CPAP/BiPAP: Non Acute Therapy; Initiation & Discontinuation (Respiratory Therapy)

Site Applicability

St. Paul's Hospital, Mount Saint Joseph Hospital

Practice Level

Respiratory Therapist

Need to Know

This guideline is meant for the application of therapy for patients with chronic conditions only. It does not apply to patients who require CPAP/BIPAP for acute respiratory failure; for acute therapy the patient must be managed in an area where continuous patient monitoring is possible.

Patient Selection:

The following criteria will be used to determine if a patient is a candidate for non-acute CPAP/BiPAP outside of a critical care area:

- Requires therapy for a chronic condition (i.e. OSA or chronic hypoventilation)
- Uses the therapy at home or is being assessed for home use on discharge from hospital
- Requires therapy intermittently (i.e. nocturnally or at rest during the day)
- Is cooperative and able to remove the mask independently

Safety Criteria:

CPAP/BiPAP systems were designed for the treatment of obstructive sleep apnea and related disorders. Patients using CPAP/BiPAP therapy on the general wards must be able to protect their airway (i.e. have an adequate cough and/or gag) and must be alert enough to remove the mask on their own in event of emergency. Nasal masks will be the preferred interface for use on the wards. Full-face mask may be considered if nasal interface options have been ineffective AND discussion has occurred with the ordering physician to determine appropriateness and degree of risk posed to the patient with using a full-face mask.

Checklist:

Complete the *Checklist for CPAP/BiPAP Non-Acute Therapy: Initiation & Discontinuation* for all non-acute CPAP/BiPAP patients.

Refusal of Therapy:

In the event the patient refuses to use the CPAP/BiPAP therapy for three consecutive nights and all three refusals have been documented, the equipment may be removed from the bedside. Documentation of removal of therapy and rationale must be provided and the ordering physician informed.

Orders (New Starts):

A Respirologist must order all new starts of CPAP/BiPAP therapy on the general wards. This therapeutic intervention is intended for the chronic treatment of Obstructive Sleep Apnea and related disorders. For CPAP the default order will be Autoset using a pressure range of 6 – 16 cmH_2O. For BiPAP an order specifying the mode and desired pressure levels is required.

Autoset/AutoCPAP:

Autoset or AutoCPAP systems measure and automatically adjust to the most effective level of CPAP that is required by the patient to treat their OSA. The Auto system monitors and adjusts CPAP level based on snore and flow obstruction indices. Unless specified, the minimum and maximum set pressure is to be 6 and 16 cmH_2O respectively. Auto is also preferred for existing users that do not know their prescribed CPAP level or the name of their CPAP provider for verification.

Existing Users:

A patient already using CPAP/BiPAP in the community does not require a Respirology order to continue using the therapy while in hospital. The patient will be encouraged to bring in their own equipment for use while admitted – this promotes consistency with mask and pressure settings, which enhances patient compliance with therapy. If the patient is unable to have it brought to the hospital, a PHC loaner machine may be provided for temporary use pending availability. In consultation with the attending physician, consider performing an overnight oximetry to rule out any respiratory complications. Any changes to the pressure or other system settings require an order from a Respirologist, and changes must be communicated to the existing CPAP provider prior to the patient being discharge from hospital.

Acute Therapy:

The use of CPAP/BiPAP as a treatment for ACUTE respiratory failure of any cause is not permitted on the wards due to lack of appropriate respiratory and nursing monitoring capabilities. CPAP/BiPAP for acute respiratory failure must occur in a critical care environment where frequent monitoring and ongoing assessment of patient condition is possible.

Emergency Department:

An Emergency physician, Respirologist or Intensivist may order CPAP/BiPAP therapy for ACUTE situations. If the therapy is intended as a new treatment therapy for obstructive sleep apnea or related disorders, a consult and order for CPAP/BiPAP must be obtained from a Respirologist. Any admitting physician may order an overnight oximetry study; however, Respirology must do the interpretation of the study.

