Literature List
Volume Guarantee

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Literature List

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Keszler M	**Volume-targeted ventilation: one size does not fit all. Evidence-based recommendations for successful use.**	*Arch Dis Child Fetal Neonatal Ed. 2018 Aug 1. pii: fetalneonatal-2017-314734. doi: 10.1136/archdischild-2017-314734*

Abstract:
Excessive tidal volume (V(T)) can lead to lung injury, hypocarbia, and neurologic damage. Volume guarantee (VG) uses exhaled V(T) as the control variable to reduce the risk of volutrauma and more closely control PaCO(2). The objective was to test the hypothesis that VG combined with assist/control (A/C) will maintain PaCO(2) and V(T) within target range more consistently than assist/control alone during the first 72 hr of life in ventilated preterm infants. Eligible infants were randomly assigned to A/C + VG or A/C alone. Data were recorded directly from the pressure and volume module of the Dräger Babylog 8000plus ventilator. Arterial blood gases were obtained every 2-6 hr, as clinically indicated. In A/C, inspiratory pressure was adjusted to achieve a V(T) of 4-6 ml/kg. In VG, the target V(T) was 5 ml/kg. Subsequent adjustments were made by the clinical team in response to arterial blood gas measurements (ABG). Proportion of breaths and PaCO(2) values outside the target range were compared by chi(2), and continuous variables by t-test. There were no differences in demographic or baseline ventilator variables between the 18 infants in the two groups. For 1,805/11,950 breaths (15.1%), V(T) was > target with A/C + VG, vs. 2,503/9,853 (25.4%) with A/C ($P < 0.001$). V(T) was < target for 21.7% of breaths with A/C + VG, vs. 35.7% with A/C ($P < 0.001$). Twenty percent of PaCO(2) values were < target, with A/C + VG vs. 36.3% with A/C, $P < 0.05$. The proportion of PaCO(2) values > target was similar in the two groups. Oxygenation and mean pH were not different. No complications related to mechanical ventilation were observed. In conclusion, Volume Guarantee significantly reduced hypocarbia and excessively large V(T). This suggests the potential to reduce pulmonary and neurologic complications of mechanical ventilation. Larger studies are needed to establish safety and demonstrate such benefits.

Conclusion: Faced with level 1 evidence of important benefits of VTV, it is hard to justify continuing to expose infants to pressure-controlled ventilation. The way forward is for us is to be willing to abandon our comfort zone and embrace the paradigm shift that VTV represents. The transition should be undertaken deliberately and only after much training and appraisal of the available literature. Focus on underlying lung pathophysiology, individualized ventilator settings and VT targets are keys to success. A formal ventilation protocol is an effective way to implement respiratory support, especially when transitioning to a new approach

Klingenberg C. et al.	**Volume-targeted versus pressure-limited ventilation in neonates.**	*Cochrane Database Syst Rev. 2017 Oct 17;10:CD003666. doi: 10.1002/14651858.CD003666.pub4.*

Background:
Damage caused by lung overdistension (volutrauma) has been implicated in the development of bronchopulmonary dysplasia (BPD). Modern neonatal ventilation modes can target a set tidal volume as an alternative to traditional pressure-limited ventilation (PLV) using a fixed inflation pressure. Volume-targeted ventilation (VTV) aims to produce a more stable tidal volume in order to reduce lung damage and stabilise the partial pressure of carbon dioxide (pCO_2).

Objectives:
To determine whether VTV compared with PLV leads to reduced rates of death and death or BPD in newborn infants and to determine whether use of VTV affected outcomes including air leak, cranial ultrasound findings and neurodevelopment.

Search Methods:
We used the standard search strategy of Cochrane Neonatal to search the Cochrane Central Register of Controlled Trials (CENTRAL 2016, Issue 12), MEDLINE via PubMed (1966 to 13 January 2017), Embase (1980 to 13 January 2017) and CINAHL (1982 to 13 January 2017). We also searched clinical trials databases, conference proceedings and the reference lists of retrieved articles for randomised controlled trials and quasi-randomised trials. We contacted the principal investigators of studies to obtain supplementary information.

