach lead nurse.

8.5 Key performance indicators for NIV audit include:

a) Suitability of treatment based on inclusion criteria

b) Diagnosis

c) Effect of treatment after 2 hours

d) Effect of treatment after 6 hours

e) Outcome of therapy
f) Hospital mortality
g) Mortality by location
h) Complimentary therapies

8.6 If concerns in care are highlighted with regards to NIV and it’s management a Datix from must be completed and the following should be made aware, Parent Consultant, the ward manager of the clinical area and a member of the Outreach team.

9 **EQUALITY IMPACT ASSESSMENT**

9.1 The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

9.2 As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

10 **LEGAL LIABILITY**

The Trust will generally assume vicarious liability for the acts of its staff, including those on honorary contract. However, it is incumbent on staff to ensure that they:

- Have undergone any suitable training identified as necessary under the terms of this policy or otherwise.
- Have been fully authorised by their line manager and their CMG’s to undertake the activity.
- Fully comply with the terms of any relevant Trust policies and/or procedures at all times.
- Only depart from any relevant Trust guidelines providing always that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible clinician it is fully appropriate and justifiable - such decision to be fully recorded in the patient’s notes.

It is recommended that staff have Professional Indemnity Insurance cover in place for their own protection in respect of those circumstances where the Trust does not automatically assume vicarious liability and where Trust support is not generally available. Such circumstances will include Samaritan acts and criminal investigations against the staff member concerned.

Suitable Professional Indemnity Insurance Cover is generally available from the various Royal Colleges and Professional Institutions and Bodies. For further advice contact: Head of Legal Services on 0116 258 8960.

11 **SUPPORTING REFERENCES, EVIDENCE BASE AND RELATED POLICIES**

This policy has been adapted from the British Thoracic Society Guidelines for management of patients with COPD suffering acute type 2 respiratory failure.


12 **PROCESS FOR VERSION CONTROL, DOCUMENT ARCHIVING AND REVIEW**

12.1 This document will be uploaded onto SharePoint and available for access by Staff through INsite. It will be stored and archived through this system.

12.2 This document will be reviewed every three years by Critical Care Outreach team
Appendix 1: Definitions

NIV- Non-invasive Ventilation
Use of a positive pressure system to assist and support the spontaneous respiratory effort of a patient. Support will be supplied in a biphasic manner (Alternating level of positive pressure between inspiration and expiration) via a specialist ventilator and facemask.

IPAP- Inspiratory Positive Airway Pressure
Minimum level of pressure exerted upon patient at the point of inspiration, encouraging improved gaseous exchange. Measured in cmH20

EPAP- Expiratory Positive Airway Pressure
Minimum level of pressure exerted against expiratory effort of patient. This ensures a minimum level pressure within NIV system, promoting alveolar reclamation. Measured in cmH20

Type 1 respiratory failure
Relative hypoxia in absence of hypercapnoea

Type 2 respiratory failure
Relative hypoxia in presence of hypercapnoea

Hypercapnoea
Serum Carbon Dioxide levels greater than 6 KPa
Guidelines for Use of NIV in Acute Exacerbation of Acute Acidotic Hypercapnic Respiratory Failure on AMU and ED LRI site

Contra-Indications

**Absolute**
- Facial burns/ trauma/ recent facial or upper airway surgery
- Fixed upper airway obstruction
- Pneumothorax
- Inability to protect airway
- Patient moribund
- Acute asthmatic attack

**Cautions**
- Life threatening hypoxaemia
- Severe co- morbidities
- Confusion/ agitation or cognitive impairment
- Upper GI surgery
- Bowel obstruction
- Copious respiratory secretions
- Haemodynamically unstable requiring inotropes/ pressors

NIV CAN BE USED IF THE PATIENT HAS ANY OF THE IDENTIFIED CAUTIONS IF THAT IS THEIR CEILING OF TREATMENT
Appendix 3

Guidelines for Clinical Management of NIV in Acute Exacerbation of Acute Acidotic Hypercapnic Respiratory Failure on AMU and ED at LRI Site

