A retrospective exploration of patient features and outcomes of non-invasive ventilation in an Australian private regional hospital

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Background

Non-invasive ventilation (NIV) is the practice of positive pressure ventilation via a face mask or helmet without the usage of endotracheal intubation. It is shown to provide mortality benefits in the management of acute respiratory failure in exacerbations of chronic obstructive pulmonary disease (COPD) and in cardiogenic acute pulmonary oedema (APO), with a more uncertain role to play in pneumonic respiratory failure and asthma.[1]

However, benefit in trial settings has not necessarily translated to good outcomes in routine clinical use. In sampled review of all UK National Health Service admissions where NIV was acutely applied to patients admitted as an emergency between February and March 2015, **in-hospital mortality was 35.3%, with a 12 month mortality of at least 46.3%[2].**

There is scant literature regarding patterns of usage and outcomes of NIV in adults in Australia, and whether the relatively high mortality rates overseas also apply here. Thus, we sought to describe the characteristics and outcomes of patients undergoing NIV at a Victorian regional private hospital.

Objectives

The primary objective was to describe the population of patients receiving NIV at the study location, and to identify their mortality rate.

Methods

Study location

St John of God (SJOG), Ballarat, Australia, is a 196 bed private hospital in regional Victoria, co-located with the public Ballarat Health Services. Inpatient NIV was only administered in the open Intensive Care Unit (ICU).

Study design

An ethics approved retrospective record review was conducted of NIV-requiring admissions over the period July 2007 to May 2012, as ascertained from the hospital ICU database. Baseline characteristics, clinical data and mortality (in-hospital and 90-day) were collected. The primary endpoint was death (in ICU, in hospital, or 90 days following discharge from ICU).

Results

66 unique patients requiring NIV in 71 individual ICU admissions were identified from July 2007 to May 2012.

Baseline characteristics

Per-patient analysis indicated a mean age of 73 (SD 12), 56% male, median ECOG functional level of 2 (self caring but unable to work). 82% of the patients were admitted from home. 35 (53%) were admitted through wards following deterioration, 21 (31%) were directly admitted from the Emergency Department.

Comorbidities

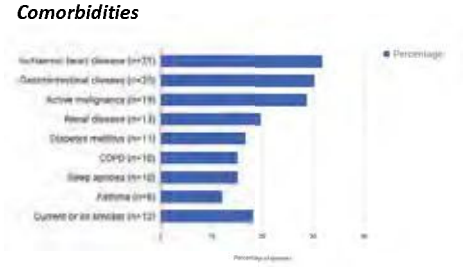

Fig 1: Frequency of comorbidities

Indications and aetiologies

Type 1 (hypoxic) respiratory failure predominated as an indication, representing 50 (78%) of cases. Type 2 failure made up 9 (14%), and 6 (9%) were undefined.

Pneumonia (n=27, 38%) and acute pulmonary oedema (n=25, 35%) were the commonest documented aetiologies of respiratory failure.

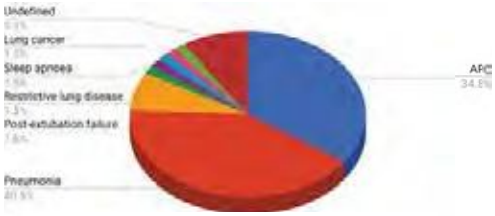

Fig 2: Distribution of aetiologies of respiratory failure

Management

NIV was ceased due to patient recovery in a majority of cases (n=37, 56%), 8 (12%) patients were withdrawn from NIV and palliated due to deterioration, and a further 7 (11%) died while NIV was being administered. 7 (11%) failed NIV and progressed to intubation. 2 (3%) others were transferred to another ICU, and 1 did not tolerate NIV but survived.

Mortality

3-month mortality was 38% (n=25), with 18 (27%) of the patients dying in hospital. 5 patients were lost to followup - the mortality rate could hence be higher.

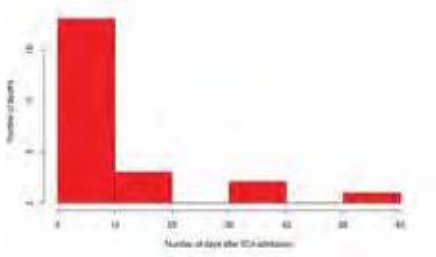

Fig 3: Frequency of deaths over time from ICU admission

Associations with mortality

The presence infiltrations on chest x-ray, (87% vs 77%, p=0.02), an active malignancy (48% vs 17%, p=0.01), agitation during NIV (9% vs 1%, p=0.006) and documented limitations of treatment (72% vs 20%, p<0.01) were associated with mortality.

Survivors

28 admissions (39%) were directly discharged home. 12 (18%) were transferred to other hospitals, 4 (6%) to rehab, 4 (6%) to residential care facilities (1 de novo), and 2 (3%) to respite/transitional care.

Conclusions

While limited by its retrospective single centre design, this study suggests significant mortality in patients undergoing NIV in the described setting. These findings are within range of the UK dataset, and raise the troubling possibility of a generally high mortality rate amongst patients undergoing NIV.

A large scale survey, preferably at a national level, is needed to determine if these finding have external validity, to help guide both quality-improvement work and realistic conversations with patients and families regarding prognosis.

References

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