Selection Criteria:
Randomised and quasi-randomised trials comparing VTV versus PLV in infants of less than 44 weeks' postmenstrual age and reporting clinically relevant outcomes.

Data Collection and Analysis:
We assessed risk of bias for each trial using Cochrane methodology. We evaluated quality of evidence for each outcome using GRADE criteria. We tabulated mortality, rates of BPD, short-term clinical outcomes and long-term developmental outcomes.

Statistics:
For categorical outcomes, we calculated typical estimates for risk ratios (RR), risk differences (RD) and number needed to treat for an additional beneficial outcome (NNTB). For continuous variables, we calculated typical estimates for mean differences (MD). We used 95% confidence intervals (CI) and assumed a fixed-effect model for meta-analysis.

Main Results:
Twenty randomised trials met our inclusion criteria; 16 parallel trials (977 infants) and four cross-over trials (88 infants). No studies were blinded and the quality of evidence for outcomes assessed varied from moderate to low.We found no difference in the primary outcome, death before hospital discharge, between VTV modes versus PLV modes (typical RR 0.75, 95% CI 0.53 to 1.07; low quality evidence). However, there was moderate quality evidence that the use of VTV modes resulted in a reduction in the primary outcome, death or BPD at 36 weeks' gestation (typical RR 0.73, 95% CI 0.59 to 0.89; typical NNTB 8, 95% CI 5 to 20) and the following secondary outcomes: rates of pneumothorax (typical RR 0.52, 95% CI 0.31 to 0.87; typical NNTB 20, 95% CI 11 to 100), mean days of mechanical ventilation (MD -1.35 days, 95% CI -1.83 to -0.86), rates of hypocarbia (typical RR 0.49, 95% CI 0.33 to 0.72; typical NNTB 3, 95% CI 2 to 5), rates of grade 3 or 4 intraventricular haemorrhage (typical RR 0.53, 95% CI 0.37 to 0.77; typical NNTB 11, 95% CI 7 to 25) and the combined outcome of periventricular leukomalacia with or without grade 3 or 4 intraventricular haemorrhage (typical RR 0.47, 95% CI 0.27 to 0.80; typical NNTB 11, 95% CI 7 to 33). VTV modes were not associated with any increased adverse outcomes.

Author's Conclusion:
Infants ventilated using VTV modes had reduced rates of death or BPD, pneumothoraces, hypocarbia, severe cranial ultrasound pathologies and duration of ventilation compared with infants ventilated using PLV modes. Further studies are needed to identify whether VTV modes improve neurodevelopmental outcomes and to compare and refine VTV strategies.

González-Pacheco N. et al.	**Using very high frequencies with very low lung volumes during high-frequency oscillatory ventilation to protect the immature lung. A pilot study.**	J Perinatol. 2016 Apr;36(4):306-10. doi: 10.1038/jp.2015.197. Epub 2016 Jan 7

Objective:
High-frequency oscillatory ventilation (HFOV) has been described as a rescue therapy in severe respiratory distress syndrome (RDS) with a potential protective effect in immature lungs. In recent times, HFOV combined with the use of volume guarantee (VG) strategy has demonstrated an independent effect of the frequency on tidal volume to increase carbon-dioxide (CO2) elimination. The aim of this study was to demonstrate the feasibility of using the lowest tidal volume on HFOV+VG to prevent lung damage, maintaining a constant CO2 elimination by increasing the frequency.