Patient fulfils criteria selection for NIV (See Step 1 sheet)

Establish NIV
- Pressure Support
- Full face mask
- IPAP commence at 10 cms H\textsubscript{2}O increasing, as tolerated to 20 cms H\textsubscript{2}O within the first 10-15 mins
- EPAP 4cm H\textsubscript{2}O
- Back up rate 12bpm and Ti to 1 sec
- Set alarms and Lock machine
- Additional O\textsubscript{2} to keep SpO\textsubscript{2} 88-92%
- Continuous saturation & ECG monitoring
- Complete NIV Patient record (step 2)
- Set calling parameters with medical staff

STABLE/IMPROVED
- pH stable/improved
- PCO\textsubscript{2} stable/improved
- RR stable
- SpO\textsubscript{2} 88-92%
- Clinically improved
- Continue NIV at current settings as tolerated with minimal interruption for 1st 24hrs

Repeat ABG’s 1 hour later

FAILURE TO RESPOND/DETERIORATION
- pH falling
- PaCO\textsubscript{2} rising
- PaO\textsubscript{2} falling
- Clinically deteriorating

In all cases optimise NIV*
- Assess for leakage
- Check ventilation circuit
- Check ventilation adequate
- Assess for pneumothorax/aspiration
- Check medical treatment delivered
- Check patient synchronisation with ventilator

*Full details on back

PaCO\textsubscript{2} Rising
- Aim for max IPAP up to 25cm H\textsubscript{2}O
- Adjust O\textsubscript{2} delivery aim for SpO\textsubscript{2} 88-92%
- Check trigger sensitivity

PaO\textsubscript{2} Falling
- Increase FiO\textsubscript{2}
- Increase EPAP (and Increase IPAP to maintain Pressure Support difference)
- Do not increase EPAP over 7cm H\textsubscript{2}O

Yes
- Improvement

No
- Re-assess patient
- Review treatment
- Consider discontinuing NIV and palliation

STABLE/IMPROVED
- Continue NIV at current settings as tolerated for 1st 24hrs with minimal interruption
- Arrange transfer to GGH
- Follow/complete NIV transfer sheet (Step 3)

Continue
- Refer to respiratory consultant for transfer
- Follow/complete transfer sheet (Step 3)
Appendix 4

Training for Non medical staff to enable prescription of NIV for patients on AMU and ED at LRI Site

Authorised Personnel
All professionals who undertake this role must fulfil all of the following criteria:-

Nurse
- Registered nurse with the NMC
- Regularly care for patients requiring advanced respiratory support (CPAP, High Flow)
- Member of the Critical Care Outreach team
- Able to instigate basic resuscitation measures
- Possess current basic life support certificate

Physiotherapist
- Named registered physiotherapist with HPC working within respiratory care at Band 7 or above/ Band 6 with 3 years respiratory physiotherapy experience
- Regularly care for patients requiring advanced respiratory support (CPAP, High Flow)
- Able to instigate basic resuscitation measures
- Possess current basic life support certificate

All Authorised Personnel must:

