

**Abstract P36 Table 1** Clinical characteristics of patients with pulmonary sarcoidosis at presentation

	Black Caribbean (n = 108)	Black African (n = 105)	Other (n = 30)	White (n = 54)	Total population (n = 503)
Age (mean $\pm$ SD)	42.1 $\pm$ 12.0	40.7 $\pm$ 10.5	44.8 $\pm$ 10.0	41.4 $\pm$ 12.6	41.7 $\pm$ 11.2
Female (%)	69.4	62	43.3	41	58.3
Organ involvement >2 (% patients)	70	63	70	59.3	63.1
Initial treatment with corticosteroids (% patients)	79.6	69.5	66.7	66.7	71.2
$\geq 2$ Immunosuppressant drugs required (% patients)	36	39	33	26	36.0
Elevated serum ACE (% of group)	79	84.2	65.2	58.1	71.7
FVC (% predicted $\pm$ SD)	77.8 $\pm$ 17.9*	80.2 $\pm$ 15.8*	84.7 $\pm$ 16.1	93.2 $\pm$ 18.2	82.5 $\pm$ 17.9
CPI (mean $\pm$ SD)	41.8 $\pm$ 14.3*	36.5 $\pm$ 13.7*	32.8 $\pm$ 15.2	30.2 $\pm$ 18.8	36.9 $\pm$ 15.6

\*p = &lt; 0.001.

are needed to determine the long-term outcome in this patient cohort, such as decline in PFTs, quality of life and mortality.

## REFERENCE

- Walsh SL, Wells AU, Sverzellati N, *et al.* An integrated clinico-radiological staging system for pulmonary sarcoidosis: a case-cohort study. *Lancet Respir Med.* 2014;2:123–130

## Acute exacerbations of COPD and acute NIV

### P37 FRAILTY AND ITS RELATIONSHIP TO MORTALITY IN PATIENTS RECEIVING ACUTE NON-INVASIVE VENTILATION (NIV) FOR RESPIRATORY FAILURE IN A DISTRICT GENERAL HOSPITAL

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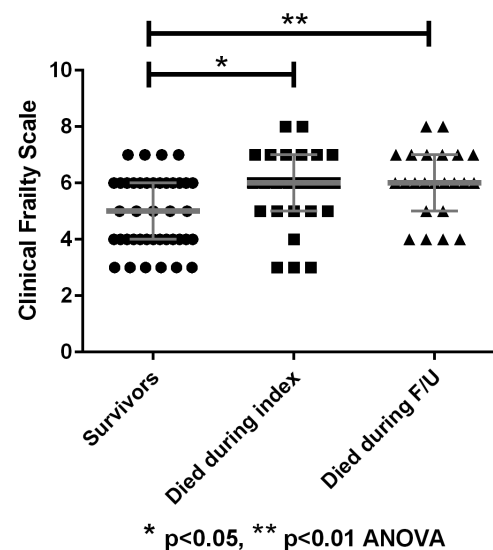
**Introduction** NIV is a treatment for acute respiratory acidosis in patients admitted with exacerbations of COPD. BTS audits have demonstrated that NIV is frequently used for other conditions, functional dependency is common and in-hospital mortality is high. Tools to prognosticate outcome from acute use of NIV tend to be disease-specific. Targeting the use of NIV to those who are most likely to benefit from it should be a clinical and ethical priority. Frailty relates to patient outcome in clinical settings including elderly patients with COPD and critical care admissions. We hypothesised that patients with higher frailty scores who receive NIV for acute respiratory failure have inferior outcomes, compared to those assessed as being less frail.

**Methods** Prospective study of patients receiving acute NIV for respiratory failure; over 15 months. The respiratory physiotherapists manage all such patients and collect data into the EPR. An additional item of data was collected – the Clinical Frailty Scale (CFS). All analyses were by episode apart from demographics and mortality which were by individual.

**Results** 89 patients received 110 episodes of acute NIV, median age 79, (range 23–97) years. Diagnoses: COPD (56%), Pneumonia and ‘other’ (30%), cardiogenic pulmonary oedema (4%), obesity-related (4%), chest wall/neuromuscular (7%). At initiation of NIV: median pH 7.26, PaCO<sub>2</sub> 9.8 kPa, PaO<sub>2</sub> 8.5 kPa.

