plugging. At 12 months post-discharge two (17%) patients were dead; seven (58%) were not on any ventilatory support; three (25%) were continuing with tracheostomy ventilation.

Conclusion Respiratory weaning from tracheostomy ventilation represent a heterogenous group which is complex with diverse aetiology and multiple comorbidities. There is a considerable variation in the LOS on ARCU and is often unpredictable. Although more than two third of patients wean successfully on our unit it carries a high one year mortality. LOS is influenced by the complexity of discharge planning. We are not a dedicated weaning unit and our unit is not staffed to look after more than two tracheostomy-ventilated patients at any one time which combined with prolonged stay slows down patient flow from ICU to ARCU and from ARCU to the wards. Multidisciplinary approach and dedicated weaning units are needed that is able to look after complex needs in hospital and coordinate complex discharges.

Abstract P131 Table 1

Age (mean+/-SD, years)	56+/-17
Males	n=8
Females	n=4
LOS in ICU pre tracheostomy	Median=8, Range=2–22
	Mean- 9+/-6
LOS in ICU post tracheostomy	Median=34, Range=7–96
	Mean 41+/-30
LOS in RCU post tracheostomy	Median=7, Range=1–93
	Mean 21+/-33
Primary Diagnosis (n=12)	
Pneumonia	6
Post-procedure/surgery	3
COPD	1
ARDS	1
Other (Cardio-respiratory arrest)	1

P132 THE ROLE OF VENTILATION IN PNEUMONIC EXACERBATIONS OF COPD

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Introduction In isolated pneumonia, most trials show that NIV does not improve outcome, and may delay more appropriate intubation. However in pneumonia complicating COPD with acidaemic respiratory failure (AHRF), an RCT showed NIV reduced the need for intubation and conferred a survival benefit at 2 months.[1] UK NIV guidelines state NIV is not indicated in pneumonia; whether this was intended to apply when pneumonia complicates another condition associated with a favourable response to NIV is unclear and there is substantial variation in practice. In our institution, most patients with pneumonic exacerbation of COPD (pECOPD) and AHRF receive NIV; few decline ventilation or are immediately intubated.

Methods From a consecutive historical cohort of patients receiving assisted ventilation for spirometry confirmed ECOPD and AHRF, chest radiographs, electronic data and clinical notes were reviewed. The presence of consolidation was determined in the following hierarchy: attending consultant physician interpretation (to mimic reality); radiologist report; or researcher interpretation. Analysis performed using IBM SPSS; significance identified using student's t-test, Mann Whitney U or chi-squared test for parametric, non-parametric and categorical data respectively.

Results Among patients surviving to discharge, 90 day and 6 month mortality was 12.8% and 20.3% respectively in those with consolidation, compared to 12.9% and 18.4% respectively in those without.

Discussion Compared to those without pneumonia, patients with pECOPD were older, had more comorbid illnesses, more severe acidaemia and greater functional limitation. In addition, AHRF was more likely to have developed after admission, despite initial medical therapies (an adverse prognostic marker). Unsurprisingly, in-hospital mortality was significantly higher in those with pECOPD, but approximately 2/3 survive to hospital discharge and post-discharge outcomes between the two groups are comparable. Coexistent consolidation is a marker of adverse acute outcome and an indication for closer monitoring but should not preclude ventilation, especially when so few are considered eligible for intubation.

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Abstract P132 Table 1 Population Descriptors and in-hospital mortality by presence or absence of complicating pneumonia.

	Consolidation present n=231	No Consolidation n=258	P Value
Age	75.4 (9.2)	70.4 (10.2)	<0.001
FEV1 (% predicted)	41.0% (17.8)	35.2% (14.6)	0.001
Current Smoker	45.5%	55.7%	0.273
BMI	24.9 (7.3)	24.3 (7.2)	0.312
eMRCD	5 (4–5)	5 (4–5)	0.14
Proportion 5a or 5b	131 (56.7%)	133 (51.6%)	0.276
Proportion 5b	54 (23.4%)	46 (17.8%)	0.145
Charlson Index	2 (1–3)	1 (1–2)	0.042
For escalation to Invasive ventilation	75 32.5%	102 (39.5%)	0.1
Received IPPV (+/-NIV)	13 (5.6%)	14 (5.4%)	0.922
Acidaemic on 1 st ABG	186 (80.5%)	235 (91.1%)	0.001
pH at ventilation initiation	7.23 (0.08)	7.25 (0.09)	0.09
CO2 at ventilation initiation	10.2 (2.7)	10.7 (2.9)	0.06
CRP at NIV	76 (27–184)	31 (10–74)	<0.001
Peak Pressure (IPAP)	19 (17–20)	20 (18–22)	0.464
In Hospital Mortality	83/231 (35.9%)	41/258 (15.9%)	<0.001

P133 ACUTE HYPERCAPNIC RESPIRATORY FAILURE; APPLICATION OF A NOVEL HUMAN FACTORS APPROACH TO IMPROVE RECOGNITION AND MANAGEMENT

