



Volume-targeted ventilation with a fabian™ ventilator: maintenance of tidal volumes and blood CO₂

Authors: Gusztav Belteki,^{1,2} András Széll,² Lajos Lantos,² Gabor Kovács,² Gyula Szántó,² Aniko Berényi,² Mónika Szilágyi,² Gábor Liszkay,² Ferenc Kőhalmi,² Colin J Morley,¹ Zsolt Somogyvári^{2,3}

1. Neonatology, Cambridge University Hospitals NHS Foundation Trust, Cambridge, UK
2. Neonatal Emergency and Transport Services of the Peter Cerny Foundation, Budapest, Hungary
3. Department of Family Care and Methodology, Faculty of Health Sciences, Semmelweis University, Budapest, Hungary

Background

Volume-targeted ventilation (VTV) is a ventilation mode where a clinician sets a target tidal volume (VTset) and the ventilator measures each expired tidal volume (VTe), then adjusts the next peak inflating pressure (PIP) to try to achieve an expired tidal volume as close to the target as possible. This study analyzed the performance of the fabian™ +nCPAP evolution ventilator during volume guarantee (VG) ventilation in neonates.

Study methods

This was a retrospective chart review of 300 neonates over 17 months who received invasive or noninvasive ventilation using a fabian™ ventilator during their care. Of these, 145 received mechanical ventilation via endotracheal tube (ETT), and 83 of these were ventilated using VG mode. Clinical and ventilator data were obtained from these 83 infants.

Results

Overall, VTdiff, the difference between the actual VTe of the ventilator inflations and the target value (VTset), was close to zero. Of all inflations, 80% were within 1 mL/kg of the target and 40% were within 0.2 mL/kg, irrespective of the weight of the infant. Increased ETT leak was noted in babies weighing <1000g; these infants experienced higher VTdiff. VTe showed considerable short-term variability, and in some cases the average value was below or above the targeted volume.

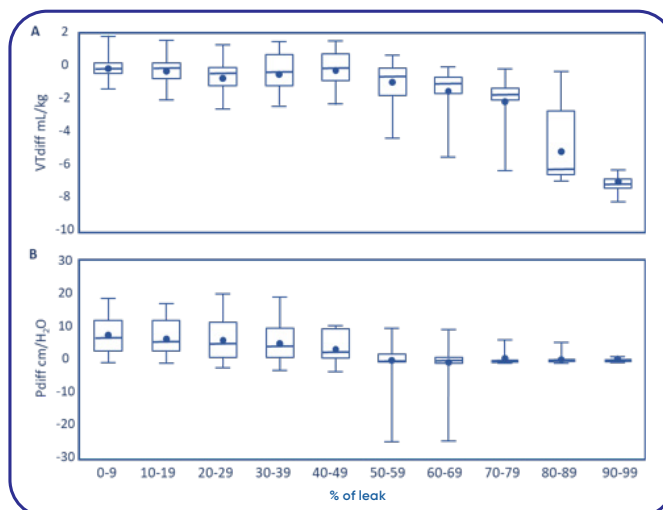


Figure 1 Boxplots showing distributions of VTdiff (A) and Pdiff (B) for different levels of ETT leaks (means, IQRs)

What is volume-targeted ventilation

Standard pressure-controlled ventilation modes are set with a target peak inflating pressure (PIP), and tidal volumes delivered with that pressure may be above or below safe levels for the patient. In volume guarantee ventilation, the target tidal volume is a fixed setting while the PIP required to deliver that volume can vary, within limits set by the clinician. The volume of each exhalation is measured to give feedback to the ventilator's microprocessor which, in turn, alters the pressure of the next inhalation to help meet a guaranteed tidal volume. The PIP varies while the positive end expiratory pressure (PEEP) is held constant. VG is offered as an option on the fabian™ +nCPAP evolution ventilator as well as other brands. This approach provides adequate inflation of the lungs without the risk of large tidal volumes which have been associated with mortality and morbidity (volutrauma, bronchopulmonary dysplasia).



Take home message

The fabian™ +nCPAP evolution ventilator delivers accurate and reliable tidal volumes and pressures during neonatal critical care. The efficiency and accuracy of the ventilation algorithm is affected by endotracheal tube leaks but not by the weight of the infant.

GLOBAL HEADQUARTERS

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