Mask Tolerance:

Patients who do not tolerate the masks available at PHC may be referred to one of the vendors by the Respiratory Therapist for a trial of therapy using another mask style or equipment configuration.

Equipment and Supplies

- Resmed Autoset CPAP S9 Series (for CPAP only)
- Philips Respironics BiPAP A40 (for BiPAP or CPAP)
- CPAP/BiPAP vented nasal mask (regular/large)
- CPAP/BiPAP tubing
- Filter
- Oxygen tubing with add-flow connector (if supplemental oxygen required)
- Humidifier accessory (optional)

Guideline

Indications for nocturnal CPAP:

- Sleep apnea, OSA

Indications for BiPAP (non-acute):

- Chronic restrictive lung disease in which patients are experiencing symptoms of nocturnal sleep disruption (i.e. daytime sleepiness, excessive fatigue, morning headache, cognitive dysfunction, dyspnea)
- Additional physiologic criteria to be considered: nocturnal desaturation, awake gas exchange abnormalities (i.e. $PaCO_2$ greater than 45 mmHg), pulmonary diagnostic abnormalities (i.e. FVC less than 50% of predicted; maximal inspiratory pressure less than 60 cmH_2O)
- Chronic (nocturnal) hypoventilation syndrome
- Obstructive sleep apnea not corrected by application of CPAP alone
- Congestive heart failure with sleep disordered breathing

Complications:

- Nasal congestion, dryness, or irritation
- Rhinitis, epistaxis
- Sores on face/around nose resulting from inappropriately applied mask
- Inability to tolerate mask, inability to sleep with mask
- Gastric distension (from inadvertently swallowing air)

Procedure

Steps for Initiating CPAP/BIPAP (New Starts and Existing Users):

1. Verify physician order for CPAP/BiPAP. Refer to *Checklist for CPAP/BiPAP Non-acute Therapy: Initiation & Discontinuation.*

2. Obtain the appropriate machine and circuit. Ensure a filter is placed between the machine outlet and patient tubing. For supplemental oxygen place an add-flow connector before the filter.
   NOTE: Omit the filter if using the optional humidifier accessory.
3. Determine the best fit of nasal interface. The mask should not be too tight against the patient's face to minimize discomfort and skin breakdown.
4. Set the ordered mode and pressure level(s) as per the machine-specific instructions below.
5. With the machine on, place the fitted mask over the patient's nose ensuring a snug seal across the bridge of the nose. Closely observe the patient for machine triggering ability and comfort.
6. If an overnight oximetry study has been ordered, set up the oximeter as per B-00-12-12086. Overnight oximetry should be performed after the initial set-up and with subsequent manual changes in pressure settings (when not using Autoset mode).
   NOTE: Replace the air inlet filter on the back of the device every 6 months. Use the white version of the equipment verification label to indicate when the filter has been replaced.

CPAP: Resmed Autoset S9 Series Operating Instructions:

1. From the **Home Screen** select the **Setup Menu** control. Use the **Rotary Dial** to scroll down to the following settings:
   a. **Tube**: Use the **Rotary Dial** to select the **Standard** tubing option.
   b. **Mask**: Use the **Rotary Dial** to select the **type of mask** being used.
2. To access the **Clinical Menu**, simultaneously press and hold the **Setup Menu control** and **Rotary Dial** for 3 seconds. Access to the **Clinical menu** is identified by the yellow 'unlocked' symbol in the top right corner of the display.
3. Once in the **Clinical Menu** use the rotary dial to scroll through and highlight **Settings tab** and press to **confirm**. Once confirmed the colour will change to orange. Use the dial to scroll to **Mode** and press to **confirm**. You can select either **CPAP** or **Autoset**.
   a. Once in **CPAP Mode**, scroll to **Set Pressure** and press dial to highlight. Select the desired pressure using the **rotary dial**.
   b. When **Autoset Mode** is active, **Max Pressure** and **Min Pressure** default to 20 cmH_2O and 4 cmH_2O. To adjust pressure, scroll to **Max** or **Min** then press the dial to highlight and use the rotary dial to change the pressure in 0.2 cmH_2O increments.
   c. The **Ramp** and **EPR** options have a default setting of **OFF**.
4. To exit the **Settings Menu** scroll down to **Back** and press dial to **confirm**. The **Clinical Menu** should appear. Press **Setup Menu** button to exit the **Clinical Menu**.
   NOTE: Maximum oxygen flow added into the system should not exceed 4 L/min.