- Only develop practice in relation to the appropriate part of their registrar
- Accept accountability for their practice
- Attend a training session on NIV machine including setting of parameters, changing parameters, setting alarms, locking machine and trouble shooting.
- Complete education competencies associated with machine (see appendix 3)
- Complete specialist nurse scenarios via on-line assessment
- Complete NIV theoretical competencies (see appendix 4)
- Demonstrate an understanding of Arterial Blood Gas analysis
- Demonstrate an understanding of Respiratory physiology
- Demonstrate understanding of altering NIV parameters in relation to interpretation of Arterial Blood Gases
- Up to date with Basic Life Support Training
- Be aware of and demonstrate understanding of the following documents:
<table>
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<tr>
<th>Complication</th>
<th>Cause</th>
<th>How to avoid/ What to do</th>
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<tr>
<td>Pneumothorax</td>
<td>• Resulting from high inspiration pressures in patients with bullous disease</td>
<td>Limit IPAP $\leq 25$ cm H$_2$O where possible. If suspected discontinue NIV apply oxygen via reservoir bag 15L/min and Call for urgent senior assistance</td>
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| Hypotension                  | • Increased intra-thoracic pressure and decreased venous return  
• Development of auto-peep                                              | Assess patient’s volume status and ensure patient is appropriately fluid resuscitated. Ensure NIV settings allow for full expiration |
| Failure to ventilate         | • Poor interface or clinical sensitivity not set  
• Sub-optimal treatment of underlying condition  
• Development of complications  
• Clinical deterioration                                                  | Clinically reassess, optimise therapy. Including titration of IPAP & EPAP pressures appropriately. Failure to improve consider palliation |
| Upper airway Obstruction     | • Drop in conscious level                                               | Discontinue NIV. Head tilt chin lift, apply oxygen and call for urgent senior assistance                     |
| Air Leak                     | • Interface not fitting well                                            | A small air leak is acceptable as the machine will compensate. Monitor ABGs                               |
| Increased risk of aspiration | • Patient may vomit and be unable to remove mask                        | Ensure patient is conscious and knows how to remove mask or call for nurse                                 |
| Gastric distension & vomiting| • Caused by patient swallowing large amounts of air                    | Remove mask intermittently, (consider nasogastric tube but this is not common practice)                   |
| Retention of secretions      | • Application of dry gases                                              | Regular nebulisers, Ensure appropriate hydration (oral/IV). Physiotherapy referral. Consider adjuncts for secretion removal |
| Pressure sores on nose and ears| • Inappropriate fitting mask  
• Mask applied to tightly                                                   | Check pressure areas regularly consider different interfaces.                                           |
| Patient intolerance/Lack of compliance | • May feel unpleasant and more difficult to breathe.  
• Can feel claustrophobic                                                  | Reassure and explain benefits, consider intermittent NIV                                                 |
| Sleep Fragmentation          | • Monitoring and treatment interventions                               | Ensure all interventions carried out simultaneously where possible to allow for sleep                    |
### Patient details

- **Full name**
- **Date of birth**
- **Unit number**

(Use sticker if available)

### Clinical presentation

#### Admission Diagnosis
- □ COPD
- □ Chest wall / neuromuscular problem
- □ Obesity / hypoventilation
- □ Cardiogenic pulmonary oedema
- □ Other (please state)

#### Smoking History
- □ Current
- □ Ex
- □ Never

#### Controlled O₂ received?
- □ Yes
- □ No

#### Focal consolidation on CXR?
- □ No
- □ Yes

#### Optimal medical management?
- □ Steroids
- □ Antibiotics
- □ Nebulisers

#### Performance scale (MRC dyspnoea scale)
1. Not troubled by breathlessness except on strenuous exercise
2. Short of breath on hurrying or walking up a steep hill
3. Walks slower than contemporise on a level ground because of breathlessness, or has to stop for breath when walking at own pace
4. Stops for breath after walking about 100m of after a few minutes on level ground
5. Too breathless to leave the house, or breathless when dressing or undressing

### Treatment planning

#### Decision to commence NIV made by
- □ Consultant
- □ SpR
- □ SHO
- □ ITU team
- □ Outreach team
- □ Physio
- □ Other (state role)