Duration of hospital stay, median 16.5 days, in-hospital mortality (28%). CFS median score 6, range (2–8). There was no

correlation between CFS and age. CFS was statistically significantly higher in those who died (either during their index admission or during follow-up) than in those who survived – see Figure 1. Patients with a CFS of 7 or 8 had an in-hospital mortality of 40% and a total mortality of 80%. By contrast those with a CFS of less than 7 had an in-hospital mortality of 24% and a total mortality of 46%.



**Abstract P37 Figure 1** Clinical Frailty Scale and outcome from acute NIV Median and IQR shown

**Conclusions** Patients receiving acute NIV who are very frail (CFS 7 or 8) are less likely to experience a mortality benefit. These data should inform discussions and decision-making about use of NIV.

### P38 IMPROVED MORTALITY AND OUTCOMES FOR PATIENTS REQUIRING NON-INVASIVE VENTILATION MANAGED IN A DEDICATED HYPER ACUTE MEDICAL UNIT

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**Introduction** Non-invasive ventilation (NIV) improves survival and outcomes in hypercapnic (type 2) respiratory failure. Following below average performance in a district hospital in the BTS national NIV audit, NIV delivery moved from acute medical and respiratory wards to a new hyper-acute medical unit (HAMU) providing level 1 nursing care and NIV. The unit is supervised by Respiratory Physicians and a dedicated NIV-

trained nursing team, to improve outcomes for acutely unwell patients. A close working relationship with the Critical care team, and physical proximity to the Intensive care unit ensures rapid joint assessment and transfer of complex patients requiring invasive monitoring or intubation.

**Aims and objectives** To compare NIV success and mortality for patients with acute type 2 respiratory failure requiring NIV, before and after introduction of HAMU.

**Method** Data was collected for all patients in acute type 2 respiratory failure requiring NIV, for nine months before (2011–2012) and after (2012–2013) the HAMU was opened. Baseline characteristics (age, gender, performance and smoking status) were recorded. NIV success and mortality were compared and analysed. Patients requiring intubation on admission were not included.

**Results** Baseline characteristics in both groups were similar, and comparable to national figures. NIV was successful in 56% (28/53) before, improving to 74% (43/58) after ( $p < 0.05$ ). National success rates from BTS 2013 data were 66.5%. All-cause mortality improved from 42% (22/53), to 24% (14/58) ( $p < 0.05$ ). National all-cause mortality rate was 34% in 2013. Transfer to Critical care was low in both groups (1/53 pre, and 1/53 post).

**Conclusions** NIV success and mortality rates improved significantly following opening of the HAMU. Following establishment of the HAMU, success rates are also clearly better than national comparators for 2013. NIV delivery in a dedicated unit with highly trained nurses and dedicated respiratory medical input improves outcomes in acute Type 2 Respiratory failure.

**P39 NONINVASIVE PH WITH TRANSCUTANEOUS PCO<sub>2</sub> MONITORING AS AN ALTERNATIVE TO ARTERIAL LINE SAMPLING: A NEW PATIENT FRIENDLY APPROACH TO MONITORING ACUTE NIV**

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Arterial blood gas measurement is a standard way to initiate and monitor Noninvasive ventilation (NIV) in acute hypercapnic respiratory Failure. It is painful for patients and time and resource intensive for staff.

In a pilot study we have demonstrated that transcutaneous CO<sub>2</sub> monitoring provides reliable CO<sub>2</sub> measurements in patients with Acute Hypercapnic Respiratory Failure (AHRF). Moreover this is less painful and preferred by patients. van Oppen *et al.*, *Respir Care*. 2014 Nov 18. pii: respcare.03335.

PCO<sub>2</sub> time trends were concordant. Mean PCO<sub>2</sub> bias was -2.33 mm Hg (95%LOA -9.60 to 5.03) mmHg,  $r = 0.89$  ( $p < 0.001$ ). Initiation of transcutaneous monitoring was less painful than the arterial equivalent ( $p = 0.008$ ).

