



Managing Cost of Care

How Automated Ventilator Weaning Protocols Can Improve Workflow and Reduce Costs

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Mechanical ventilation is a highly complex procedure that's become routine in today's ICUs. One of the most important considerations regarding ventilators is to complete the weaning process as soon as possible – because every delay increases the cost of care and risk of adverse ventilator-related events.

The clinician's first step is to determine if the patient is ready for weaning by using information from a screening test that predicts whether or not they can tolerate a reduction of ventilatory support during the weaning process. Clinicians, however, are challenged with information overload and multiple high-priority tasks – so even when explicit protocols are available, adhering to them is inconsistent.¹

Automated protocols can help. When using closed-loop control systems, employing automated algorithms can lead to higher uniformity in clinician decision making. With the right application, this technology can improve therapeutic quality and efficacy.²

The average cost per day for a patient in an ICU is \$3000. Mechanical ventilation costs an additional \$1500 daily.³ ICU costs are highest during the first two days of admission, stabilizing at a lower level thereafter. Interventions that reduce length of stay and/or duration of mechanical ventilation can substantially reduce total inpatient costs.⁴

A 2014 Corcoran Review study, which compared automated protocols to standard weaning practices without protocols, found that automated protocols:

- Reduced the average total time spent on the ventilator by 26%
- Reduced the duration of weaning by 70%
- Reduced length of stay in the ICU by 11%
- Caused no additional harmful effects

The study included considerable variation in the types of protocols used, the criteria for considering when to start weaning, the medical conditions of the patients, and usual practice in weaning.⁵

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Reducing workload by decreasing ventilator manipulations

Because automated weaning decreases the number of ventilator manipulations, it can also reduce workload for an already-overburdened staff.⁶ In fact, staffing shortages, increasing number of patients requiring ventilation, and mandated staff/patient ratios may be the most compelling argument for automated weaning.⁶

Dräger's SmartCare®/PS software is an automated clinical protocol designed to stabilize the patient's spontaneous breathing in a so called "Zone of Respiratory Comfort" (ZoRC) and adjust the inspiratory support level automatically. After the clinician determines that a patient is ready for weaning, the protocol monitors and evaluates three parameters that define the ZoRC: spontaneous respiratory rate, spontaneous tidal volume, and end-tidal CO₂.

SmartCare/PS software supervises the weaning process. Based on the defined parameters, it will either adapt to the patient's changing clinical requirements, maintain current support, or continue to observe and suggest separation. When the "Consider Separation" resp. "SBT successful" notice appears, the clinician can evaluate the patient's condition and consider the appropriate course of action.

In conclusion, automated algorithms can support decision making, reduce respiratory workflow, and provide a uniform approach to ventilator weaning. However, there is no substitute for the experienced human brain. The bedside clinician must choose which patients are appropriate for this technology and determine solutions for any subjective physical issues that occur.

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