



# WHAT % OF PATIENTS IN A RESPIRATORY UNIT ARE LIBERATED FROM MECHANICAL VENTILATION?

by *Herb Patrick MD*

The original peer-reviewed research article selected this month to teach the Scientific Method is: Bigatello, Luca M. MD; Stelfox, Henry Thomas MD, PhD; Berra, Lorenzo MD; Schmidt, Ulrich MD, PhD; Gettings, Elise M. RN. Outcome of patients undergoing prolonged mechanical ventilation after critical illness. *Critical Care Medicine*, November 2007; Volume 35(11): pages 2491-2497. The authors are from the Department of Anesthesia and Critical Care, Massachusetts General Hospital, Harvard Medical School, Boston, MA (LMB, LB, US, EMG) and the Department of Critical Care Medicine, University of Calgary, Alberta, Canada (HTS).

We will continue to teach the traditional Scientific Method as: Background/Introduction, Question, Hypothesis, Methods, Results, Discussion/Reflections/Future Research, Conclusions, Acknowledgements, Conflicts of Interest and Bibliography.

**Patients are ventilated with pressure-support ventilation and undergo daily spontaneous breathing trials**

The Background or Introduction of the research project explains interest in the topic and why the topic is significant. The authors state that acute respiratory failure requiring mechanical ventilation accounts for approximately

30% of admissions to intensive care units (ICU). Improved survival has resulted in increased numbers of patients receiving prolonged mechanical ventilation. In many hospitals, stable patients with acute respiratory failure are transferred from the ICU into units that specialize in completing the process of weaning from mechanical ventilation. Therefore, the authors designed a study to examine the long-term outcomes of patients undergoing prolonged mechanical ventilation for acute respiratory failure.

The Question being asked by the researchers was divided into six separate but interrelated parts; we will review their first part only: What percentage of patients receiving prolonged mechanical ventilation in an acute care respiratory unit are liberated from mechanical ventilation? Note: The Question asked in research projects may have the possible answers: "yes" and "no", or in this study, may be a numerical result. The preconceived answer by researchers to the Question is called the Hypothesis.

The Methods for the research project describe the design and steps to answer the Question. Since this research project involved human subjects, the authors indicate approval was obtained by the Human Research Committee of the Massachusetts General Hospital and that written informed consent to perform telephone follow-up was obtained from the patient or the next of kin. The authors description of the ten bed Respiratory Unit includes intensive care physicians, one dedicated registered respiratory therapist on site at all times and a dedicated nursing staff that includes a nurse manager and a clinical nurse specialist. A dedicated physician from the physical medicine and rehabilitation service of an affiliated rehabilitation institution is consulted in the majority of patients. There is a weekly interdisciplinary conference to discuss ongoing issues and long-term plans. Specific protocols have been developed over the years, including guidelines addressing weaning from mechanical ventilation, downsizing tracheostomy tubes for speech and oral feeding and decannulating the tracheostomy site. Since the inception of the Respiratory Unit in 2001, most patients are ventilated with pressure-support ventilation and undergo daily spontaneous breathing trials. The authors designed this as a prospective, observational study of consecutive patients admitted to a respiratory unit of an acute, tertiary care university hospital. The authors prospectively identified consecutive adults undergoing mechanical ventilation at the time of their admission to the acute care Respiratory Unit at the Massachusetts General Hospital between January 2002 and March 2004. All patients who were receiving mechanical ventilation through an endotracheal tube or a tracheostomy tube were eligible for enrollment. Patients who were not mechanically ventilated were excluded. Liberation from mechanical ventilation was defined as the ability to come off the ventilator within the 6 months of the study follow-up period. For statistical analysis, the authors estimated that 200 patients would need to be enrolled for the study, assuming 33% of patients would not be weaned from mechanical ventilation, 25% would die during their hospitalization, and 10% would be lost to follow-up after discharge.

The Results section compiles the data to answer the Question. The authors enrolled 210 consecutive mechanical-

ly ventilated patients admitted to their Respiratory Unit. There were 27 patients excluded because they either were not receiving ventilatory support ( $n = 25$ ) or were on a stable schedule of home noninvasive ventilation ( $n = 2$ ). A total of 165 (79%) patients were ventilated through a tracheostomy at admission; 40 patients (19%) were ventilated through an orotracheal tube, and 19 of these 40 received a tracheostomy during their Respiratory Unit stay; five patients (3%) were ventilated via a face mask. Nine patients had incomplete follow-up: six did not consent to the telephone interview, and three were lost after the 3-month interview. Within 6 months of discharge from the Respiratory Unit, 146 patients (69%) were free from mechanical ventilation. The majority of these patients ( $n = 136$ ) were weaned in the Respiratory Unit within a median time of 14 days. Nine additional patients were weaned in rehabilitation institutions.

The Discussion/Reflections/Future Research offers a comparison with similar research projects and a critique by the authors of their own research project, possibly suggesting modifications that would improve the quality of the research. In this research project, the authors noted that specialized units that admit mechanically ventilated patients after a critical illness report ventilator weaning rates of 40–60%. They note that the difference between 40 and 60% is in part due to the varying administrative and clinical makeup of each unit, plus lack of consensus on definitions, including what constitutes weaning success and what constitutes prolonged mechanical ventilation.

The Conclusion is the final summary of the research project. This research project demonstrated that within 6 months of discharge from the Respiratory Unit, 69% of the patients were free from mechanical ventilation. Therefore, in this research project, the Question was properly addressed.

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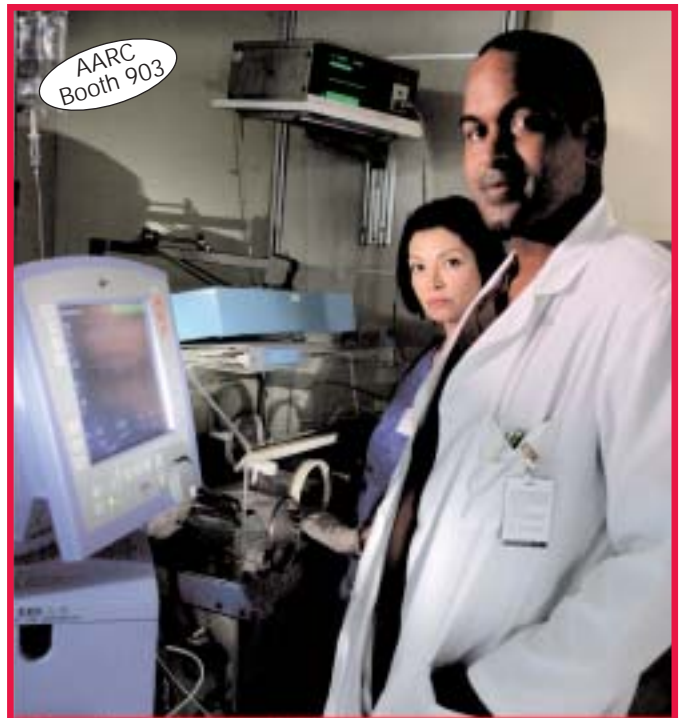
Conflicts of Interest are listed for all participating in authorship of the research project. Conflicts include advisory board membership, ownership of stock, and receipt of services, honoraria or gifts from companies related to the research project. The authors have disclosed no potential conflicts of interest.

The Bibliography section includes references to support the research as included in the manuscript by reference number. For this research project, there were 21 references.

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