Particularly in patients with AHRF due to COPD exacerbation pH plays an important role in initiating and guiding therapy. We explored whether TcCO<sub>2</sub> can be used to predict pH thereby minimising the need for repeated arterial blood gases in this patient group.

Based on Henderson Hasselbalch equation  $\text{pH} = 6.1 + \log (\text{HCO}_3/\text{CO}_2)$ .

In the pilot study mentioned above Non-invasive pH<sub>tc</sub> was determined using ptcCO<sub>2</sub> and predicted bicarbonate. Reference bicarbonate was recorded from ABG taken at NIV initiation. TcCO<sub>2</sub> was monitored continuously over 12 h using Radiometer TOSCA TCM4. PaCO<sub>2</sub> was obtained from arterial blood samples at 0, 4, 8 and 12 h. Mean pH bias was 0.012 (95%LOA -0.070 to 0.094),  $r = 0.84$  ( $p < 0.001$ ).

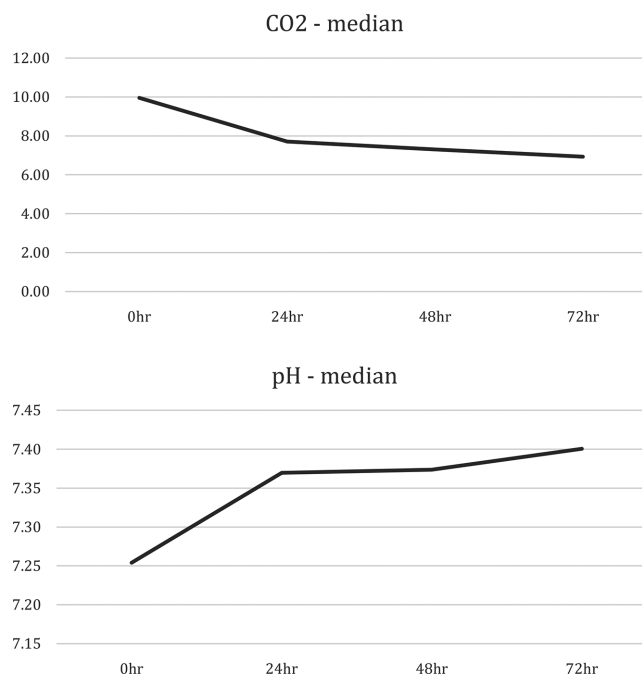
We have subsequently reviewed records for 38 patients who received Acute NIV for AHRF. We retrospectively looked at change in pH, bicarbonate and CO<sub>2</sub> over 24, 48 and 72 h.

**Abstract P39 Table 1**

Median absolute change	in 24 hr	in 48 hr	in 72hr
absolute increase in pH	0.11	0.12	0.15
absolute increase in HCO <sub>3</sub>	0.70	1.60	4.15
absolute reduction in CO <sub>2</sub>	1.85	2.21	2.47

Using these data and Henderson Hasselbach equation we can show that in the first 48 h change in pH is almost exclusively explained by change in CO<sub>2</sub> (Pearsons Correlation coefficient for change in CO<sub>2</sub> and pH = 0.84;  $p < 0.05$ ).

Therefore in patients with pure Respiratory Acidosis transcutaneous CO<sub>2</sub> would provide trend for pH as well as CO<sub>2</sub>, thereby minimising the need for arterial blood gas measurement and improve patient comfort.



**Abstract P39 Figure 1** Change in pH and PaCO<sub>2</sub> in patients on NIV for AHRF

**REFERENCE**

- van Oppen JD, Daniel PS, Sovani MP. What is the potential role of transcutaneous carbon dioxide in guiding acute noninvasive ventilation? *Respir Care*. 2015;60:484–91

**P40 SHOULD PROVISION OF ACUTE INPATIENT NON INVASIVE VENTILATION IN A DISTRICT GENERAL HOSPITAL BE EXCLUSIVELY A RESPIRATORY CONSULTANT-LED SERVICE?**

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