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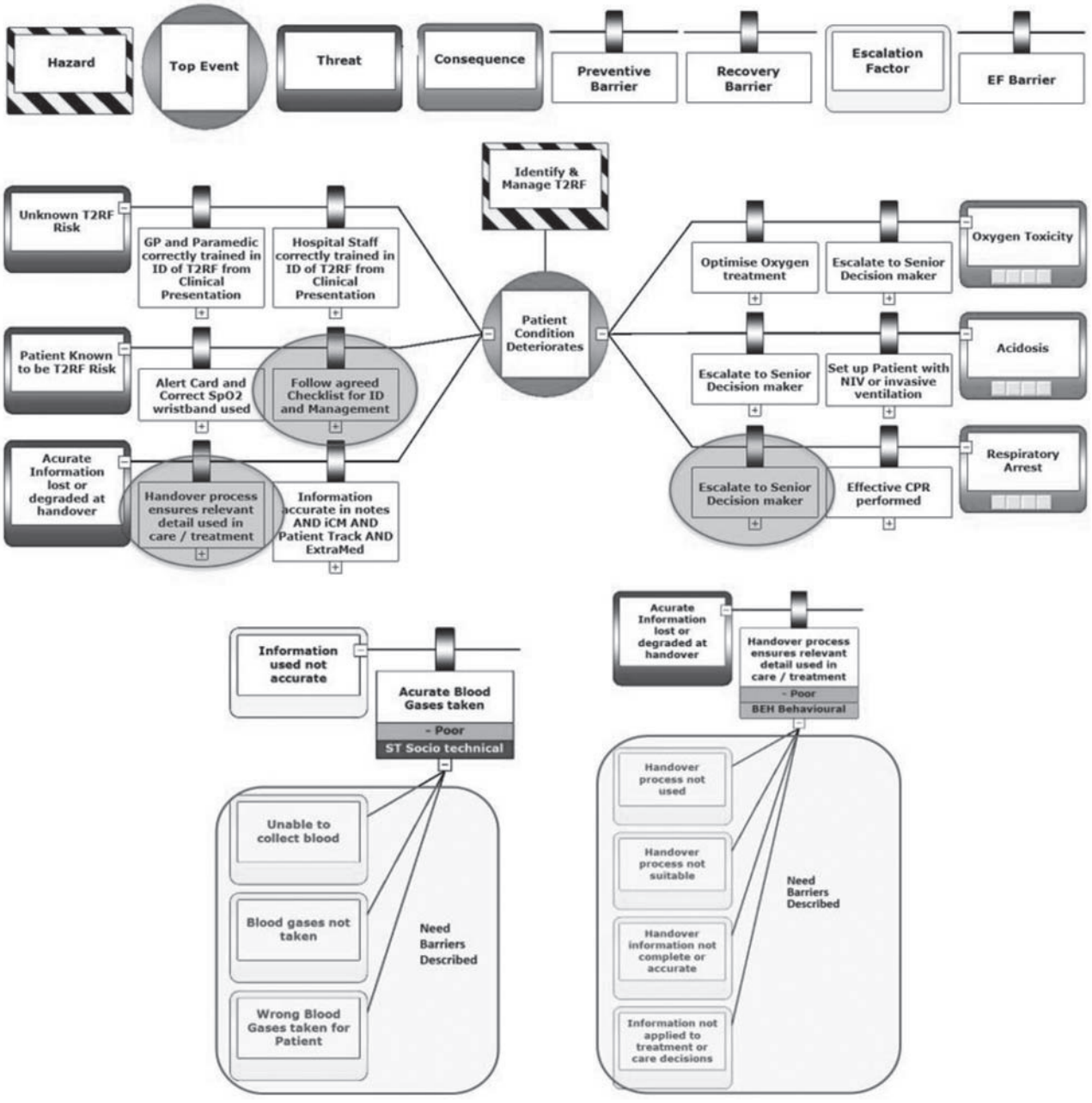
Aim Acute hypercapnic respiratory failure (AHRF) is a medical emergency.[1,2] Data from National COPD Audit Programme identified that median time from admission to Non-Invasive Ventilation (NIV) is 4.1 hours and only 42.7% of patients requiring ventilatory support receive it in under 3 hours. We utilised a novel human factors approach, reviewing AHRF case examples and undertaking multi-disciplinary discussion, to review current systems and develop interventions to improve the recognition and management of AHRF.

Methods Multi-disciplinary workshops were undertaken across emergency medicine, acute medicine, and specialist medicine to discuss case examples of AHRF. Attendees discussed the identification and management of AHRF based on the presented cases and their clinical experience. Output from the workshops and case reviews were analysed and informed the development of a Bow-Tie model that reviewed current systems in AHRF. The model identified barriers which usually facilitate effective management of these patients and threats to barriers which compromise patient care (figure 1) Interventions to address threats were developed and implemented.

Outcome/Results Interventions resulting from the multidisciplinary workshops and novel application of Bow-Tie analysis (figures 1) included: automated flag of Results showing AHRF on electronic Results software; AHRF management and referral checklists; multifaceted training of teams in management of AHRF (simulation training, capillary blood gases training, ward based training).

