mysafety insight

EasySync™

Clinical Information Leaflet

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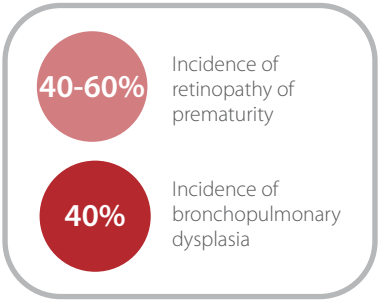
Ventilation needs of the neonate

Advances in perinatal and neonatal care have significantly reduced morbidity and mortality rates in new-borns. These improved outcomes are mostly achieved thanks to more effective intensive care and aggressive cardiovascular and respiratory support. Still, a significant proportion of neonates admitted to NICU require mechanical ventilation with increased risk of mortality.

Preterm infants may experience dificulty with spontaneous, unassisted breathing for a variety of reasons, including lung immaturity, chest wall instability, upper airway obstruction and poor central respiratory drive. Their nervous system is not fully developed, usually presenting apnoea of prematurity and a general respiratory instability that causes frequent drops in oxygen saturation (SpO_2) [1]. Survival rate in artificially ventilated neonates is reportedly increasing thanks to surfactant therapy and treatment with non-invasive respiratory support methods, but it is still as low as 40-60% [2].



Some of the main risks associated with mechanical ventilation.

Bronchopulmonary dysplasia

Bronchopulmonary dysplasia (BDP) is a form of chronic lung disease that affects premature newborn and infants and it is attributed to the damage caused to the lungs by mechanical ventilation as a major risk factor, as well as the long-term use of oxygen therapy. Both the airway and parenchyma of the lung can be affected in this condition [3]. Despite advances in neonatal respiratory care, BDP remains a frequent complication in preterm infants with an incidence reported to be relatively stable at approximately 40% of premature infants [4]. The use of non-invasive respiratory support has steadily increased to reduce complications associated with invasive mechanical ventilation in preterm infants.

Non-invasive respiratory support

Historically, the primary method of respiratory support for preterm infants has consisted of endotracheal intubation and intermittent positive pressure ventilation. This method can be often accompanied by complications like upper airway damage, BDP or sepsis,

and it is associated with an increased economic cost. A goal for any neonatal intensive care unit is either minimising the duration of endotracheal intubation or avoiding it completely. Nasal continuous positive airway pressure (NCPAP) is a less invasive way of providing respiratory support for neonates with respiratory distress syndrome (RDS), or at risk of developing it. A systematic review of clinical trials showed that this method, if begun immediately afer a period of endotracheal intubation, reduces the rate of adverse events like apnoea, respiratory acidosis and increased oxygen requirements leading to reintubation [5].

Even if NCPAP is the most common form of non-invasive respiratory support used in new-borns, some studies have shown significant failure rates in preventing invasive ventilation and reintubation in the smaller infants [6-8]. efforts to reduce failure prompted the use of nasal ventilation. This method has been found to be more effective than NCPAP in preventing extubation failure and also as a primary mode of support in respiratory distress syndrome (RDS)[9-11].

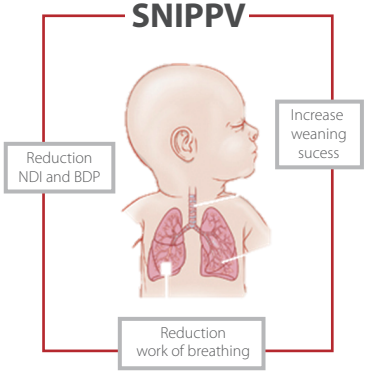
The most commonly reported mode of nasal ventilation is nasal intermittent positive pressure ventilation (NIPPV). A recent systematic review and meta-analysis of 35 randomised clinical studies comparing non-invasive respiratory support modes for primary respiratory support in preterm neonates with RDS, demonstrates that NIPPV was indeed the most effective nasal ventilation treatment. This method decreases the requirement for mechanical ventilation, reduces the treatment failure and the incidence of BD and mortality when compared to high flow nasal cannula, CPAP and bilevel CPAP (BiPAP) [12].

Synchronised nasal intermittent positive pressure ventilation

Synchronised NIPPV (SNIPPV) harmonises the initiation of the mechanical breaths with the neonate's spontaneous effort.

