Respiratory insufficiency remains one of the major causes of neonatal mortality and morbidity. By minimising lung injury, haemodynamic and neurological impairment and work of breathing whilst optimising comfort for the infant, you allow your little patients to grow safely with a higher chance of a positive long-term outcome. Volume Guarantee ventilation has been shown to improve the clinical outcome of neonates by reducing the number of respiratory and neurological complications as well as reducing the total duration of mechanical ventilation.
The global Sustainable Development Goals target to reduce neonatal mortality to at least as low as 12 deaths per 1,000 live births. New evidence proofs that there is still room for improvement to impact the outcome of newborns and neonates with the right ventilation strategies:

Infant Respiratory Distress Syndrome occurs in approximately 7% of all preterm infants.

More than 60% of ELBW infants develop Bronchopulmonary Dysplasia (BPD) with an oxygen dependency.

There is a high risk (25%) for poor long-term outcome for infants with BPD resulting in mortality rates as high as 14% – 38% [...] at 2 – 3 years of age.

As the population of NICU survivors grow, long-term manifestations of chronic lung injury with BPD is likely to represent a greater burden to health systems.

**Ventilation in harmony with the infant with Volume Guarantee**

Babies frequently demonstrate substantial variations in respiratory drive often on a breath-to-breath basis. Surfactant therapy can have a rapid and profound impact on compliance values. Assuring the accurate delivery of tidal volumes during changes in compliance, resistance, and leak volumes is a technically challenging prospect, but one that’s well worth the effort. Scientific documentation has shown that strategies utilizing volume-targeted ventilation can significantly lower mean airway pressures and avoid complications such as overdistention, barotrauma and hypocarbia.

Pressures adapt to individual changes in lung mechanics and respiratory drive whereas the tidal volume of the mandatory breaths remains constant. To prevent not only volutrauma but also barotrauma, the pressure can be limited to a maximum pressure (Pmax). The greater the patient’s inspiratory efforts are, the lower the pressure the ventilator applies. The pressure load on the lungs is limited to the extend absolutely necessary.

**MANDATORY MINUTE VENTILATION WITH VOLUME GUARANTEE**

Mandatory Minute Ventilation (PC-MMV) is based on conventional PC-SIMV. It builds on the advantages of this mode including synchronization, Volume Guarantee and the pressure support of spontaneous and mandatory breaths. While in conventional PC-SIMV the mandatory rate is reduced manually to wean the patient off the ventilator, PC-MMV offers the benefit of weaning and transitioning the work of breathing from ventilator to patient seamlessly. This is supported by integrated Pressure Support and Apnea Ventilation. PC-MMV enables a more stable gas exchange, as the mandatory rate and pressures are continuously and automatically adjusted to secure a minimum level of minute ventilation – the key determinant of carbon dioxide removal from the lung. Integrated Volume Guarantee ensures that complications of excessive inflations such as pneumothoraces are reduced. When combined, scientific evidence suggests that these benefits can significantly reduce ventilation related time.

**HIGH-FREQUENCY OSCILLATION WITH VOLUME GUARANTEE**

High Frequency ventilation has shown to effectively manage oxygenation and especially CO2 removal in critical patients. In order to prevent complications from hyper- and hypoventilation such as periventricular leukomalacia (PVL) and intraventricular hemorrhage (IVH), tidal volumes, pCO2 and pH shall remain rather constant. By selecting Volume Guarantee in combination with PC-HFO, the oscillation amplitude is continuously adjusted to ensure the delivery of a pre-set volume. Thereby, High-Frequency Ventilation with Volume Guarantee stabilizes blood gases by compensating for dynamic changes in lung and breathing circuits.

**SUMMARIZED: IMPROVED OUTCOME WITH VOLUME TARGETED VENTILATION STRATEGIES**

- Reduction of mechanical ventilation time compared to pressure limited ventilation by up to 2,36 days
- Decrease in the death or Bronchopulmonary Dysplasia (BPD) by 11%
- Reduction in the incidence of Pneumothorax by 6%
- Reduction of Periventricular Leukomalacia or Intraventricular Haemorrhage grade 3 - 4 by 8%

**WHAT EXPERTS SAY ABOUT VOLUME GUARANTEE**

“Volume guarantee reduces the risk of inadvertent hyper-ventilation and lung injury due to excessive stretching of lung tissue. Volume guarantee also results in more stable minute ventilation, so that fewer blood gas determinations are needed. It is a self-weaning mode and has been shown to reduce the total duration of mechanical ventilation.”

Dr. Martin Keszler

Associate Director of the Neonatal Intensive Care Unit

Women and Infants Hospital in Providence, Rhode Island, USA

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Learn more about neonatal non-invasive ventilation under www.draeger.com/neonatal-ventilation