

NON-INVASIVE VENTILATION MANAGEMENT POLICY & PROCEDURES



Who needs to know about this Policy?

All Camp Carers, Camp Registered Nurses (RNs) and MDNSW Camp staff.

Policy

This policy and the following procedures apply if a camper/client requires Non-Invasive Ventilation (NIV) whilst attending a MDNSW camp or retreat.

MDNSW's short stay programs currently does not support campers/clients who require *invasive ventilation* as this cohort requires a much higher level of support.

- Some campers/clients require nocturnal non-invasive ventilation (NIV), such as CPAP or BiPAP.
- Some camper/clients also require the use of a Cough Assist machine.
- Camp Carers can assist those clients with NIV aids such as CPAP, BiPAP.
- Camp RNs will provide support for campers/clients if they require Cough Assist.
- Camp Carers will be trained in supporting clients with NIV.
- Camp RNs will receive training if they require it.
- Camp RNs and Camp Carers must follow the Non-Invasive Ventilation Management Policy & Procedures and refer to the camper/client's Respiratory Management Plan.

Where can I get help?

If you have any questions or concerns, immediately contact:

- Camp RN
- Camp Manager
- Camp Carer Team Leaders
- Client Services Manager

What is NIV?

Non-invasive ventilation (NIV) refers to the administration of ventilatory support without using an invasive artificial airway (endotracheal tube or tracheostomy tube). The goal of NIV is to assist the muscles used for breathing by providing mechanical support. This also helps the camper become less tired during the day and reduce daytime somnolence (sleepiness).

Most campers/clients requiring nocturnal ventilation use BiPAP or CPAP ventilators as prescribed by their doctor or specialist.

BiPAP stands for Bilevel Positive Airway Pressure and is very similar in function and design to a CPAP machine. CPAP stands for Continuous Positive Airway Pressure.

Both machine types deliver pressurised air through a mask to the patient's airways. Both CPAP and BiPAP machines support campers/clients to breathe more easily and regularly throughout the night.

BiPAP machines have two different pressures: a higher pressure when breathing in and a lower pressure when breathing out. By alternating the inhalation and exhalation pressures, the BiPAP encourages the lungs to operate more efficiently.

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CPAP machines can only be set to a single pressure that remains consistent throughout the night. However, many CPAP machines have a ramp feature that starts off with a lower pressure setting and gradually builds to the prescribed pressure. This comfort feature simply makes the pressure at the beginning more tolerable and less immediate, once the pressure builds to the required setting, it stays at that setting for the rest of the night.

Cough Assist machines

Cough Assist machines clear secretions by gradually applying a positive pressure to the airway, then rapidly shifting to negative pressure. The rapid shift in pressure produces a high expiratory flow, simulating a natural cough.

The Cough Assist machine is an important part of daily respiratory care in some campers/clients and for others only used during an illness, like cold or flu.

Nebulisers and Suction Units/Machines

Some campers/clients use nebulisers at bedtime and/or morning. Nebulisers change liquid medication into a vapour that can be inhaled. It works by pumping pressurised air through the liquid to form a fine mist, which can then be breathed in through a mask or mouthpiece. Used to treat asthma, it can also be used to support breathing as it loosens secretions and enables a more productive cough.

All nebuliser equipment should be washed in warm soapy water and rinsed thoroughly after use. It should be left to dry prior to next use.

Suction machines are used by some campers to help clear secretions from the mouth, throat, or nose. Prescribed by their doctor/specialist, the machine is used by some campers/clients with neuromuscular conditions where the ability to cough or swallow is impaired causing secretions to pool in or dribble from the mouth. DEEP suction where the gag reflex is stimulated is not permitted.

PROCEDURES

Camp Carers caring for campers / clients who require nocturnal NIV will be supported by Camp Team Leaders and Camp Nurses.

