



# 2010 Adult Non-invasive Ventilation Audit Summary Report

Dr Craig Davidson

**T**hank you to all who participated in the national audit of non-invasive ventilation in adults in February and March 2010, which aimed to enable hospitals to review the effectiveness of acute NIV benchmarked against other contributing hospitals. The audit included questions on cause of respiratory failure and prior lung function, and performance status. Both process and outcome were recorded. 61 hospitals contributed data on 925 patients with a range from 5 to 39 patients treated by NIV over the 2 months. Half were admitted to hospital out of hours and cardiogenic pulmonary oedema was second to AECOPD as the most common reason for NIV (COPD 70%).

As would be expected, performance status was limited in 70% but was very impaired (no self-care/bed or chair-bound) in only 8%. The chest x-ray showed consolidation in 34%; 27% of patients had been given NIV on a previous admission (no data in 20%). Importantly, respondents reported that uncontrolled oxygen therapy had contributed to hypercapnia in 25% with pre-hospital and in-hospital exposure being equally responsible.

The average initial PaCO<sub>2</sub> was 10.2kPa, falling by 1kP by one hour and 2kP by 4–6hrs to an average of 7.3kPa at discharge. The average pH was 7.3 at the start of NIV, suggesting that many patients were chronically hypercapnic. This was borne out by a bicarbonate >30 in 50%. Worryingly, metabolic acidosis was also

treated by NIV as the minimum PaCO<sub>2</sub> was reported to be 2.9!

We asked if a treatment plan was evident specifying progression to intubation or NIV removal in the event of failure. Treatment plans were documented in 72%. Within this group, NIV was planned as “ceiling therapy” in 70% with intention to escalate to IMV in 19% with palliative intent in 7% with only 2% having no data. However, in reviewing outcome, only 2.3% were invasively ventilated although NIV was reported as unsuccessful in 27%. It therefore seems that, despite intention, patients did not always progress to intubation when failing to improve with NIV. This is difficult to understand although the intubation rate is similar to national data (1). Disappointingly care plans were rarely discussed with the ICU (30%) and patient or carer involvement in decision-making was also uncommon at 36% although no data was available in a further 24%. Advance directives were very infrequent (4.4%). It is of some concern that for patients (and for consultants), the care plan was reportedly decided following discussion with a consultant in only 30%.

For a group of patients with a high-risk of re-admission or early death, it is surprising that there was no hospital follow-up in at least one third of cases. On the other hand 9% were discharged home on NIV and 23% on LTOT. Given the high incidence of chronic hypercapnia and recent evidence in favour of home NIV (2) perhaps this should be the other way round?

This remains a contentious issue (3) and hopefully the recently launched national study of NIV v LTOT will finally provide the answer (4).

This data provides a fascinating snapshot of ‘real life’ NIV. The results are largely encouraging in comparison with a report based on the 2005 national COPD audit (5). However, it is likely the good success rates represent the results from better and more enthusiastic providers. This is the first national prospective audit of NIV and provides excellent benchmarking data for units to evaluate their own performance. It also highlights areas for attention such as senior involvement in decision-making, the use of NIV in patients with pneumonia (30% had CXR consolidation) and the need for specialist follow-up of high risk patients.

How should the results of such audits be used in the future? Should NIV process and outcome be used as performance indicators of hospitals in the same way that ICU performance is judged on the basis of outcomes? The writer believes this is the way to improve standards and that enrolling most hospitals in the forthcoming repeat audit in February & March 2011 will provide even more useful data. In the meantime, hospitals can continue (or start) to use the audit tool on a local basis to generate reports on their performance.

Comments and suggestions on improving the audit in 2011 are welcome. Please write to: [audittools@brit-thoracic.org.uk](mailto:audittools@brit-thoracic.org.uk)

## References:

1. Wildman MJ, Harrison DA, Bradley AR et al. Case Mix and Outcomes for Admissions to Adult General Critical Units with COPD: a second analysis of the ICNARC case mix programme database. *Crit Care* 2005;9: S38-48.
2. Windisch W, Haenel M, Storre JH & Dreher M. High intensity non invasive positive pressure ventilation for stable COPD. *Int J Med Sci.* 2009, 6: 72-76.
3. Elliott MW. Domiciliary non invasive ventilation in stable COPD. *Thorax* 2009 64 553-556.
4. Home Oxygen Therapy versus Home Mechanical Ventilation for Chronic Obstructive Pulmonary Disease ISRCTN28058693
5. Kaul S, Coutts I, Lowe D et al. Survey of NIV in Clinical Management of Acute COPD in 233 U.K. hospitals. *Thorax* 2007;62: S111 A-20.