Study Design:
Newborn infants with RDS on HFOV were prospectively included. After adequate and stable ventilation using a standard HFOV strategy, the tidal volume was fixed using VG and decreased while the frequency was increased to the highest possible to maintain a constant CO2 elimination. Pre- and post-PCO2, delta pressure and tidal volume obtained in each situation were compared

Result:
Twenty-three newborn infants were included. It was possible to increase the frequency while decreasing the tidal volume in all patients, maintaining a similar CO2 elimination, with a tendency to a lower mean PCO2 after reaching the highest frequency. High-frequency tidal volume was significantly lower, 2.20 ml kg (-1) before vs 1.59 ml kg(-1) at the highest frequency.

Conclusion:
It is possible to use lower delivered tidal volumes during HFOV combined with VG and higher frequencies with adequate ventilation to allow minimizing lung injury.

Iscan B. et al.	**Impact of Volume Guarantee on High-Frequency Oscillatory Ventilation in Preterm Infants: A Randomized Crossover Clinical Trial.**	*Neonatology. 2015;108(4):277-82. doi: 10.1159/000437204. Epub 2015 Sep 1.*

Background:
High-frequency oscillatory ventilation (HFOV) with volume guarantee (VG) is a new ventilation mode that allows the clinician to set a mean tidal volume to be delivered.

Objective:
This study aimed to investigate whether HFOV with a VG option may result in constant tidal volume delivery and less fluctuant CO2 levels compared to HFOV alone in premature infants with respiratory distress syndrome (RDS).

Methods:
Inborn infants at less than 32 weeks of gestation with RDS requiring invasive mechanical ventilation were eligible. Patients were randomized to receive HFOV + VG or HFOV alone as the initial ventilator mode and then crossed over to the other mode. HFOV was performed with 'optimal lung volume strategy' during both of the periods.

Results:
Twenty infants were evaluated. The mean high-frequency tidal volume (VThf) and CO2 diffusion coefficient (DCO2) were significantly higher in the HFOV + VG mode than HFOV alone. HFOV + VG maintains VThf within the target range more consistently than HFOV. The incidences of hypocarbia and hypercarbia were lower in HFOV with VG than HFOV alone.

Conclusion:
This is the first prospective, randomized, short-term crossover clinical study that compared HFOV with and without VG in infants with acute RDS. Because of the lower VThf fluctuation and lower incidences of out-of-target PCO2 levels, HFOV combined with VG seems to be feasible for preterm infants. However, the results should be interpreted with caution due to the small sample size and short-term crossover design of the study.

Peng W. et al.	**Volume-targeted ventilation is more suitable than pressure-limited ventilation for preterm infants: a systematic review and meta-analysis.**	*Arch Dis Child Fetal Neonatal Ed. 2014 Mar;99(2):F158-65. doi: 10.1136/archdischild-2013-304613. Epub 2013 Nov 25.*

Objective:
To assess the effect of volume-targeted ventilation (VTV) compared with pressure-limited ventilation (PLV) in preterm infants.

Method:
We searched the Cochrane Library (Issue 3, 2013), PubMed (1966 to 5 March 2013), China National Knowledge Infrastructure (CNKI) and periodical databases (1979 to 5 March 2013). We selected randomised controlled trials (RCTs) and quasi-RCTs of VTV versus PLV as active interventions in preterm infants. We performed meta-analyses using the Cochrane statistical package RevMan 5.0.

Results:
Eighteen trials met our inclusion criteria. There was no evidence that VTV modes reduced the incidence of death (relative risk (RR) 0.73, 95% CI 0.51 to 1.05). The use of VTV modes resulted in a reduction in the incidence of bronchopulmonary dysplasia (BPD) (RR 0.61, 95% CI 0.46 to 0.82) and duration of mechanical ventilation (mean difference (MD) -2.0 days, 95% CI -3.14 to -0.86). VTV modes also resulted in reductions in intraventricular haemorrhage (IVH) (RR 0.65, 95% CI 0.42 to 0.99), grade 3/4 IVH (RR 0.55, 95% CI 0.39 to 0.79), periventricular leukomalacia (PVL) (RR 0.33, 95% CI 0.15 to 0.72), pneumothorax (RR 0.52, 95% CI 0.29 to 0.93), failure of primary mode of ventilation (RR 0.64, 95% CI 0.43 to 0.94), hypocarbia (RR 0.56, 95% CI 0.33 to 0.96), mean airway pressure (MD -0.54 cmH2O, 95% CI -1.05 to -0.02) and days of supplemental oxygen administration (MD -1.68 days, 95% CI -2.47 to -0.88).