Camp Carers should read the following procedures when supporting campers / clients with nocturnal NIV:

- Respiratory Management Plan
- Support and Monitoring
- Equipment – BiPAP, CPAP
- Operation of Equipment
- Controls
- Cleaning & Maintenance of Suctioning Equipment
- Fitting the Breathing Mask
- Alarms
- Hygiene and Infection Control
- Waste Management
- Appendices 1 - 4

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Management Plans

- A Respiratory Management Plan is required for every camper/client who requires Non-Invasive Ventilation (NIV).
- Minimum plan requirements for non-invasive include:
 - Regime
 - Action to take if client refuses NIV
 - Emergency Plan / back up
 - Signs and symptoms that indicate if camper/client is unwell
 - When to call an ambulance
 - Daily Client Monitoring
 - Machine maintenance
 - Suctioning to maintain clear airway (if applicable)

General Procedures

Support and Monitoring

- Camp carers and Camp RNs are required to monitor and support the client as directed in the Respiratory Management Plan.
- Camp carers are also required to report on the health and wellbeing of the people they support, in the Daily Camp Report.
- All types of ventilation equipment are pre-set based on the camper/client's clinical assessment. Settings must never be amended by the camp carer/ camp RNs.
- If the client's respiratory function changes, for example, difficulty breathing, increase in frequency of suctioning, pain, discomfort or blockages, an ambulance must be contacted.

Equipment – BiPAP / CPAP

- Equipment will vary depending on type of ventilation. The Respiratory Management Plan will outline instructions on machine use.
- The Appendices at the back of this policy contain basic information for BiPAP and CPAP machines.

Operation of Equipment

- Camp Carers must follow the camper's Respiratory Management Plan and not adjust the settings.

Controls

- Products may differ depending on the supplier. Always refer to the owner's manual for operating instructions.
- Settings have been determined by the doctor / specialist and will be pre-set.
- Some basic controls and functions for NIV machines include:
 - On/Off Switch: This switch is located at far left of the bottom row on the machine.
 - Mode of Ventilation: The doctor / specialist will have determined which method of ventilation will best benefit the client's respiratory needs.
 - Breath Rate: This controls how many breaths are given each minute.

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- Tidal Volume: This controls how much air is given in each breath.
- Inspiratory Time: This controls how fast to deliver the set tidal volume during inhalation.
- Pressure Support: This control supports each spontaneous breath the client takes by providing extra pressure, reducing the amount of work needed by the camper/client to breathe.
- Sensitivity: This allows the NIV machine to be set according to the camper/client's breathing effort. The NIV can provide 100% of the breathing work or it can be set to "assist" a camper/client who has some breathing ability.
- Lock: will lock the settings. This control will safeguard against children changing NIV settings accidentally.

Fitting the Breathing Mask

- Camp Carers are to take particular care in fitting the breathing mask properly. Instructions of how best to fit the mask should be provided by the manufacturer and any additional client fitting preferences should be noted in the client's folder. Carers are to follow these instructions.
- A proper fitting mask is extremely important. The following issues can occur with an ill fitted mask:
 - Air leakage can result in dry, sore eyes and incorrect amount of prescribed air administered.
 - Pressure areas from masks that are too tight, particularly around the bridge of nose and ears.
 - Incorrect ventilation pressure.

Alarms

- Alarms are indicators that will let you know if something is wrong with the NIV. When an alarm sounds, it is important that you respond to it immediately.
- Check the camper/client to make sure they are not in distress. If the NIV machine tubing has become disconnected, re-connect it. If it is not something obvious refer to the client's Management Plan and call the Camp RN for assistance.
- If you still cannot find the problem, call Triple Zero (000).
- Low Pressure Alarm:
 - This is a safety alarm that goes off when the NIV machine does not reach the pressure needed to give the full breath.
 - This usually means there is a leak somewhere in the tubing.
- High Pressure Alarm:
 - This is a safety alarm that goes off when the NIV reaches the high-pressure setting.
 - This usually happens when there is a blockage in the airway, often caused by too much mucous. The client might need to use the cough assist machine or be suctioned as according to their Respiratory Management Plan.
 - The client is wheezing, coughing or has the hiccups.
 - There is a kink in the NIV tubing.

Back-up Planning

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- The camper/client's Respiratory Management Plan has an Emergency Plan outlining what to do if the NIV machine fails, or if there is a power outage.
- In most cases if machine failure occurs whilst campers/clients are using CPAP or BiPAP, wake the camper, if asleep, until power returns.

Suctioning

- Suctioning guidelines will be specified in the camper/client's Respiratory Management Plan and must be followed according to plan.
- Suctioning tasks are to be performed by trained Camp RNs only.