The importance of synchronisation:

Several studies have shown the advantages of SNIPPV over other ventilation techniques. SNIPPV decreases work of breathing in premature infants compared to NCPAP, an effect that was not observed during unsynchronised NIMV [13, 14]. SNIPPV also increases weaning success from mechanical ventilation reducing extubation failure when delivered

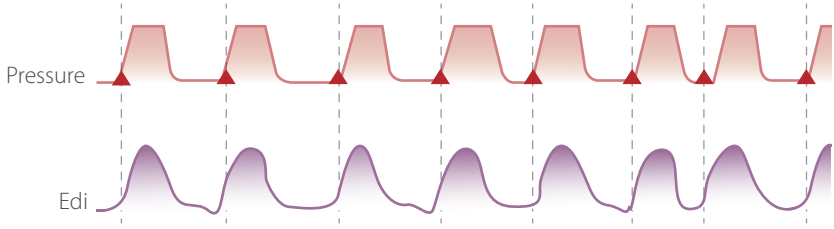


Beneficial effects of the use of SNIPPV ventilation technique.

through a ventilator rather than BIPAP device [15]. Importantly, SNIPPV used in infants at greatest risk of BPD or death (500 – 750g) was associated with decreased BPD, BPD/death ratio, neurodevelopmental impairment (NDI), and NDI/death ration when compared with infants managed with NCPAP [16].

However, factors such as short inspiration time, rapid respiratory rate, and leakage of patient-interface pose severe challenges to the patient-ventilator synchrony and detection spontaneous breathing during NIV.

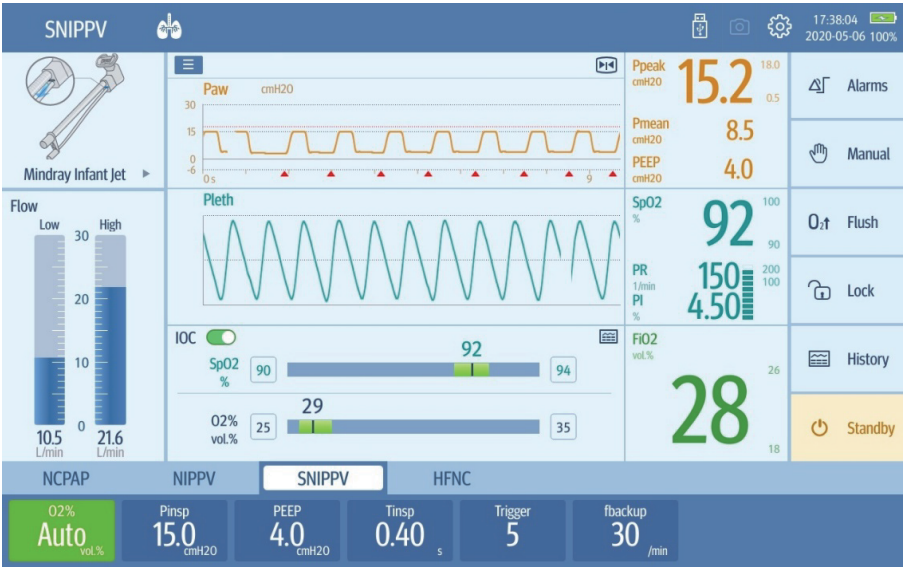
Caring for neonates every step of the way with the EasySync™



The trigger performance of EasySync is comparable to electrical activity of the diaphragm (Edi).

The patented EasySync technology analyses multi-channel parameters such as gas flow and pressure without additional sensors, providing accurate detection of spontaneous breath and improving synchrony in SNIPPV. It precisely detects the spontaneous breathing effort of the neonate, with a synchronization performance comparable to the electrical activity of the diaphragm (Edi), providing more neonatal status information to assist clinical decision-making. A continuous and automatic monitoring system provides safer ventilation by detecting apnoea episodes and disrupting them with the apnoea wake up function.

The system does not rely on any external sensor or invasive catheter hence improving clinical usability and minimizing constraints on neonates.



A Mindray ventilator screen with the EasySync technology incorporated.

Mindray's EasySync™ technology cares for neonatal ventilation every step of the way by analysing multi-channel parameters such as gas flow and pressure without additional sensors, providing accurate detection of spontaneous breath and improving synchrony in SNIPPV mode.

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