Conclusions:
Preterm infants ventilated using VTV modes had reduced duration of mechanical ventilation, incidence of BPD, failure of primary mode of ventilation, hypocarbia, grade 3/4 IVH, pneumothorax and PVL compared with preterm infants ventilated using PLV modes. There was no evidence that infants ventilated with VTV modes had reduced death compared to infants ventilated using PLV modes.

Duman N. et al.	**Impact of volume guarantee on synchronized ventilation in preterm infants: a randomized controlled trial.**	*Intensive Care Med. 2012 Aug;38(8):1358-64. doi: 10.1007/s00134-012-2601-5. Epub 2012 May 23.*

Purpose:
The aim of this randomized controlled trial was to assess whether the addition of volume guarantee (VG) to triggered ventilation decreases the duration of ventilation in very low birth weight (VLBW) infants with respiratory distress syndrome (RDS).

Methods:
Infants were randomized into two groups to initially receive either assist/control (A/C) or A/C plus VG ventilation and then weaned with synchronized intermittent mandatory ventilation (SIMV) or SIMV plus VG.

Results:
Forty-five infants were included in the study. The demographic and clinical characteristics, values of tidal volume (VT), peak inspiratory pressure (PIP), fraction of inspired oxygen, carbon dioxide tension, and pH were similar for all participating infants initially. During the follow-up, the VT levels were more stable, and the PIP levels were significantly decreasing in the VG group. Although the duration of ventilation was shorter in the VG group, this trend was not statistically significant. The incidences of death and bronchopulmonary dysplasia (BPD) were not significantly different, but the combined outcome of death or BPD was lower in the VG group. Although the VG group experienced less frequent BPD, periventricular leukomalacia, and intraventricular hemorrhage, these differences were not statistically different.

Conclusion:
The VG option, when combined with A/C (in the acute phase of RDS) and SIMV (in the weaning), reduced VT variability, and may have shortened the duration of ventilation in VLBW infants. Overall mortality and BPD rates did not change, but their combined outcome was significantly improved in infants treated with VG modes as compared to those treated with synchronized pressure-limited modes alone.

Klingenberg C. et al.	**A practical guide to neonatal volume guarantee ventilation.**	*J Perinatol. 2011 Sep;31(9):575-85. doi: 10.1038/jp.2011.98. Epub 2011 Jul 14.*

Abstract:
A recent systematic review and meta-analysis shows that volume-targeted ventilation (VTV) compared with pressure-limited ventilation (PLV) reduce death and bronchopulmonary dysplasia, pneumothorax, hypocarbia and severe cranial ultrasound abnormalities. In this paper, we present published research and our experience with volume guarantee (VG) ventilation, a VTV mode available on the Dräger Babylog 8000plus and VN500 ventilators. The VG algorithm measures the expired tidal volume (V(T)) for each inflation and adjusts the peak inflating pressure for the next inflation to deliver a V(T) set by the clinician. The advantage of controlling expired V(T) is that this is less influenced by endotracheal tube leak than inspired V(T). VG ventilation can be used with an endotracheal tube leak up to ~50%. Initial set V(T) for infants with respiratory distress syndrome should be 4.0 to 5.0 ml kg(-1). The set V(T) should be adjusted to maintain normocapnoea. Setting the peak inflating pressure limit well above the working pressure is important to enable the ventilator to deliver the set V(T), and to avoid frequent alarms. This paper provides a practical guide on how to use VG ventilation.

