



Ways to Support Breathing: Invasive Respiratory Support or Mechanical Ventilation

For some babies, non-invasive respiratory/breathing support is not enough. Some signs may be:

- Using extra muscles to breathe
- Low levels of oxygen or high levels of carbon dioxide
- Breathing fast
- Not growing appropriately
- Having difficulty participating in developmental therapies

Infants with these issues may need invasive respiratory support, also called mechanical ventilation. With help from a ventilator, air mixed with additional oxygen can be gently pushed into your baby's lungs. These ventilator breaths are timed (synchronized) with your baby's own breaths, and help move oxygen in, and carbon dioxide out. If needed, the ventilator can do all of the breathing for the baby.

Though life-saving, these machines and the support they deliver have side effects.

- The most important one is that a baby has to have a breathing tube in their windpipe (or trachea).
 - While the breathing tube is in place, babies cannot drink or cry normally.
 - The tube can also irritate and occasionally injure some parts around the mouth or airway.
 - The amount of pressure and oxygen delivered by the ventilator can injure the developing lungs.

Because of these potential complications, we try to remove breathing tubes and ventilators as soon as we can. But some babies depend on this technology to help them breathe for a while; or sometimes for the long-term.

There are a few types of ventilators

1. **Conventional ventilators used in the NICU:** These ventilators have many different ways to support infants. The team will set the pressures given with each breath, breathing rate, amount of oxygen, and other settings to help the baby breathe comfortably and effectively. Changes to the ventilator can be frequent, depending on how long the baby may need it.
2. **Neurally adjusted ventilatory assist (NAVA):** In this mode, in addition to a breathing tube, we place a special tube in the baby's nose that goes to the stomach by the diaphragm (a big muscle below the lungs), and it detects when the baby is ready to take a breath. This way, a ventilator knows when to give an extra breath, how much to give, and can give higher-pressure breaths safely. Since this tube goes to the stomach, your baby may also be safely fed through this special NAVA tube.



PATIENT AND FAMILY EDUCATION

- High frequency ventilation:** This form of mechanical ventilation is different and does not try to copy normal breathing. Instead, little pulses of air are given to a baby very quickly (about 10 times per second). Sometimes they are used to protect the lungs when higher settings are needed, or when air has leaked or may leak outside the lung (a sign of lung injury or severity of illness).
- Conventional ventilator for home:** The home ventilators work the same way as the hospital ventilators but cannot deliver as much support. So babies who use them are typically on a path of improvement, stable, and breathing comfortably. These devices are also portable, so families are able to transport their child while receiving support from the ventilator. For infants who may need these types of ventilators, their families work closely with our home ventilation team to help transition infants from the hospital ventilators to the ones used at home.



This is a hospital ventilator

If your baby needs mechanical ventilation, please talk with your medical team about these different devices and options to support your baby's needs.