



RN₂

Regional Neonatal News & Notes

January, 2006

Ventilator Modes in the NICU

There are basically three types of respiratory support in the NICU provided by the ventilator. They include CPAP (continuous positive airway pressure), high frequency oscillation ventilation (HFOV) and positive pressure ventilation often referred to as conventional ventilation. Only conventional ventilation will be discussed here.

Positive pressure ventilators are the most commonly used ventilator in the NICU. These ventilators are constant flow, time cycled, pressure limited devices. Constant flow suggests there is a constant flow of gas past the top of the endotracheal tube. Pressure limited means that once the pre-set PIP (Positive Inspiratory Pressure) has been reached, it is maintained for the length of the inspiratory cycle. Time cycled means that breaths are given at fixed intervals and are independent of the infant's respiratory effort. Newer pressure ventilators are able to sense infants breaths and synchronize to them. Conventional ventilation has become more complex as many different ventilator modes are now available. Not all modes are available on every brand of neonatal ventilator.

Ventilator modes include the following:

IMV (Intermittent Mandatory Ventilation) - Intermittent breaths are given at a fixed rate. These breaths are not synchronized with the infant's breaths. This mode is rarely used. Ventilation can be impaired because of the lack of synchronization.

SIMV (Synchronous Intermittent Mandatory Ventilation) - This mode is like IMV in that there is a set ventilator rate, but the breaths are synchronized with the infant's breaths. The ventilator is able to sense the infant's breath and a ventilator breath is triggered. If the infant is breathing faster than the set rate, only the set rate number of breaths is assisted. Additional breaths above the set rate are not assisted. If the infant is breathing less than the set rate, the ventilator will synchronize all the breaths the infant takes and will also deliver some untriggered breaths so that the total number of breaths equals the set rate. If the infant is apneic, the ventilator will function exactly like IMV and give the infant the set rate of breaths.

A/C (Assist /Control) - A/C is also known as SIPPV (Synchronized Intermittent Positive Pressure Ventilation). With this mode, every breath the infant takes is assisted with a preset level of pressure. The inspiratory time is also fixed. In this mode the infant can control the respiratory rate. If the infant is apneic, most ventilators will revert to IMV and give the infant a set rate.

PSV (Pressure Support Ventilation) - With this mode all breaths are assisted as in A/C but the length of the inspiration is limited by the infant's own lung inflation. As the lungs fill up, the breath is terminated. With this mode the infant can control the respiratory rate and the inspiratory time. There is also a set default rate in this mode in case the infant is apneic.

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Congratulations!!!!

& Thank You To Everyone

.....Stacey

(Continued from page 1) Ventilator Modes

VG (Volume Guarantee) - Volume guarantee combines pressure controlled ventilation while maintaining consistent tidal volumes. The goal of VG is to provide effective ventilation with a sufficient tidal volume and at the same time avoid volutrauma. With VG, the ventilator is set to give a certain expired tidal volume (usually 4-6cc/kg). The ventilator software looks at the previous breath and delivers the appropriate amount of PIP to deliver this set tidal volume. A maximum amount of PIP is set. The ventilator will alarm if it cannot deliver the appropriate tidal volume. Volume guarantee can be used with SIMV, A/C or PSV modes. Using the VG function. This mode is not available on every ventilator.

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