Conclusion:
A Cochrane systematic review supports the use of VTV for ventilated preterm infants in need of mechanical ventilation.12, 13 The VG mode controls the expired VT and provides breath-by-breath adjustments of the PIP to achieve the set VT. By controlling the expired VT, this mode is less influenced by endotracheal tube leak and can be used with ETT leaks up to ~50%. The initial set VT for infants with RDS should be 4.0 to 5.0 ml kg−1, but may need adjustments to maintain acceptable PaCO2 values. Very high (>8 ml kg−1) and very low (<3.5 ml kg−1) set VT may cause harm. Setting the PIP limit well above the working pressure is important to enable the ventilator alter the PIP to deliver the set VT, and to avoid frequent low tidal volume alarms. We recommend combining VG with triggered modes supporting all inflations (AC or PSV modes). A ventilator BUR <40 per min permits the infant to trigger most inflations. VG automatically weans the PIP as the baby's lung compliance and respiratory effort improves.
This state-of-the-art review on VG ventilation is intended to be used with the Dräger Babylog 8000plus and VN500 ventilators, which have a similar VG mode. We have insufficient experience with other ventilators to make recommendations for their use. Some of the principles apply to other ventilators targeting expired VT but caution should be applied, as these ventilators do not work exactly in the same way (Table 2). We urge the clinicians to report their experiences with all VTV modes and the manufacturers to describe the technical details of VTV modes in new neonatal ventilators.

Kaiser JR.	**The effects of closed tracheal suctioning plus volume guarantee on cerebral hemodynamics.**	*J Perinatol. 2011 Oct;31(10):671-6. doi: 10.1038/jp.2011.8. Epub 2011 Feb 17.*

Objective:
To compare the effects of open tracheal suctioning (OS) plus intermittent mandatory ventilation (IMV) vs. closed tracheal suctioning (CS) plus volume guarantee ventilation (VG) on changes in mean cerebral blood-flow velocity (CBFv) of ventilated very low birth weight (VLBW) infants.

Study Design:
A total of 75 normotensive, ventilated VLBW infants (with normal cranial ultrasounds) had monitoring of mean CBFv, PCO2 and mean arterial blood pressure (MABP) before, during and after 220 tracheal suctioning sessions during the first week of life. Multiple linear regression analysis was used to determine the factor(s) influencing the magnitude of relative changes from baseline in mean CBFv after suctioning.

Result:
In all, 49 VLBW infants receiving IMV had monitoring during 124 OS sessions between July 2002 and May 2005; 26 VLBW infants receiving VG had monitoring during 96 CS sessions between January 2006 and July 2007. The average magnitude of relative changes in mean CBFv was significantly less with CS+VG, and was associated with the magnitude of relative changes in PCO2 and suctioning-ventilator group.

Conclusion:
The average magnitude of relative changes in mean CBFv was reduced in VLBW infants with CS+VG vs. OS+IMV.

Wheeler KI.	**Volume-targeted versus pressure-limited ventilation for preterm infants: a systematic review and meta-analysis.**	*Neonatology. 2011;100(3):219-27. doi: 10.1159/000326080. Epub 2011 Jun 22.*

Background:
The causes of bronchopulmonary dysplasia (BPD) are multifactorial. Overdistension of the lung (volutrauma) is considered an important contribution. As an alternative to traditional pressure-limited ventilation (PLV), modern neonatal ventilators offer modes which can target a set tidal volume

Objectives:
To determine whether volume-targeted neonatal ventilation, compared with PLV, reduces death or BPD.

Methods:
We performed a systematic review and meta-analysis using the methodology of the Neonatal Review Group of the Cochrane Collaboration. A comprehensive literature search was undertaken, and data for prespecified outcomes were combined where appropriate using the fixed effects model.

