Protocol directed weaning reduced time spent on mechanical ventilation


Objective
To compare protocol directed weaning from mechanical ventilation by nurses and respiratory therapists with physician directed weaning.

Design
Randomised controlled trial with follow up to discharge.

Setting
4 medical and surgical intensive care units in 2 university teaching hospitals in the USA.

Patients
357 patients (50% surgical, median age 66 y, 53% women) who were age > 18 years and required mechanical ventilation. Exclusion criteria were head or facial burns or trauma, previous mechanical ventilation in another hospital, or mechanical ventilation needed for organ retrieval.

Intervention
Patients were stratified by intensive care unit site, and allocated to protocol directed weaning (n = 179) or physician directed weaning (n = 178). Protocol directed weaning was done by nurses and respiratory therapists when the underlying conditions for mechanical ventilation had resolved or substantially improved. Physicians were notified about the start of weaning, and could change the criteria based procedures. The criteria were PaO₂/FIO₂ ratio of > 200, positive end expiratory pressure ≤ 5 cm water, heart rate < 140 beats per minute, respiratory rate ≤ 35 breaths per minute, awake and oriented mental status, and not requiring vasoactive or inotropic agents. Standard weaning failure criteria were also pre-established. 3 separate weaning protocols were designed to facilitate acceptance in the 4 units. All protocols used pressure support ventilation with emphasis on spontaneous breathing trials, pressure support, or intermittent mandatory ventilation. Physician directed weaning was at their discretion, and nurses and respiratory therapists could not assess for weaning readiness, or initiate or advance weaning in these patients without orders from the physician.

Main outcome measures
Duration of mechanical ventilation. Secondary outcomes were need for mechanical ventilation > 7 days, reintubation, hospital mortality, length of stay, and costs.

Main results
Patients in the protocol directed weaning group were less severely ill at baseline (p = 0.03), had a shorter duration of mechanical ventilation before weaning (39.6 v 58.3 hours, p = 0.016), and a shorter total time on mechanical ventilation (69.4 v 102 hours, p = 0.029) than did patients in the physician directed group. The groups did not differ for proportion of patients who required mechanical ventilation for > 7 days (12% v 17%, p = 0.13), reintubation (13% v 10%, p = 0.42), hospital mortality (22% v 24%, p = 0.78), hospital length of stay (12.7 v 14.2 days, p = 0.51), or cost (US $ 27 439 v $27 680, p = 0.93).

Conclusion
Protocol directed weaning from mechanical ventilation implemented by nurses and respiratory therapists reduced time until start of weaning and total time patients spent on mechanical ventilation, and did not differ for other outcomes when compared with physician directed weaning.


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Commentary

The work reported by Kollef et al is the first study to show definite reductions in ventilation time with the use of protocol directed weaning managed by nurses and respiratory therapists. Previous research has concentrated on the improvement associated with different methods of weaning, and little consistent evidence has supported any method.1 2

The major message from this study is that the mode of weaning is less important than the way the weaning is carried out. Protocols have been shown to be successful in patients who had short term ventilation, but not yet in long term (> 5 days). Unfortunately, this study does not differentiate between short and long term mechanical ventilation, so applicability to the long term group cannot be confirmed. The study does indicate that the use of a protocol to establish the point at which weaning should start is effective in reducing ventilation time. The most important benefit for the patient is that weaning starts when the patient is ready rather than when the medical staff are available.

Starting protocol directed weaning needs to be supported by detailed protocols determining weaning progress and failure and point of extubation. Commitment from senior medical staff to endorse their use and to give advice where necessary is essential. The use of weaning goals will ensure that patients are not allowed to overtire, and stipulated conditions of variables such as oxygen saturation and respiratory rate are used to assess patient response.

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