Depth of Suctioning

- Passing a suction catheter around the oral cavity and mouth is considered 'shallow' suctioning. This is often all that is required if the person has reasonably loose secretions which can be coughed towards the end of the tube. If secretions do not clear, an ambulance should be called.
- Passing a suction catheter any further than the oral cavity is deemed 'deep' suctioning. DEEP suction where the gag reflex is stimulated is not permitted. If a camper/client requires deep suctioning this should be performed by hospital staff.

Reasons for Suctioning

- Audible or visual signs of secretion.
- Noisy respirations / laboured breathing.
- Restlessness.
- Client may request suctioning.
- Increased respiratory distress.
- Changes in skin colour.
- Changes in ventilation pressures.

However, if a camper/client shows any of these symptoms, immediately seek assistance from the Camp RN, who may call an ambulance.

Cleaning and Maintenance of Suction Units/Machines

The manufacturer's instructions relating to cleaning methods /solutions and maintenance should be followed. If not available, see below:

Suction machines use 'ionised water' in machines that contain water chambers. This is to be emptied and replaced every day. Facial/nasal masks should be washed out with warm soapy water and left to dry after use each day.

Suction catheters (tubing) are once-only-use and should be disposed of after each session. "Yankauer" suckers are not disposable and warm soapy water should be suctioned through them after each use, rinsed and left to dry.

Hygiene and Infection Control

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- Standard precautions must be followed when supporting clients with ventilation care in accordance with Infection Control Guidelines.
- Personal protective equipment (PPE) including facial and eye protection is important as there is a risk of airborne respiratory secretions during suctioning.
- Camp RNs will be provided with gloves, masks/face shields and aprons as part of their PPE.

Waste Management

- Any waste should be disposed of in designated bags and placed in a camp refuse bin.
- If there are signs of visible blood in waste, dispose in the designated sanitary bins.

Training

- All Camp Carers who are required to support clients requiring NIV will receive practical training during MDNSW 2 Day Camp Training.
- Refresher training will occur at the beginning of Camp before the campers arrive.
- Current CPR and First Aid is a pre-requisite.

