

What is it?

Diaphragm pacing is a form of mechanical ventilation for those who are unable to breath on their own and have been dependent on a ventilator. Mechanical ventilators can be limiting when people have to consider the multitude of equipment, battery life, supplies like tubing and transportation. An implanted diaphragmatic pacer, which does not require being continuously hooked to a ventilator, allows an individual a new sense of freedom. The system can be used part-time or full-time in hopes of helping patients lead more functional and independent lives. Patients are also able to regain their sense of smell, taste and speech.

What are the benefits?

- Increases quality of life
- More freedom off ventilator
- Less secretions
- Decreased risk of pulmonary infection

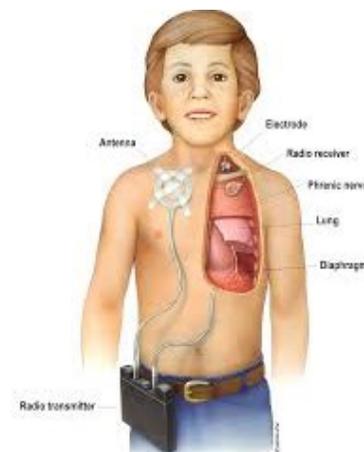
How does it work?

Small electrodes are implanted on the phrenic nerve. The phrenic nerve is responsible for breathing as the motor part of the diaphragm because it transmits the electrical signal from the brain to the diaphragm. This nerve then receives signals from an external transmitter device worn by the patient. This external device, about the size of a remote, is connected to wires on the chest. Since power for the contraction is supplied via this external transmitter, there are no implantable batteries inside the child. The result is a diaphragm contraction which mimics natural breathing as it allows the lungs to fill with air. The impulse sensation has been described as the “flick of a finger.” The diaphragm contracts which imitates the inhalation phase of breathing. Next, the transmitter will stop. This sends a signal allowing the diaphragm to relax, imitating exhalation. This same cycle is automatic and continuous.

Programmable settings are patient specific and are adjusted as the child grows. Diaphragmatic pacer candidates will initially still require a tracheostomy as back up as they build tolerance for this alternative ventilation method.

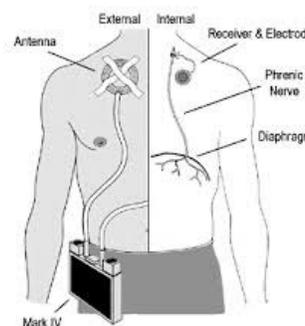
Safety considerations for staff

- Have ventilator and ambu bag available at all times
- No abdominal coughing during first 30 days, use other cough assisted techniques
- Do not manipulate wires
- Use caution with transfers
- Use abdominal binder to support child’s position
- Note battery life and alarms (new battery will last 2-3 weeks at full time rate)



The *BORG scale* is used by the child to rate how they are feeling while on the pacer. This scale will let you know when the child needs to return to their vent.

- 0:** No breathlessness
- 1:** Very slight breathlessness
- 2:** Slight breathlessness
- 3:** Moderate breathlessness
- 4:** Somewhat severe breathlessness
- 5:** Severe breathlessness=
- 7:** Very severe breathlessness
- 10:** Maximum breathlessness



SHNIC school nurses information:

Specific health issues for individual health care plans

- Diagnosis and date of device implantation
- Baseline respiratory assessment, including pulse ox parameters
- Orders for current settings including current tolerated time increment
- Signs and symptoms of respiratory fatigue while on pacer; use of BORG scale if applicable
- Orders for use of Passy-Muir valve
- Dressing change orders, back up supplies available at school
- Training of staff about device and positioning
- Safety precautions about exposed wires, alarms, etc.
- Emergency plan for respiratory distress symptoms and/or event of equipment malfunction
 - Tracheostomy orders (including suction procedure and supplies, emergency “To-Go” bag)
 - Ventilator orders
 - Oxygen orders

Helpful hidden device information for school nurse

Type of device: _____
Serial #: _____
Model #: _____
Implant date: _____

For school health professional working with student

Experience with device: Y N

Device manual at school: Y N

DME contact information: Y N

Device specific

Alarms: Y N

Battery: Y N

Back up equipment at school: Y N

Precautions to consider at school

Positioning of student: Y N

Emergency plan in place: Y N

Physical activity restriction: Y N

Magnet sensitivity: Y N

Emergency outlet: Y N

Resources & Manuals

Sheperd Center- Diaphragm Pacing System Fact Sheet
<http://www.myshepherdconnection.org/respiratory/dps/fact-sheet>

University Hospitals: Diaphragm Pacing System for Spinal Muscular Atrophy
<https://www.youtube.com/watch?v=yWCwBM1dA3s>

Sheperd Center- Troubleshooting the Diaphragm Pacer System
http://www.myshepherdconnection.org/docs/Troubleshooting_the_Diaphragm_Pacer_System.pdf