Reviewer’s report

Title: Challenges on non-invasive ventilation to treat acute respiratory failure in the elderly

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Reviewer: Stephen Bourke

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This is a helpful review of an area of practice that is fraught with clinical and ethical challenges, yet comparatively under-researched. With socioeconomic and medical advances, the proportion of people living beyond 80 years continues to increase, but often with long-term conditions and multi-morbidity, limiting functional status and health-related quality of life. Such patients frequently experience life-threatening episodes of decompensation; technological advances in the area of respiratory support increasingly offer the potential to extend life, but often with severe and progressive underlying chronic disease and consequent disability. Clinicians' estimates of outcome, should ventilation be provided, are often inaccurate and prognostic tools offer only modest performance. The decision, taken with the patient and their family, about whether to escalate levels of respiratory support is often difficult. As such, the subject of this review is very relevant to routine clinical practice.

Comments

Line numbers correspond to those detailed on the page margin, not actual line number.

Page 3, lines 5 - 10 (Abstract): The authors are correct to highlight that in many elderly patients invasive ventilation is considered inappropriate, and the wider implications of applying technologies that extend survival at the end of life. However, "as is", the non-expert reader may assume that NIV is predominantly used in patients deemed not suitable for invasive ventilation, and not that NIV offers better outcomes than invasive ventilation across a range of conditions.

Page 4, lines 10-27: The author has highlighted that advanced respiratory disease is associated with high symptom burden and that patients may be dissatisfied with their QoL and may not want their lives unnecessarily prolonged. This is correct, and it is important that patients are given the opportunity to make an informed choice about escalation to higher levels of care. However, undue nihilism about outcomes of ventilation in conditions such as COPD is common (highlighted in the CAOS study) and of concern, as the patient may be swayed by inaccurate inferences about the likely outcome, should support be provided. I think that such concerns should also be included. This is particularly important as the target audience is international, including countries where access to higher levels of care and use of such respiratory support may be more restricted than in Italy.

Page 4, lines 29-34: "...quality of life seems to be sensibly reduced...". This is unclear (consider rewording). Provision of respiratory support, including NIV, often improves quality of life (although this is not necessarily true across all conditions). If the patient survives the acute
episode, impairment in subsequent QoL is related to the severity of the underlying condition, and not reduced by NIV. I am sure the author did not intend to imply that this was the case.

Page 6, lines 53-58: In patients with advanced respiratory disease, individual units vary greatly in regard to selection based on age. Stable-state performance status and other important indicators are of greater significance. Whilst some units may restrict access primarily on age, this is not justified by existing data, nor do I think exceptionally common in current practice. In the DECAF internal and external validation cohorts, of patients ventilated the proportion aged 80 years or over was 25% and 20.8% respectively (unpublished data across six UK hospitals). I suggest "...usual behaviour..." overstates the prevalence of using age alone to exclude access to higher level care.

Page 7, lines 7 - 10: to conditions in which NIV is usually preferable to invasive ventilation, I suggest adding neuromuscular disease without severe bulbar impairment, obesity hypoventilation syndrome and chest wall deformity.

Page 7, lines 12-22: in addition, it is perhaps worth mentioning that most patients receiving NIV are managed without sedation. This facilitates early weaning, and helps minimise other complications.

Page 8: I strongly support provision of NIV on specialist units outside of ICU staffed appropriately for level 2 patients, ensuring effective outcomes with efficient use of resources. This approach is preferable to administration of NIV on general medical admissions units or respiratory wards. However, the term RICU is not universal (e.g. RHDU, Respiratory Support Units etc also used). A brief explanation of the level of intermediate support recommended, and acknowledgement of the varying terminology applied, would provide greater clarity for an international audience.

Page 10, line 25: An important exception is neuromuscular disease, particularly progressive conditions such as ALS; any degree of hypercapnic should be considered an indication for NIV.

Page 11, line 34-39: This section may be interpreted as recommending NIV as a default ceiling of care in all "do not intubate" patients. There are few contra-indications to NIV in patients deemed not for intubation, but the likelihood of a favourable outcome should inform discussions with patient's / their families and inform clinical decisions. NIV is an intrusive therapy, and if there is little chance of a good outcome initiating NIV may increase distress when alternative palliation would be more appropriate. It is clear elsewhere that the author supports this view; consider including a statement to this effect.

Page 11, line 61: Patients with low GCS related to hypercapnia often tolerate NIV well (at least until they wake up). Non-randomised data shows outcomes are similar, if not better, in patients with hypercapnic coma compared to those without. It is important to mention agitation, but would be helpful to describe strategies to overcome such problems (e.g. cautious use of opiates +/- alternative agents).
Secretion clearance in neuromuscular disease (NMD): use of a volume recruitment bag is worthy of mention. An RCT comparing this approach to MI-E has recently been published. HFCWC (or "HFCWO" - chest wall oscillation): the available data do not support the routine application of this technique in NMD - perhaps make this clearer.

The section on palliative use of NIV could be shortened without compromising clarity.

Tables / figures: it may help the reader to provide a summary of conditions by likely outcome of NIV.

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