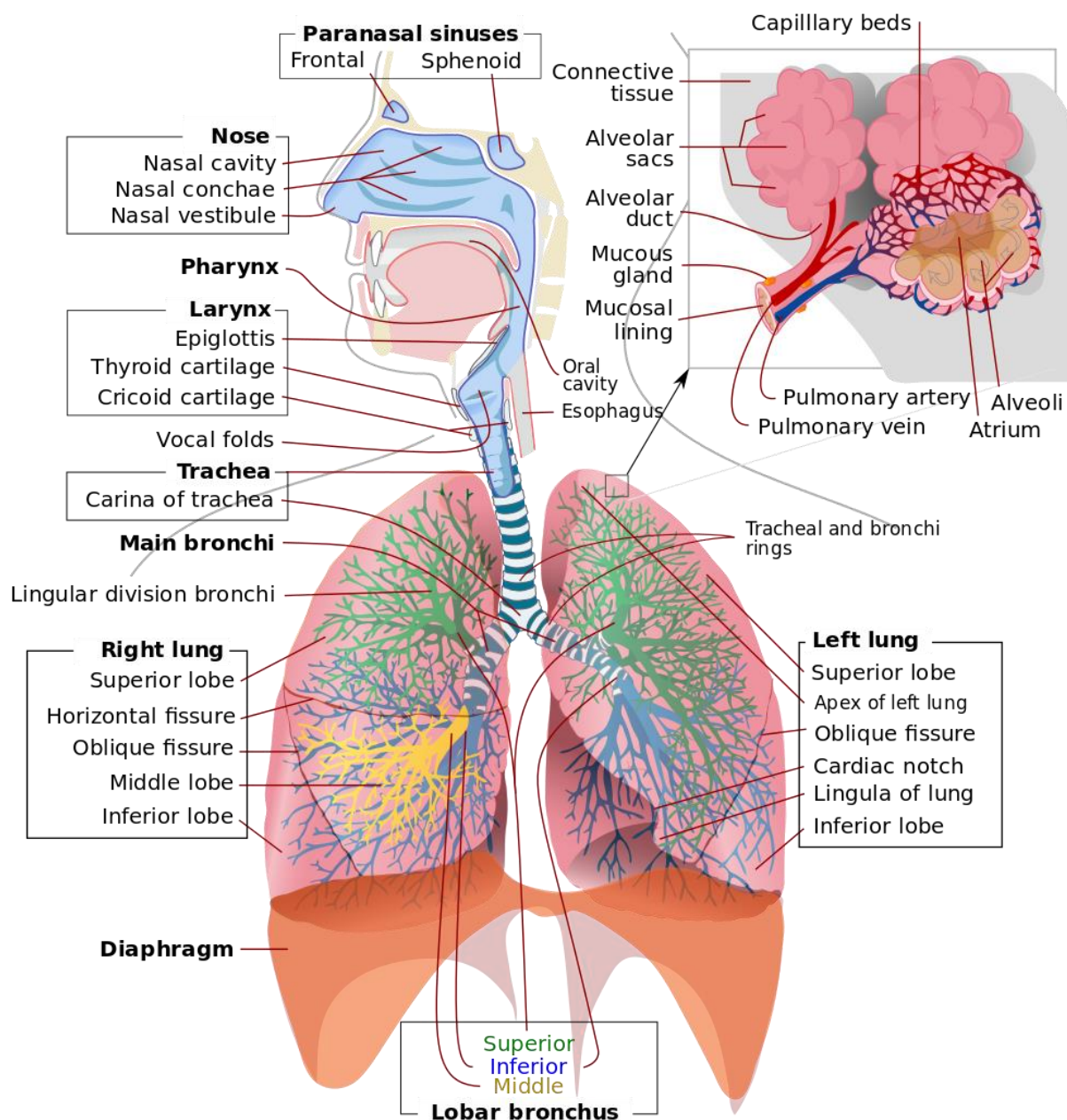
Related forms and information

- Infection Control Guidelines
- Respiratory Management Plan

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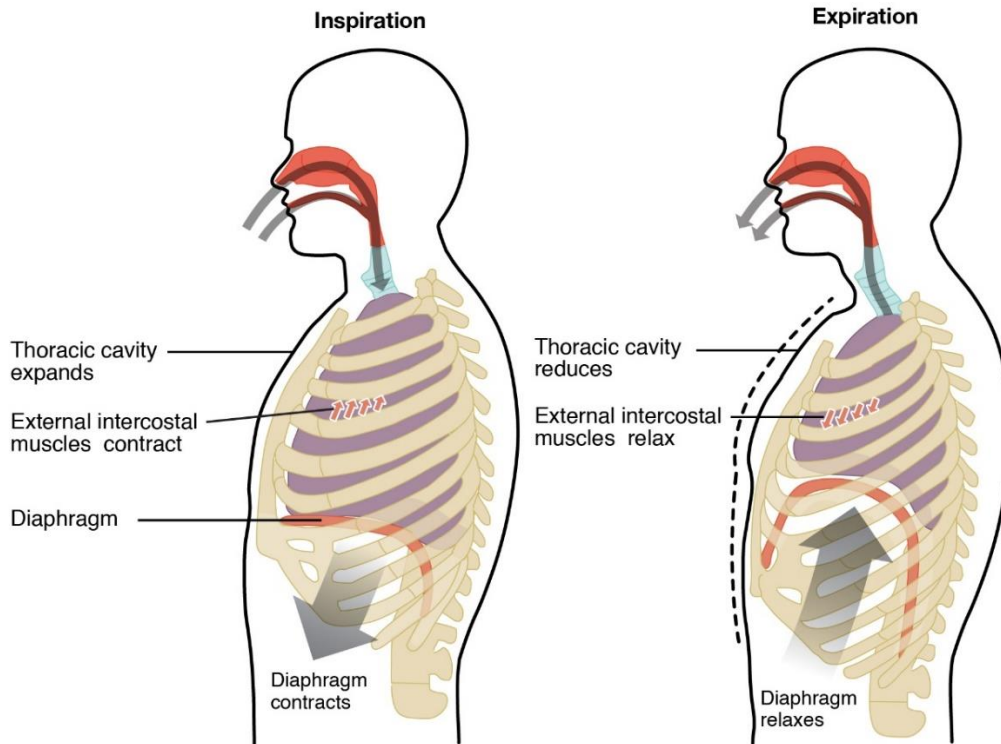
APPENDIX 1 - Anatomy of the Respiratory System