#### NIV Commenced in
- □ ED resus
- □ ACB
- □ CDU
- □ GGH respiratory ward
- □ Other

#### Clinical plan if NIV fails
- □ Escalate to ITU / intubation
- □ Palliative / supportive management

#### If escalation appropriate was patient discussed with ITU?
- □ Yes
- □ No

#### Documented plan in case of NIV failure
- □ Yes
- □ No
- □ DNAR signed (if applicable)

#### Previously treated with NIV?
- □ Yes (Acute)
- □ No
- □ Long term
- □ Nocturnal

### Arterial blood gases

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<th>Date</th>
<th>Time</th>
<th>FiO₂/L/min</th>
<th>pH</th>
<th>pCO₂</th>
<th>pO₂</th>
<th>HC₀₃</th>
<th>BE</th>
<th>IPAP</th>
<th>EPAP</th>
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</tbody>
</table>
## Outcomes

<table>
<thead>
<tr>
<th>Date / time NIV was discontinued</th>
<th>Duration of NIV</th>
<th>Weaning programme</th>
<th>Total length of hospital stay (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>□ Yes □ No</td>
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</tbody>
</table>

### Outcome of NIV
- □ Success
- □ Failure
- □ Failure but proceeded to intubation

### Reason for failure
- □ Intolerance of mask
- □ General intolerance
- □ Asynchrony
- □ Excessive secretions
- □ Excessive leaks / poor mask fitting
- □ Patient choice to stop treatment

### Outcome of admission
- □ D/C without NIV
- □ D/C with NIV
- □ Transferred to Glenfield for long-term NIV
- □ Death (Respiratory cause)
- □ Death (Non-respiratory cause)

### Any other comments/incidents

---

NB: Paper copies of this document may not be most recent version. The definitive version is held on Insite Documents.
### Patient details

- **Full name**: 
- **DoB**: 
- **Unit number**: (use sticker if available)

### ABG prior to starting NIV

<table>
<thead>
<tr>
<th>Time</th>
<th>pH</th>
<th>PaCO&lt;sub&gt;2&lt;/sub&gt;</th>
<th>PaO&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Bicarbonate (actual)</th>
<th>Base excess</th>
<th>SaO&lt;sub&gt;2&lt;/sub&gt;</th>
<th>FiO&lt;sub&gt;2&lt;/sub&gt;</th>
<th>Respiratory rate</th>
</tr>
</thead>
</table>

### Initial NIV Settings

<table>
<thead>
<tr>
<th>Mask Size</th>
<th>IPAP</th>
<th>EPAP</th>
<th>FiO&lt;sub&gt;2&lt;/sub&gt; (L/min)</th>
<th>SpO&lt;sub&gt;2&lt;/sub&gt; on NIV</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ M</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>☐ L</td>
<td></td>
<td></td>
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<tr>
<td>☐ Nasal (if even ‘L’ does not fit)</td>
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</table>

### Medical calling parameters (to be completed by doctor prescribing NIV)

<table>
<thead>
<tr>
<th>Signature / print name</th>
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</table>

<table>
<thead>
<tr>
<th>RR</th>
<th>SpO&lt;sub&gt;2&lt;/sub&gt;</th>
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</thead>
<tbody>
<tr>
<td>&lt;</td>
<td>Drop in conscious level</td>
</tr>
<tr>
<td>&gt;</td>
<td></td>
</tr>
<tr>
<td>&lt;</td>
<td>Haemodynamic instability</td>
</tr>
</tbody>
</table>

If at any time clinical condition or calling parameters are triggered medical staff must be notified.

---

**Policy for the management of Non-Invasive Ventilation in Acute Hypercapnoeic Respiratory Failure at LRI**

**Awaiting Approval**

**Next Review: January 2015**

**NB: Paper copies of this document may not be most recent version. The definitive version is held on InSite Documents**
Patients on NIV require continuous monitoring of
- \( \text{SpO}_2 \)
- ECG (during acute phase)

Respiratory rate and \( \text{SpO}_2 \) must be recorded
- every 15min during 1st hour after NIV started
- hourly for 4 hours
- thereafter as clinical condition requires

Any changes to NIV machine and supplemental \( \text{O}_2 \) settings must be recorded and signed for

