

Why is Ventilation Necessary?

There are a variety of reasons why some babies are unable to breathe without assistance at birth, particularly if they are preterm

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Lung immaturity

Some extremely preterm babies have not had sufficient time for their lungs to mature and this could mean that they struggle to breathe on their own. Sometimes mothers who are likely to deliver early are given steroids to encourage lung development in their unborn baby.

'Apnoeic spells'

This is when a baby's breathing pattern is sporadic, which often happens in preterm babies where they have long pauses between breathing. Sometimes drugs can be given to reduce this but in severe cases ventilation will help.

Lack of Surfactant

Sometimes preterm babies may not have sufficient levels of an important chemical called surfactant. Surfactant is an enzyme which is naturally produced in the body and which prevents the air sacs in the lung from collapsing when the baby exhales. Premature babies without enough Surfactant will breathe quicker and often make a grunting noise as they try to breathe properly. This is known as RDS or Respiratory Distress Syndrome

Fluid in the lungs

Usually fluid that is in the lungs prior to birth is cleared before a baby is born. However if labour is short or premature or sometimes after a Caesarean section, this fluid still remains in the baby's lungs. In the severest cases the lungs can become infected and stiff, which means they don't work well and it is then difficult for the baby to breathe. The baby will then need ventilation to assist with breathing.

Meconium aspiration

This is a dark material that is found in the baby's digestive system prior to birth. Usually within 24 hours of birth, the baby passes bowel movements to expel the Meconium. However, if a baby is distressed before delivery they may pass meconium in the womb and this can sometimes be ingested by the baby and can partly block the airways. The function of breathing is to allow oxygen from the air to enter

the bloodstream via the tissues of the lung. It then travels around the body to allow the bodily systems to work. Carbon dioxide (waste gas) is then eliminated through the lungs. When a baby needs help with breathing, ventilation can help ensure they receive the correct amount of oxygen under the correct amount of pressure to sufficiently inflate the lungs so as to achieve the optimum level of gas exchange.

How Does A Ventilator Work?

A mechanical ventilator can either assist the baby's own efforts to breathe or can at times take over the function of breathing altogether, if the baby is too tired or finding it too difficult to breathe on their own.

The ventilator gently delivers a supply of air and oxygen via a tube which is inserted either into the nose or mouth of the baby. The end of the tube sits in the windpipe and ensures that equal amounts of oxygen and air are delivered to both lungs equally. The tube will be secured in place until the baby no longer needs to be ventilated, although sometimes the tube may be changed for cleaning purposes or if it becomes dislodged.

Different Types Of Ventilator

There are a number of different ventilators available on the market and new more advanced modes are being introduced to enable more efficient and safer ventilation.

The aim is to help reduce the incidence of Chronic Lung Disease, which is one of the main issues clinicians have to deal with, especially when ventilating an extremely premature infant.

The newer generation of ventilators enable doctors to measure the amount of volume the pressure creates in the lungs, and in so doing are able to prevent the damage that causes Chronic Lung Disease. Whilst your baby is being ventilated you will hear various terminology that may be confusing.

Here is an easy explanation of some of terms you may hear:

CMV or Continuous Mandatory Ventilation

The doctor will set the ventilator to deliver a set amount of oxygen at a set pressure for a set number of times in a minute. Your baby may also be breathing on his own as well but if he becomes agitated he may be given some sedation so that the ventilator is able to work effectively. This is nothing to worry about as it provides relief from discomfort and if your baby just won't settle, then he may be helped by the use of drugs which stop him trying to breath for himself for a few days.

SIMV or Synchronised Intermittent Mandatory Ventilation

The doctor will set the ventilator to deliver a set amount of oxygen at a set pressure for a specific number of breaths in a minute. Your baby will be breathing on his own and every one of the set ventilator breaths will work together with a spontaneous breath from the baby.

HFO or High Frequency Oscillation Ventilation:

In this mode of ventilation the ventilator delivers breaths at a very, very fast rate. Unlike other forms of ventilation, you will not see the rise and fall of the baby's chest at the breathing rate. The normal breathing rate for a baby is between 60-80 breaths per minute, whereas HFO delivers breaths at the rate of 600-900 per minute and the chest will feel like it is vibrating. Initially your baby will make breathing efforts, but he will settle down as soon as his ventilation requirements are being met. Although the vibration of his chest and sometimes other parts of his body may appear alarming, babies do seem to be comfortable with this mode of ventilation.

CPAP or Continuous Positive Airway Pressure: this is a non-invasive type of ventilation (ie. no breathing tube is inserted in the baby's thorax) whereby soft nasal prongs or a small mask over the nose are used to deliver a small amount of pressure in conjunction with the baby's own breaths. The ventilator or flow driver supports the respiration with oxygen and makes sure that some pressure is left in the little sacs in the lung after expiration. This prevents the little sacs from collapsing and sticking together. If this did not happen the effort to open these little sacs with every breath would make your baby very tired and eventually he would be too tired to breathe on his own. CPAP can be used before mechanical ventilation is commenced and is nearly always used when the baby has been weaned off the ventilator.

Other Medical Interventions

Whilst your baby is being ventilated blood samples will have to be taken at regular intervals to determine the correct levels of oxygen and carbon dioxide. The bloods will be taken from a small catheter that will have been inserted into an artery as soon as ventilation commences. This helps the doctor adjust the ventilator settings and decide when the baby no longer needs assistance from the ventilator.

Sometimes mucus collects in the airways when a baby is being ventilated and a tiny, soft tube called a suction catheter is often used to clear the airway and get rid of mucus every few hours, to ensure that the baby is more comfortable.

Although seeing your baby on a ventilator will be a worrying experience, it is important to remember that your baby will only be ventilated if he needs assistance with breathing and many babies undergo the experience of ventilation with no long term lasting effects.

It is important to discuss your concerns and anxieties with the staff on the unit who are all highly experienced in dealing with this type of situation.