https://en.wikipedia.org/wiki/Respiratory_system

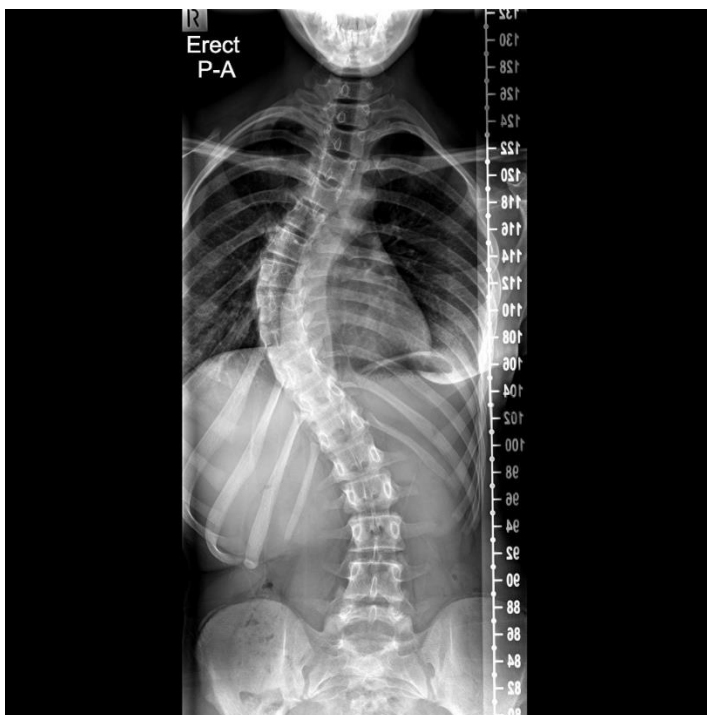
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Appendix 2 - Inspiration & Expiration



<https://courses.lumenlearning.com/suny-ap2/chapter/the-process-of-breathing-no-content/>

Appendix 2a - Example of scoliosis



<https://radiopaedia.org/cases/scoliosis-7>

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Appendix 3 – BiPap

https://www.schn.health.nsw.gov.au/files/factsheets/sleep - bi-level_ventilation-en.pdf

FACTSHEET



This fact sheet is for education purposes only. Please consult with your doctor or other health professionals to make sure this information is right for your child. If you would like to provide feedback on this fact sheet, please visit: www.schn.health.nsw.gov.au/parents-and-carers/fact-sheets/feedback-form.

Bi-level ventilation

What is Bi-Level Ventilation?

Bi-Level therapy (or BiPAP) is a type of breathing support that assists your child's ability to breathe. It involves the use of a mask and a Bi-Level machine. The Bi-level machine delivers pressure via the mask to the airway and lungs. This opens the airways to allow normal breathing to occur.

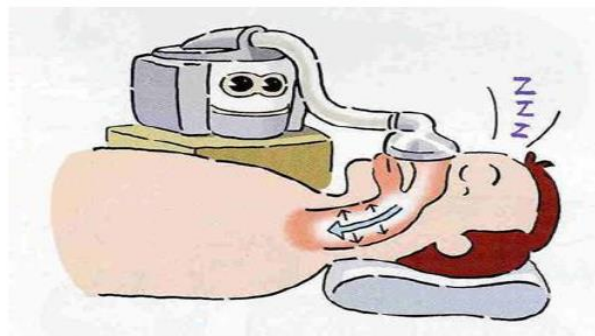
Normal breathing is important as it helps deliver oxygen and get rid of carbon dioxide. The pressure in Bi-Level therapy is delivered at 2 levels – inspiratory (breathing in) pressure and expiratory (breathing out) pressure.



Why does your child need Bi-Level Ventilation?

Your doctor has told you that your child has a breathing disorder called Central Sleep Apnoea (CSA) or hypoventilation. In CSA the body “forgets” to breathe for

periods when asleep. Hypoventilation happens when your child does not breathe enough.



CSA and hypoventilation are only a problem when your child sleeps. For this reason your child will be required to use Bi-Level when sleeping. Bi-Level provides pressure during sleep to prevent the airways closing. It also helps with your child's breathing rate.

If your child sleeps during the day it is important to also use Bi-Level for these naps.

What will we do?