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>IPAP / EPAP (only record if changed)</th>
<th>Doctor initials</th>
<th>( \text{FiO}_2 ) (only record if changed)</th>
<th>Resp rate</th>
<th>( \text{SpO}_2 )</th>
<th>Facial pressure areas checked (Y/N)</th>
<th>Nurse initials</th>
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Date / Time NIV was discontinued __________________________

Reason for discontinuing NIV must be documented in patient’s notes
### Step 3  
**LRI NIV checklist for transfers to Glenfield Hospital**

<table>
<thead>
<tr>
<th>Patient details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full name</td>
</tr>
<tr>
<td>DoB</td>
</tr>
<tr>
<td>Unit number</td>
</tr>
</tbody>
</table>

- Please retain this proforma in patient’s record
- Transfers from **AMU** should not normally be undertaken out of hours
- Transfers of patients suitable for potential escalation to ITU care from **ED** should not be undertaken out of hours

**Medical checklist**
- Accepted by Glenfield Hospital respiratory consultant; ________________________________
- Glenfield Hospital respiratory team has confirmed patient destination; ________________________________
- Nurse coordinator on Glenfield Hospital receiving ward contacted
  - Bed will be available (ED patients: within 4 hours of patient’s arrival in ED)
  - NIV machine will be available on ward
- Resuscitation (DNAR) status of patient documented in patients notes
- If escalation to ITU appropriate
  - Patient has been reviewed by LRI ITU team
  - Glenfield Hospital ITU bed available
  - Glenfield Hospital ITU medical staff contacted
  - Glenfield Hospital critical care outreach team contacted (bleep 5293)

**Nursing checklist**
- Paramedic crew ambulance booked; ________________________________
- Items prepared for transfer
  - Patient record
  - Property
  - Medication
- Next of kin notified of transfer reason, time and destination
- Escort (e.g. HCA) available to bring NIV machine back to its LRI base
- Receiving ward called immediately prior to patient leaving LRI - bed and NIV machine ready

**Signature** _____________  **Role** __________  **Print name** ______________  **Date_______  Time______**
Appendix 7

University Hospitals of Leicester NHS Trust
NIPPY 3+ NON-INVASIVE VENTILATOR
Competency Checklist

Name: ____________________  Position: ____________________________  Site: LRI

Competency Training Statement: Participant will demonstrate the theory of operation and practical application of the ventilator in a clinical setting

<table>
<thead>
<tr>
<th>Performance Criteria</th>
<th>NIPPY 3+ Ventilator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Demonstrate set up/operation and correct application of NIPPY inc</td>
<td>Competency Date</td>
</tr>
<tr>
<td>a) Is able to list the safety features of the ventilator.</td>
<td>Assessor</td>
</tr>
<tr>
<td>b) Is able to safely connect AC power.</td>
<td></td>
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<tr>
<td>c) Is able to ensure battery back-up is charged or charging.</td>
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<tr>
<td>d) Is able to turn ventilator on/off.</td>
<td></td>
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<tr>
<td>e) Is able to set-up tubing and interface components.</td>
<td></td>
</tr>
<tr>
<td>f) Is able to select correct mode and set correct prescribed ventilator setting.</td>
<td></td>
</tr>
<tr>
<td>g) Is able to set upper and lower flow pressure alarms.</td>
<td></td>
</tr>
<tr>
<td>h) Is able to lock and unlock machine.</td>
<td></td>
</tr>
<tr>
<td>i) Is able to attach oxygen correctly if required.</td>
<td></td>
</tr>
<tr>
<td>j) Is able to attach and correctly use in line nebuliser.</td>
<td></td>
</tr>
<tr>
<td>k) Is able to trouble shoot machine when alarms.</td>
<td></td>
</tr>
<tr>
<td>l) Is able to disconnect and dispose of tubing correctly.</td>
<td></td>
</tr>
</tbody>
</table>