

JOURNAL CLUB: BREATHE (JAMA 2018)

Effect of Protocolised Weaning With Early Extubation to Noninvasive Ventilation vs Invasive Weaning on Time to Liberation From Mechanical Ventilation Among Patients With Respiratory Failure

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Presented by Dr Joel Davis, ACCS CMT

STUDY QUESTION:

In adults in whom weaning from invasive mechanical ventilation is “difficult” (ie a spontaneous breathing trial has failed), does protocolised weaning with early extubation to non-invasive ventilation reduce time to liberation from ventilation, compared with protocolised invasive weaning?

HOW DOES THIS RELATE TO OUR PRACTICE ON JVF-ICU?

Invasive mechanical ventilation is one of the most common lifesaving interventions performed on our unit, but prolonged ventilation is associated with increased morbidity and mortality.

The authors of this paper state that 33% – 86% of invasively ventilated patients are “difficult to wean”, and this concords with our experience on the JVF. To provide a snapshot example, on the unit today we have 13 ventilated patients, of whom 8 have undergone tracheostomy – most of them for actual or anticipated difficulty weaning.

These patients consume a disproportionate amount of our resources. Any intervention that can reduce the morbidity, mortality, length of stay and cost associated with this would be very welcome.

WHAT DO WE CURRENTLY KNOW ABOUT THIS AREA?

Several previous studies have tried to address this question, but the majority of patients enrolled had COPD. In that cohort, weaning with NIV has been shown to reduce mortality as well as the rates of tracheostomy and ventilator-associated pneumonia (see the meta-analysis by Burns et al <https://www.ncbi.nlm.nih.gov/pubmed/24323843>). However, it is not known whether these results are generalizable to a modern general ICU population, in which fewer COPD patients are now invasively ventilated.

WHY WAS THIS STUDY NEEDED?

The earlier trials referred to above suggested that weaning to NIV does produce clinically important and statistically significant benefits for patients with COPD, but this does not reflect the case mix of ventilated patients on our ICU, who may have different pathological processes and lung mechanics hampering their weaning.

Importantly, this new trial also sought to mitigate a key source of potential bias by ensuring that both the control and intervention groups underwent protocolised weaning. In most previous studies, a protocol had been adopted only for the intervention group, making it difficult to distinguish whether any beneficial effects arose from the actual intervention or simply from the protocolisation.

AT JOURNAL CLUB WE SHOULD DISCUSS THE FOLLOWING:

- Considering they had all failed an initial SBT, the patients in both arms of this trial had a surprisingly low duration of mechanical ventilation (2.9 days on average). This may have been because of the strict protocols, that called for weaning assessments q2 hours. It might not be feasible to offer this to every patient on the JVF, but should we at least consider protocolising our weaning plans more consistently?
- Does it matter that only a small proportion of eligible patients were included (and we don't know why); or that almost half of the patients were recruited from only 3 centres?
- Although no benefit was seen in the primary outcome of liberation from all ventilation, the secondary outcome of total invasive ventilation time was reduced. This is surely beneficial – should it alone prompt us to change practice?
- On the other hand, extubation to NIV did bring with it an increased risk of reintubation – is this a major concern? And what about other risks? (No mortality difference was seen, but the study was inadequately powered to detect one. The authors accept that reintubation is risky – see <https://www.ncbi.nlm.nih.gov/pubmed/27377334>.)
- What are our patients' preferences?? (MyICUVoice could be very helpful here!)

SHOULD WE CHANGE PRACTICE ON JVF-ICU?

As explained in an accompanying JAMA editorial (see below), the importance of this paper is in challenging the “dogma” that patients who fail an SBT necessarily require ongoing *invasive* ventilation. As we all know, reducing the total time that patients spend intubated could have major benefits for both the patient and for our ICU resource allocation, so these results suggest that we should strongly consider extubating to NIV in such cases – provided we recognise and mitigate any potential risks, particularly the increased risk of reintubation.

In fact, on the JVF we are increasingly extubating patients onto high-flow nasal oxygen (HFNO) when we anticipate that they will require extra support. In a 2016 paper, Hernandez *et al* showed HFNO to be non-inferior to NIV for patients they defined as ‘high-risk’ (although they had not necessarily actually failed a SBT). So, could HFNO provide another alternative strategy for extubating patients who fail their SBT?

The questions we should consider going forward are:

- In spite of the negative results of this trial, are there cohorts of patients who would be liberated from ventilation more quickly if extubated to NIV after failing an SBT?
- Even if the answer is no, should we consider it anyway, to reduce the time (and associated risk, resources etc) of invasive ventilation? Or is the reintubation risk unacceptable?
- Whenever we find ourselves considering extubation to NIV, could we achieve comparable outcomes with HFNO instead? (More resource-friendly and almost certainly a less traumatic experience for the patient!)

FURTHER READING

A nice editorial of this article and its importance –

<https://jamanetwork.com/journals/jama/fullarticle/2708257>

2013 meta-analysis of previous trials – <https://www.ncbi.nlm.nih.gov/pubmed/24323843>

Summary of the Hernandez trial (HFNO in high-risk patients) –

<https://www.thebottomline.org.uk/summaries/icm/hernandez-2/>

And a useful lit review on the same topic -

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5395483/>