Results:
Nine trials were eligible. Volume-targeted ventilation resulted in a reduction in: the combined outcome of death or BPD [typical relative risk, RR, 0.73 (95% confidence interval, 0.57-0.93), numbers needed to treat, NNT, 8 (95% CI 5-33)], the incidence of pneumothorax [typical RR 0.46 (95% CI 0.25-0.84), NNT 17 (95% CI 10-100)], days of ventilation [weighted mean difference 0.8 days (log-transformed data, p = 0.05)], hypocarbia (pCO(2) <35 mm Hg/4.7 kPa); [typical RR 0.56 (95% CI 0.33-0.96), NNT 4 (95% CI 2-25)], and the combined outcome of periventricular leukomalacia or grade 3-4 intraventricular hemorrhage [typical RR 0.48 (95% CI 0.28-0.84), NNT 11 (95% CI 7-50)].

Conclusions:
Compared with PLV, infants ventilated using volume-targeted ventilation had reduced death/BPD, duration of ventilation, pneumothoraces, hypocarbia and periventricular leukomalacia/severe intraventricular hemorrhage. Further studies are needed to assess neurodevelopmental outcomes.

Klingenberg C. et al.	**An international survey of volume-targeted neonatal ventilation.**	*Arch Dis Child Fetal Neonatal Ed. 2011 Mar;96(2):F146-8. doi: 10.1136/adc.2009.181081. Epub 2010 Jun 28.*

Objective:
To evaluate clinical practice of volume-targeted ventilation (VTV).

Design:
Internet-based survey of all 50 tertiary neonatal units in Australia, New Zealand, Sweden, Denmark, Finland and Norway.

Results:
Response rate was 100%. VTV was routinely used in 25 (50%) units; 15/25 (60%) in Australasia and 10/25 (40%) in the Nordic countries. The most common reason given for using VTV was that it reduces bronchopulmonary dysplasia (13/25; 52%). The median (IQR) of upper limits of target tidal volume were (1) for initial ventilation of preterm infants with respiratory distress syndrome 5.0 (4.6-6.0) ml/kg and (2) for infants with ventilator-dependent bronchopulmonary dysplasia 6.0 (5.0-8.0) ml/kg. The median (IQR) maximum peak inspiratory pressure limit units were prepared to use in VTV-mode was 35 (30-42.5) cm H(2)O.

Conclusion:
Half of the units used VTV routinely, but with a considerable variation in VTV practice. More studies are required to establish best VTV practice.

Lista G. et al.	**Volume guarantee versus high-frequency ventilation: lung inflammation in preterm infants.**	*Arch Dis Child Fetal Neonatal Ed. 2008 Jul;93(4):F252-6. Epub 2007 Apr 3.*

Background:
Appropriate ventilation together with improvement of clinical care of premature babies can contribute to reducing lung inflammation, known to represent the "primum movens" of bronchopulmonary dysplasia (BPD). High-frequency oscillatory ventilation (HFOV) and volume-guarantee (VG) ventilation are effective in the treatment of neonatal respiratory distress syndrome (RDS).

Objective:
To assess the potential of HFOV and VG to prevent BPD in the acute phase of RDS, by a randomized clinical study evaluating lung inflammation in premature infants.

Study Design:
Forty infants (gestational age 25-32 weeks) with RDS were assigned to assist-control ventilation plus VG (Vt = 5 ml/kg) or HFOV (both with a Dräger Babylog 8000 plus ventilator). Levels of interleukin (IL) 6, IL8 and tumour necrosis factor were determined in tracheal aspirate on days 1, 3 and 7 of life.

Results:
In the HFOV group IL6 levels were significantly higher on day 3 (0.5 (0.2) vs assisted-control ventilation plus VG group 0.1 (0.2) ng/ml) and oxygen dependency was significantly longer (36 (23) vs assisted-control ventilation plus VG group 19 (11) days).

Conclusion:
VG ventilation is an effective lung-protective strategy to be used in acute RDS, inducing a lower expression of early inflammation markers than HFOV. Whether the use of this initial ventilatory strategy contributes to the prevention of BPD requires further studies.

