**Acute Non-Invasive Ventilation management can be improved by focused multidisciplinary education and an algorithm guideline**

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### INTRODUCTION

Bi-level Non-Invasive Ventilation (NIV) reduces mortality in decompensated Acute Exacerbations of COPD by up to 50\%.

Respiratory consultants at our hospital are not always available for 24/7 specialist advice, and junior trainees (especially below Registrar level) may not have experience of NIV and its management.

The aim of this programme was to improve NIV management using focused multidisciplinary education and algorithm guidance.

### METHODS

A quantitative questionnaire and audit were conducted to assess medical and nursing staff knowledge, confidence and current NIV practice. Medical staff surveyed included FY2, GP Specialty Trainee and Medical Specialty Registrars, forming the middle grade team and Hospital at Night Team Leaders.

The questionnaire consisted of 11 questions relating to NIV indications and contraindications. The audit included all patients referred to NIV over the period from October 2012 to February 2013. It investigated NIV initiation day and time, timing and results of Arterial Blood Gas (ABG) measurements in conjunction with NIV settings and the outcome of NIV therapy.

An educational programme and an algorithm guiding management (Figure 1) were developed in association with new hospital guidelines, then taught in small group theoretical and practical sessions. The questionnaire and audit were repeated after the education.

### RESULTS

A total of 11 patients were included in the audit.

Twelve medics and four nurses from the Level 1 area replied to the anonymous questionnaire, with 30\% returning the post intervention questionnaire.

The questionnaire revealed a low average baseline confidence of 30\% for FY2, GP Specialty Trainee and Specialty Registrar medics, improving to 75\% after the intervention using a numerical scale. A smaller improvement in confidence was also noted for nursing staff.

Both groups' performance on the indications and contraindications for NIV improved after the educational intervention (Figure 3).

The audit cycle showed that compared with pre-education, time on NIV decreased (19.3 to 10.6 hours), time to ABG improvement decreased (5.7 to 2 hours) and NIV titration improved (0 to 1 setting change in the first 4 hours), as shown in Table 1.

There was one clinical incident before education involving a patient starting NIV with an undiagnosed pneumothorax, with adverse clinical effect. On senior review this was by ceasing NIV and inserting an intercostal drain.

A trend was noted to greater clinical success of treatment after educational intervention although due to the small numbers involved, this is difficult to quantify.

### CONCLUSIONS

Focused education and algorithm guidance can improve the management of patients requiring acute NIV.

A high proportion of cases are initiated out of normal working hours, where Respiratory Consultant specialist advice at our District General Hospital is available only when coincidentally covering General Medical on-call.

Improved staff knowledge, confidence and guidance are associated with reduced time on NIV and time to ABG improvement. Education in the form of guidelines, flowcharts, and small group learning improves confidence and knowledge.

Medical staff on rotations will have variable experience of NIV, and constant rotations will introduce inexperienced staff at regular intervals. Experienced nursing staff with support from guidelines and flowcharts are a valuable resource and can assist inexperienced medical staff in NIV management decisions.

NHS Learnpro modules have been developed to provide ongoing accessible education to all staff to provide both an understanding on the physiology behind NIV support, then through interactivity within a case example, explain and emphasise the NIV management workflow.

### Table 1 - Outcomes of patients managed before and after education intervention

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<thead>
<tr>
<th></th>
<th>BEFORE INTERVENTION</th>
<th>AFTER INTERVENTION</th>
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<tbody>
<tr>
<td>Time on NIV</td>
<td>19.33</td>
<td>10.67</td>
</tr>
<tr>
<td>Average number of ABGs in 4 hours</td>
<td>1.63</td>
<td>1.33</td>
</tr>
<tr>
<td>Average number of setting changes in 4 hours</td>
<td>0.38</td>
<td>1.00</td>
</tr>
<tr>
<td>Hours to ABG improvement (pH &gt;0.03)</td>
<td>5.71</td>
<td>2.00</td>
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### Figure 3 - Chart showing Confidence and Knowledge scores before and after intervention

![Figure 3 - Chart showing Confidence and Knowledge scores before and after intervention](image)

### Reference