BIPAP: Philips Respironics BiPAP A40 Operating Instructions:

Therapy Modes:

CPAP:	- System maintains a constant level of pressure throughout the breathing cycle
S:	- Spontaneous Pressure Support - Breaths are patient-triggered and patient-cycled - Device triggers to IPAP and EPAP; also cycles a patient-triggered breath if no patient exhalation effort detected for 3 seconds

S/T:	- Spontaneous/Timed Pressure Support - Breaths are patient-triggered and patient-cycled, or machine-triggered and machine-cycled; device enforces a set minimum breath rate via machine (time) triggered breaths
T:	- Timed Pressure Support - Breaths are machine-triggered and machine-cycled - Provides mandatory pressure assist with bi-level pressures - Patient breathing rate has no effect on machine rate or pressure levels
PC:	- Pressure Control Pressure Support - Breaths are patient or machine-triggered and machine-cycled
AVAPS-AE:	- Bi-level therapy that provides an automatically adjusting EPAP, Pressure Support, and back-up rate - Device monitors upper airway resistance and adjusts EPAP to maintain patent airway - In this mode, AVAPS feature is always enabled; allows device to automatically adjust Pressure support to maintain a target tidal volume - If Breath Rate set to Auto, device will automatically adjust the back-up rate based on the patient's spontaneous respiratory rate

Therapy Features:

AVAPS:	- Average Volume Assured Pressure Support; available in S, S/T, PC, T modes - Helps patients maintain a tidal volume equal to or greater than the target tidal volume by automatically controlling the pressure support provided to the patient; adjusts PS by varying the IPAP level between the IPAP Min and IPAP Max settings (or Pressure Support Min and Pressure Support Max in AVAPS-AE mode) - If IPAP Max is reached and the target tidal volume is not achieved, the Low tidal Volume alarm activates
AVAPS Rate:	- Allows adjustment of the maximum rate at which the pressure support automatically changes to achieve the target tidal volume - Higher rate allows AVAPS to change pressure support faster to meet the target tidal volume - Can be set from 0.5 cmH_2O/min to 5.0 cmH_2O/min
Bi-Flex Comfort Feature:	- Comfort feature in S mode only - Adjusts therapy by inserting a small amount of pressure relief during the latter stages of inspiration and during active exhalation - Set levels of 1, 2, or 3 progressively reflect increased pressure relief
Ramp:	- Offers lower pressures when activated and then gradually increase - If activated when AVAPS enabled, will reduce the maximum pressure support capability to IPAP Min or Pressure Support Min and ramp to the IPAP Max or Pressure support Max over the ramp time period
Rise Time:	- Feature available in S, S/t, PC, and AVAP-AE modes - Amount of time it takes the device to change from the expiratory pressure setting to the inspiratory pressure setting

	- Rise time levels of 1, 2, 3, 4, 5, or 6 reflect progressively slowed response of the pressure increase that will take place at beginning of inspiration; a setting of 1 is the fastest rise time while a setting of 6 is the slowest
Digital Auto-Trak:	- Ability to recognize and compensate for unintentional leaks in the system and to adjust trigger and cycle accordingly - Adjusts flows as circuit leak changes - Adjusts sensitivity thresholds for optimum patient-machine synchrony

Steps If Patients Bring Their Own CPAP/BIPAP From Home:

1. Perform a visual check of the equipment to ensure the system and electrical cord is free from obvious physical damage. Check the tubing, mask, and humidifier (if applicable) for integrity and general cleanliness. Do not use the unit if there are concerns noted with any of the above items. Inform the patient of the concerns and proceed with using a PHC-owned system if available.
2. Plug system into electrical outlet & turn on. Confirm pressure setting (if unable to verify the set pressure via the display use an external pressure manometer to measure direct or contact the patient's CPAP provider for verification).
3. Have the patient demonstrate their ability to fit the mask and set up the system to confirm that they can be considered a self-starter at night.
   NOTE: Even if confirmed as "self-starter", the therapist will provide a courtesy check-in with the patient on a per shift basis to offer assistance with fitting the mask, initiating the machine, refilling the humidifier, answer any questions, or provide general troubleshooting assistance.

Steps for Home Discharge of New CPAP/BIPAP Patients:

Refer to *Checklist for CPAP/BiPAP Non-Acute Therapy: Initiation & Discontinuation.*

1. Confirm physician order for CPAP/BiPAP upon discharge and verify the planned discharge date. Have the Unit Clerk order a Social Work consult if there are concerns around the patient's financial situation.
2. Obtain a prescription from the physician
3. In consultation with the patient/family, select a vendor to support the patient.
   NOTE: If the patient has a restrictive lung disease or neuromuscular disorder they may be eligible for funding through the Provincial Respiratory Outreach Program (PROP). Complete the *PROP Application for Services* form if criteria met.
4. Fax the prescription with cover letter to vendor (PROP if eligible) and be sure to include related studies such as nocturnal oximetry, sleep screen, or ABGs/PFTs. File a copy in the CPAP/BiPAP binder for reference. Confirm with vendor (or PROP) that the fax has been received.
   NOTE: Vendor may provide you with an appointment time for the patient. Confirm with vendor as to whether they will bring the equipment directly to the patient in hospital or if they will deliver it to the patient's home. Review next steps with the patient and/or family. Inform them of the appointment time (if applicable).
5. Notify vendor upon patient discharge from hospital.

Documentation

1. Documentation of assessments, findings, interventions and therapies provided, including patient response, is to occur in Cerner.
2. Communicate with the bedside nurse on the system set-up and overall plan and goals.
3. Communicate with Respirology about a discharge plan, particularly if the patient appears close to discharge but there are no CPAP/BiPAP discharge orders in place.
4. Ensure the patient is monitored at least twice per overnight shift.

Patient and Family Education

Provide bedside education as required and review any relevant emergency/safety procedures.

Related Documents

1. B-00-12-12086 (Nocturnal Oximetry)
2. B-00-12-12082 (ApneaLink AIR)
3. B-00-12-12014 (Non-invasive/BiPAP: Acute)

References

1. Siccoli, MM et al. *Effects of continuous positive airway pressure on quality of life in patients with moderate to severe obstructive sleep apnea: data from a randomized controlled trial.* Sleep. 31 (11): 1551-8. 2008 Nov.
2. Khan, F. et al. *Apneic disorders associated with heart failure: pathophysiology and clinical management.* South Med Journal. 103 (1): 44-50. 2010 Jan.
3. Noda, A. et al. *Beneficial effects of bilevel airway pressure on left ventricular function in ambulatory patients with idiopathic dilated cardiomyopathy and central sleep apnea-hypopnea: a preliminary study*. Chest. 131 (6): 1694-701. 2007 June.
4. *Clinical indications for noninvasive positive pressure ventilation in chronic respiratory failure due to restrictive lung disease, COPD, and nocturnal hypoventilation – a consensus conference report*. Chest. 116 (2): 521-534. 1999 August.
5. IRS Rapid Discharge Program (RDP) Reference Manual. 2014.
6. Resmed Autoset CPAP S9 Series User Manual. 2012
7. Resmed Autoset CPAP S9 Series Clinical Manual. 2009.
8. Philips Respironics Bipap A40 User Manual. 2015.
9. Philips Respironics System One Heated Humidifier User Manual. 2017.

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