BiPAP (Bilevel Positive Airway Pressure) Ventilation
For a child with neuromuscular issues

What is BiPAP?
BiPAP is a type of “non-invasive” breathing aid. It’s a machine that can help your child breathe better when breathing muscles are weak or fatigued because of muscular dystrophy or other conditions. It is also used to treat breathing problems during sleep, such as sleep apnea. BiPAP is used primarily at night while your child sleeps, but can also be used while awake.

How BiPAP will help your child
BiPAP helps your child breathe better through the use of pressurized air. It is considered a “non-invasive” breathing aid because there are no tubes in your child’s airway. Unlike CPAP that blows continuous flow of air for many people who have sleep apnea, there are two levels of pressure in BiPAP – high when your child breathes in and low when your child breathes out. The pressurized air is sent through a mask that fits over the nose, or nasal pillows that fit within the nostrils (like oxygen tubing, but bigger). Your respiratory therapist will help decide the best fit for your child. The BiPAP machine is connected to the mask by tubing, and uses a motor to create air pressure at settings made by your child’s doctor. This combined high and low pressurized air allows children to take a larger breath than they can on their own.

Most of the time, BiPAP is started after a sleep study shows shallow breathing or sleep apnea. Sometimes it is started in the hospital because your child is sick or recovering from surgery. BiPAP helps to support weak breathing muscles, but does not make them weaker or stronger. Your child will not become “dependent” on BiPAP, though in situations where muscles are weaker (such as illness), they may ask to wear it for longer amounts of time. Children can talk while wearing their BiPAP, and some children and young adults even wear it to school.

BiPAP settings and what they mean
IPAP - Inspiratory pressure, or the amount of support the device provides your child when breathing in. This pressure helps to fill the lungs with air. Typical range is 10 to 20 cmH₂O, depending on the size of the patient and how weak the breathing muscles are. IPAP may need to be increased when sick, or as your child gets older.

EPAP – Expiratory pressure, or the amount of support the device provides when your child is breathing out. This pressure helps to hold the throat and lung muscles more open to make the next breath easier. Typical range is 4 to 8 cmH₂O. EPAP is usually not increased with illness, but may need to be higher if your child is overweight.
**Back-up Rate** – this setting determines the slowest possible speed your child can breathe when sleeping. Some children with breathing muscle weakness have pauses or very shallow breaths during sleep, this setting will prevent those from being too long. It will only activate if your child is breathing slower than the setting.

**I-time** – **Inspiratory time**, or the length of each breath. Most machines are set at a minimum and maximum time, in the range of $\frac{1}{2}$ to $1 \frac{1}{2}$ seconds.

**Trigger** – how the machine knows when to deliver the IPAP pressure to your child. Most are set in the range medium to high, which means your child does not have to breathe very deeply for the machine to respond.

**How to start BIPAP – getting it comfortable**

Your child will likely have a lung function test and/or a sleep study to see if BiPAP is right for them. If the tests show that your child could benefit from this therapy, you will be prescribed BiPAP with equipment through a home care company. The clinic or home respiratory therapist can help your child find the most comfortable mask. They will set the initial pressures and help your child to become comfortable using device. They will teach you how to turn the BiPAP machine on and off, how to get the mask fitting most comfortably, and how to clean all of the parts.

Getting comfortable with BiPAP is critical to using it successfully. Sometimes you have to slowly work up to wearing the nasal mask and using BiPAP. Contact the Pulmonary Clinic or sleep center respiratory therapist if your child has problems tolerating BiPAP. This early stage of first wearing the device is called the desensitization process. Changes can be made in order to help your child progress through this process. The 4-step “desensitization process,” which can help your child get used to non-invasive ventilation, is listed below.

**The 4-step BiPAP desensitization process:**

1. **Get used to wearing the mask.** Have your child try wearing the mask for $\frac{1}{2}$ to 1 hour at a time once or twice a day with no air pressure turned on.

   During this time, have them do something that distracts them from the device like listening to music, watching TV, or reading. Adjust the headgear so that it is secure and not too tight. It may take several days before your child feels comfortable enough to progress to the next step.

2. **Attach the air.** Once your child feels pretty comfortable wearing the mask, you can attach the breathing circuit hose from the machine to the interface.

   Start the BiPAP machine and use for short time periods. Give your child time to adjust to the mask with the feeling of the in-and-out pressure airflow. If at first your child feels uncomfortable with the airflow, try having someone hold the mask on their face rather than securing the headgear. This is so they have some control in initiating this step. If your child feels very uncomfortable with this step, start with very short periods of time, 1 to 5 minutes, and try to progress up to $\frac{1}{2}$ to 1 hour as able. The flow of air from the mask will feel quite strong until you seal it on the face.
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The flow of air should then be more comfortable as your child feels the machine respond to their breathing pattern. Once your child is able to use the system for ½ to 1 hour at a time without difficulty, they are ready to move to the next step.

3. This step is optional. Your child may not have the time in their schedule to take naps during the day. If they can, it is good to try napping with the system before using it at night. This can help to gain both additional comfort and the confidence in knowing that they can sleep while using this therapy.

4. The last step is to progress towards using BiPAP therapy all night long. It is important not to become frustrated. Using this therapy at night may feel uncomfortable at the beginning. If your child first tries sleeping and cannot fall asleep, move back to step 2 or 3 before trying again. If they are not able to sleep using BiPAP for a short period and cannot fall asleep again after awakening, do not have them lie in bed. Simply start again the next night. Your child’s ability to sleep even part of the night using BiPAP is a successful step! Keep trying to increase the amount of time they use BiPAP until they sleep comfortably through the night with the device.

Other important care tips:

- Remember, it is important to identify anything that limits your child’s ability to become comfortable in using this therapy. Contact either your pulmonary clinic or homecare respiratory therapist if it’s not working for your child. Changes can be made to the therapy to better suit them.
- Humidification is usually provided with the BiPAP system, which warms and humidifies the air going through the mask. Using the system without humidity will often cause your mouth and throat to be uncomfortably dry, but it is optional.
- Many children and adults also develop nasal stuffiness at night. They may need either heated humidity or nasal decongestants to breathe comfortably if this happens.
- There are no set rules regarding how fast your child should get used to this therapy. You should continue to progress through the desensitization process as best as you can. Your pulmonary clinic and homecare respiratory therapists will support your ongoing use of this therapy.
- It is important to follow the cleaning instructions from the equipment provider.

This is an adaption by Seattle Children’s Hospital Pulmonary Division with permission from the UW Pulmonary Rehabilitation Clinic.

To Learn More
• Respiratory Care
  206-987-2149,
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  206-987-2114 or
Pulmonary Nurses
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• Ask your child’s home care provider
• www.seattlechildrens.org

Free Interpreter Services
• In the hospital, ask your child’s nurse.
• From outside the hospital, call the toll-free Family Interpreting Line 1-866-583-1527. Tell the interpreter the name or extension you need.