If you have seen your sleep doctor in clinic and it has been decided that your child needs Bi-Level support you will be booked into the “sleep clinic” which is held every Friday. During this appointment your child will be fitted with a mask. Your child needs to get used to wearing the mask before Bi-Level therapy can start. You will take the mask home and over the next few days encourage your child to wear the mask for short periods. This can be

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when your child is either awake or asleep, as the objective is to make sure that your child is not fearful of the mask. You will also be given information about hiring the mask and machine for use at home. We will take a 3D photograph of their facial bones before starting treatment. This will help us to monitor the growth of the bones and make sure that the mask is not pressing on the top teeth. With continuing mask and pressure treatment, this 3D photograph should be repeated every 2-3 years.

Your child will need to come into hospital for 3-4 nights while we alter the pressures on the machine and they get used to using Bi-Level. During this time you will meet the Clinical Nurse Consultant (CNC) or Clinical Nurse Specialist (CNS) and get education and information about the Bi-Level machine so you can confidently use the machine when you go home. You will also be given contact details in case there is a problem with the Bi-Level machine at home. If your child is already in the hospital and your sleep doctor decides that your child needs to start Bi-Level ventilation, you will meet the Clinical Nurse Consultant or Clinical Nurse Specialist the same day. They will fit your child with the right size mask, start education and give you information on hiring the equipment to take home.

How do you get the mask and machine?

The Children's Hospital at Westmead has a limited supply of Bi-Level machines which we are able to hire out to families for a fee. Hire costs vary depending upon the type of machine your child needs. Please tell us if you have a health care (concession) card, so we can help with any application for purchase or funding.



When your child is first established on Bi-Level you pay a fee for the mask at The Children's Hospital at Westmead. This fee is a single payment of \$100 and must be paid at the Cashier (next to the Emergency Department). With

the exception of children under the age of 6 months, any additional masks must be bought at retail outlet centres.



The retail price of a mask is approximately \$250 - \$300. We will give you the details you need to purchase future masks from a retail outlet.

How long will your child need to use Bi-Level Ventilation?

In most cases Bi-Level therapy is a long term treatment. For this reason it is *important to have regular follow-up appointments* with your Sleep/Respiratory Doctor. Your child will also need to have regular sleep studies to monitor their progress.

Other comments

When your child is discharged home on Bi-PAP, you are eligible for the 'Essential Medical Equipment Payment' at Centrelink. This is an annual payment of \$140. An application needs to be completed by you and your doctor to take to Centrelink.

Most Bi-PAP machines do not have internal batteries. You must be aware of this as it will stop working in the event of a blackout. It is advisable to contact your electricity supplier and notify them that a family member is on Bi-PAP. We will provide you with a form for this as you will also be eligible for a discount on your electricity bill.

What if your child becomes unwell at home?

If your child gets sick and needs to come to the Emergency Department you will need to bring all Bi-Level equipment with you.

If your child is breathing rapidly, noisily or seems to be having difficulty breathing you should see a doctor urgently.

Appendix 4 – CPAP

https://www.schn.health.nsw.gov.au/files/factsheets/sleep - cpap_ventilation-en.pdf

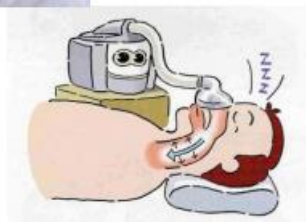
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CPAP Ventilation

What is CPAP?

CPAP (Continuous Positive Airway Pressure) is a type of respiratory support therapy used to overcome obstruction of the airways. It involves the use of a CPAP mask and machine. The CPAP machine uses *air* pressure to keep the airways open during sleep.



Why does your child need CPAP?

Your doctor has told you that your child has a breathing disorder called Obstructive Sleep Apnoea (OSA). Symptoms of OSA include snoring, pauses in breathing, waking at night, bed wetting, poor concentration and hyperactivity. OSA can be caused by a number of things including large tonsils and adenoids, a cleft palate,

muscle weakness, being overweight, having narrow airways or lung disease. For this reason your child will be required to use CPAP every time they sleep (including daytime naps).

The use of CPAP opens the airways to stop the snoring and allows normal breathing to occur. Normal breathing is important as it helps deliver oxygen and removes carbon dioxide.

What will we do?

Once it has been decided that your child needs CPAP you will meet with the Clinical Nurse Consultant, or the Scientific Officer from the Respiratory Support Service, or a member from the Sleep Unit.