Keszler M.	**Volume guarantee: stability of tidal volume and incidence of hypocarbia.**	*Pediatr Pulmonol. 2004 Sep;38(3):240-5.*

Abstract:
Excessive tidal volume (V(T)) can lead to lung injury, hypocarbia, and neurologic damage. Volume guarantee (VG) uses exhaled V(T) as the control variable to reduce the risk of volutrauma and more closely control PaCO(2). Our objective was to test the hypothesis that VG combined with assist/control (A/C) will maintain PaCO(2) and V(T) within target range more consistently than assist/control alone during the first 72 hr of life in ventilated preterm infants. Eligible infants were randomly assigned to A/C + VG or A/C alone. Data were recorded directly from the pressure and volume module of the Draeger Babylog 8000+ ventilator. Arterial blood gases were obtained every 2-6 hr, as clinically indicated. In A/C, inspiratory pressure was adjusted to achieve a V(T) of 4-6 ml/kg. In VG, the target V(T) was 5 ml/kg. Subsequent adjustments were made by the clinical team in response to arterial blood gas measurements (ABG). Proportion of breaths and PaCO(2) values outside the target range were compared by chi(2), and continuous variables by t-test. There were no differences in demographic or baseline ventilator variables between the 18 infants in the two groups. For 1,805/11,950 breaths (15.1%), V(T) was > target with A/C + VG, vs. 2,503/9,853 (25.4%) with A/C ($P < 0.001$). V(T) was < target for 21.7% of breaths with A/C + VG, vs. 35.7% with A/C ($P < 0.001$). Twenty percent of PaCO(2) values were < target, with A/C + VG vs. 36.3% with A/C, $P < 0.05$. The proportion of PaCO(2) values > target was similar in the two groups. Oxygenation and mean pH were not different. No complications related to mechanical ventilation were observed.

Conclusion:
VG significantly reduced hypocarbia and excessively large V_T. This suggests the potential to reduce pulmonary and neurologic complications of mechanical ventilation. Larger studies are needed to establish safety and demonstrate such benefits.

Lista G.	**Impact of targeted-volume ventilation on lung inflammatory response in preterm infants with respiratory distress syndrome (RDS).**	*Pediatr Pulmonol. 2004 Jun;37(6):510-4.*

Abstract:
Volutrauma and pulmonary inflammation are thought to be the most important predisposing factors of chronic lung disease (CLD), a major complication of prematurity. A new option in patient-triggered ventilation (PTV), the volume guarantee (VG), a volume-targeted ventilation, seems to be a promising approach in reducing the risk of CLD, by limiting lung inflammatory injury and volutrauma. Our aim was to evaluate lung inflammatory response in preterm infants with respiratory distress syndrome (RDS), mechanically ventilated with and without VG, as measured by proinflammatory cytokines (IL-6, IL-8, and TNF-alpha) in tracheobronchial aspirate (TA) fluid. Fifty-three preterm infants (GA = 25-32 weeks) with RDS were randomized at birth to be ventilated using pressure support ventilation (PSV) with VG (Vt = 5 ml/kg) (n = 30) and without VG (n = 23) (Draeger Babylog 8000 Plus, 5.n). IL-6, IL-8, and TNF-alpha were determined by ELISA in TA samples on days 1, 3, and 7 of life. We observed a significant difference (ANOVA) in IL-8 and IL-6 levels on day 3 between the two groups ($P < 0.05$), and an increasing significative trend in IL-8 values in PSV group ($P < 0.05$). Mechanical ventilation lasted longer in the PSV group (12.3 +/- 3 vs. 8.8 +/- 3 days) (P = no significance). In conclusion, these preliminary data suggest a role for volume-targeted ventilatory strategy in reducing acute inflammatory response in preterm infants with RDS. Further studies are required in order to define whether this ventilatory strategy prevents lung injury.

Conclusion:
These preliminary data suggest a role for volume-targeted ventilatory strategy in reducing acute inflammatory response in preterm infants with RDS. Further studies are required in order to define whether this ventilatory strategy prevents lung injury