Conclusions The novel application of this human factors approach in a healthcare setting allowed the identification of specific threats and development of interventions to strengthen barriers targeted at improving patient care and reducing harm.



Abstract P133 Figure 1 Bow-tie model identifying barriers and threats in the recognition and management of acute hypercapnic respiratory failure.

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Characterisation of lung disease with imaging and physiology

P134 AN EVALUATION OF A NEW LUNG FUNCTION TEST: TLNO IN HEALTHY SUBJECTS

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Background and Aims TLNO, transfer factor for nitric oxide, is a pulmonary function test of gas transfer. The test, in combination with carbon monoxide, allows for calculation of the alveolar membrane diffusing capacity and red blood cell conductance. This allows physicians to recognise physiologically where issues with gas transfer arise. Currently, there are very few papers looking at TLNO reproducibility in healthy subjects and none aiming with a target of 5% repeatability between efforts. This study attempts to look at the reproducibility of TLNO over 10 sessions (7 weeks total) with an intra-session repeatability of 5%. In addition, comparison of TLCO measurements between 10 and 5 s breath holds are made.

Methods 14 normal subjects were recruited and a baseline spirometry was taken and height, weight, age and sex were recorded. Subjects were asked to perform a TLCO test with 10 s breath hold followed by 10 repeated sessions of the TLNO test on different days. Measurements within 5% of each other were considered acceptable repeated Results in one session. A Bland-Altman plot and regression line were constructed to compare TLCO measures between different breath hold times. One-way repeated measures ANOVA, measurement error values, intra and inter-session variability were calculated for TLNO and TLCO recordings obtained over the 10 repeated sessions.

Results Bland-Altman plot revealed no statistically significant ($p=0.783$, $p\geq0.05$) difference between TLCO breath hold times. Coefficient of determination from the regression line, $r^2=0.860$. Repeated measures ANOVA revealed no significant difference for TLNO and TLCO measurements over time at $p=0.374$ and $p=0.842$ ($p\geq0.05$) respectively. Intra-session and inter-session variability for TLNO were calculated as 15.02 ml/min/mmHg and 16.12 ml/min/mmHg respectively. TLCO intra-session and inter-session variability were 4.30 ml/min/mmHg and 3.70 ml/min/mmHg. We have shown that TLCO values recorded with the shorter 5 s breath hold agree with the conventional 10 s technique. Over a 7 week period TLNO and TLCO do not change significantly and calculated session variability is consistent with ERS/ATS guidelines.

Conclusion TLNO is a highly reproducible test over a 7 week period and a shortened breath hold in healthy people provides the same values as the traditional 10 s breath hold for TLCO.

P135 THE PREVALENCE OF UNDIAGNOSED COPD IN PATIENTS WITH AN ABDOMINAL AORTIC ANEURYSM AND ITS IMPACT ON CARDIOPULMONARY EXERCISE TESTS

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Introduction Cigarette smoking is a known contributing factor to the development of chronic obstructive pulmonary disease (COPD), and to the formation of an aneurysm. In addition COPD is the most important risk factor associated with abdominal aortic aneurysms (AAA). Studies[1] have observed the relationship of COPD and AAA, demonstrating a prevalence in COPD patients of 3.7% and a 1.22–1.78 fold increased risk of AAA when compared to those without COPD.[2]

Aims Our aim was to identify the prevalence of undiagnosed airflow obstruction in patients attending for CPET for preoperative assessment for AAA.

Methods Data from 122 patients (108 male), median age 75 years (range 65–90) with an AAA of 5 cm or more, attending between September 2014 and May 2016 were included. Spirometry, CPET, smoking history, BMI and current medication were all analysed. The patient's clinical records were reviewed to establish any previous respiratory diagnosis.

Results 17/122 (14%) patients had a known diagnosis of COPD however 32/122 (26%) had airflow obstruction on spirometry, with only 12 of these having a diagnosis of COPD. 5 patients with a diagnosis of COPD did not demonstrate airflow obstruction. There were significant differences between those with airflow obstruction and those without for breathing reserve 20.8 versus 37.95% ($p=0.0002$), anaerobic threshold 11.0 versus 12.30 ml/min/kg ($p=0.0073$), Peak VO2 15.1 versus 16.8 ml/min/kg ($p=0.0018$), smoking history 49 versus 30 pack years ($p=0.0069$) and BMI 26.0 versus 28.1 kg/m^2 ($p=0.0024$); respectively.

Conclusion The Results confirmed that a significant proportion of our patients had previously undiagnosed/unrecognised airflow obstruction. As would be expected, patients with airflow obstruction had an increased pack year smoking history and a decreased BMI when compared to those without. Airflow obstruction also resulted in a decreased peak VO2 and a worsening of ventilatory limitation which has the potential to influence surgical decision making.

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P136 NON-INVASIVE ASSESSMENT OF DIAPHRAGM CONTRACTILITY USING SURFACE MECHANOMYOGRAPHY IN HEALTHY SUBJECTS

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