During this appointment your child will be fitted with a CPAP mask. Your child needs to get used to wearing the mask before CPAP treatment can start. You will take the mask home and over the next few days encourage your child to wear the mask for short periods of time. This can be when your child is either awake or asleep, as the goal is to ensure that your child is not afraid of the mask.

We will take a 3D photograph of their facial bones before starting treatment. This will help us to monitor the growth of the bones and make sure that the mask is not pressing upon the top teeth. With continuing mask and pressure treatment, this 3D photograph should be repeated every 2-3 years.

Once your child is happy wearing the mask, call the Scientific Officer and we can book you in for admission to hospital to commence CPAP. The hospital admission will be for approximately 3 - 4 nights. During this time the

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team will work out the best pressure settings for your child and you will receive education on CPAP. During this time you will be required to hire all CPAP equipment for home.

Some children who live close to the hospital can start the CPAP in their home with the assistance of our home nurses.

How do you get the mask and machine?

When your child is first established on CPAP you pay a fee for the mask at The Children's Hospital at Westmead. This fee is a single payment of \$100 and must be paid at the Cashier (next to the Emergency Department). With the exception of children under the age of 6 months, any additional masks must be bought at retail outlet centres. The retail price of a mask is approximately \$250 - \$300. We will give you the details you need to purchase future masks from a retail outlet.



The Children's Hospital has a limited supply of CPAP machines. For this reason you will be required to rent or purchase the machine. There are many outlets that provide this and you will be provided with the contact details of these outlets. Hire costs vary depending upon the type of machine your child requires. Please advise us if you have a health care card, so we can assist any application for purchase or funding.

How long will your child need to use CPAP?

If your child has sleep apnoea and is awaiting surgery (e.g. the removal of adenoids and tonsils) then CPAP may be needed as a short-term solution until the day of surgery. In some cases the surgery will fix sleep apnoea and CPAP will no longer be needed.

Some children continue to have sleep apnoea after surgery and will need to use CPAP as a long term treatment. For some children we know CPAP will be needed long-term because surgery is not a treatment option. In these cases your child will need to see their Sleep/Respiratory doctor every 3 – 6 months (as instructed by your Sleep doctor). Your child will also need to have further sleep studies every 6 - 12 months. The use of repeat sleep studies allows us to monitor the progress of your child's sleep breathing and the need for CPAP.

Other comments

When your child is discharged home on CPAP, you are eligible for the 'Essential Medical Equipment Payment' at Centrelink. This is an annual payment of \$140. An application needs to be completed by you and your doctor to take to Centrelink.

CPAP machines do not have internal batteries. You must be aware of this as it will stop working in the event of a blackout. You can purchase a 12V battery and/or contact your electricity supplier. By contacting your electricity supplier you can notify them that a family member is on CPAP and request to be put on a 'Priority List' in the event of a blackout. By notifying your electrical supplier you are also eligible for a discount on your electricity bill.

What if your child becomes unwell at home?

If your child gets sick and needs to come to the Emergency Department you will need to bring all CPAP equipment with you.

If your child is breathing rapidly, noisily or seems to be having difficulty breathing you should see a doctor urgently.

If the problem is very severe you may see a dusky colour around your child's lips or there may be pauses when they stop breathing. You should call an ambulance (000) if this occurs.

Contacts

RSS Scientific Officer	(02) 9845 1851
RSS Clinical Nurse Consultant	(02) 9845 2572
Respiratory Support Service	(02) 9845 3437
Biomedical Engineering Department	(02) 9845 2602

Acknowledgement for images

Philips Home Healthcare - customer care number
1300 766 488

Devillebiss Healthcare Australia

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Appendix 5 – Commonly used masks



CPAP full face mask

<https://www.usawheelchair.com/resmed-airfit-f30-full-face-cpap-mask-with-headgear.html>

Fitting tips:

<https://www.resmed.com/ept/en/healthcare-professional/support/masks/how-to-fit-your-mask.html>

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Children's nasal mask CPAP/BiPAP

<https://www.philips.com.au/healthcare/product/HC1104961/wisp-pediatric-nasal-mask>

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CPAP children's nasal mask

<https://www.cpapusa.com/mirage-kidsta-cpap-nasal-mask.html>

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Children's full-face mask

<https://www.medicalhomeportal.org/clinical-practice/medical-technology/cpap-and-bilevel-pap>