Institution Name: Directorate General of Specialized Medical Care, MoH

Document Title: Policy and Procedure of BiPAP Ventilatory Support System

Approval Process

	Name	Title	Institution	Date	Signature
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Acknowledgement

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Acronyms:

ABG'S	Arterial blood Gases
ARF	Acute Respiratory Failure
BiPAP	Bi- Level Positive Airway Pressure
BPM	Breaths Per Minute
CO2	Carbon Dioxide
COPD	Chronic Obstructive Pulmonary Disease
CPAP	Continuous Positive Airway Pressure
DOB	Difficulty of Breathing
EPAP	Expiratory Positive Airway Pressure
FIO2	Fraction of Inspired Oxygen
IPAP	Inspiratory Positive Airway Pressure
NIV	Non- Invasive Ventilation
PCO2	Partial pressure of carbon dioxide
RCS	Respiratory Care Services
RRT	Registered Respiratory Therapist
S	Spontaneous
S/T	Spontaneous- Timed
SpO2	Peripheral Capillary Oxygen Saturation
T	Timed

VT	Tidal Volume
WOB	Work of breathing

Policy and Procedure of BiPAP Ventilatory Support System

1. Introduction

Patients with chronic obstructive pulmonary disease (COPD) often require hospitalization due to acute exacerbations. There is ventilatory support that is capable of providing support through an endotracheal tube or mask; BiPAP is one of them and can be supported with supplemental oxygen and a backup respiratory rate. It may be used for obstructive sleep apnea for those patients who are obese or have central sleep apnea

The BiPAP name is derived from Bi-Level Positive Airway Pressure. It is an airway pressure support ventilation that uses either flow or time to cycle between inspiratory positive airway pressure (IPAP) and expiratory positive airway pressure (EPAP). The dual settings allow the patient to get more air in and out of their lungs. The difference in pressures helps to eliminate extra CO2 carbon dioxide gas from the body. BiPAP is intended to augment patient breathing in those patients with spontaneous respirations and should not be used as a life support ventilator. It is not intended to provide total ventilatory requirements of the patient.

BiPAP enables the therapist to let the patient breathe freely even under the most invasive ventilation conditions. This may occur in intensive care, high dependency and dedicated specialist respiratory units with a higher level of clinical support. Our inability to predict success based on initial data, supports the use of bi-level pressure ventilation trials for all stable patients with ARF.

2. Scope

This document is applicable to all health institutions in Ministry of Health providing care for patients who are treated with BiPAP Ventilatory Support System.

3. Purpose

The purpose of this policy is:

3.1. To be as reference for Respiratory therapist, Nurses, doctors, and other health care personnel to follow with patients needful of a non-invasive bi-level positive airway pressure ventilation (BiPAP).

3.2. To help decrease rates of endotracheal intubation with the application of BiPAP prior to the onset of respiratory failure.

3.3. To identify and select appropriate patient as a potential candidate for BiPAP use.

3.4. To establish safe and uniform standard of practice for the application and monitoring of bi-level positive airway pressure ventilation (BiPAP) in patients.

4. Definitions

4.1. BiPAP is a low pressure, electrically driven unit with electronic pressure control. The unit provides air at suitable pressure and flow rates for patient ventilation assistance.)

4.2. Spontaneous (S) – In spontaneous mode the device triggers IPAP when flow sensors detect spontaneous inspiratory effort and then cycles back to EPAP.

4.3. Timed (T) – In timed mode the IPAP/EPAP cycling is purely machine-triggered, at a set rate, typically expressed in breaths per minute (BPM).

4.4. Spontaneous/Timed (S/T) – Like spontaneous mode, the device triggers to IPAP on patient inspiratory effort. But in spontaneous/timed mode a "backup" rate is also set to ensure that patients still receive a minimum number of breaths per minute if they fail to breathe spontaneously.

4.5. Continuous Positive Airway Pressure (CPAP): The pressure set on the corresponding dial will be delivered continuously.

5. Policy

5.1. All members of the Respiratory Care Services (RCS) Department who are responsible for BiPAP ventilatory support system will adhere to this policy and procedure.

5.2. Respiratory Care BiPAP treatments shall be provided as ordered by a physician

5.3. BiPAP therapy is to be set up and initiated by a qualified respiratory therapist.

5.4. Properly trained nursing personnel may remove and replace mask as necessary or assist the patient with the same settings.

5.5. Mechanical changes of BiPAP settings shall be made only by a member of the Respiratory Care Services Department. These changes will be made upon receipt of a complete written or verbal order from the appropriate physician

5.6. BiPAP shall not influence the treatment of patients in the Intensive Care Units but is indicated and necessary on patients with acute and chronic pulmonary disorders causing

hypercapnic respiratory failure, increased work of breathing (WOB), upper airway obstruction, COPD spectrum, disorders of oxygenation where positive pressure ventilation with CPAP pressure and alveolar recruitment.

6. Procedure

6.1. Equipments

6.1.1 Stethoscope

6.1.2 BiPAP unit with power cord

6.1.3 BiPAP Single Use Disposable Circuit

6.1.4 Mainstream Bacterial Filter

6.1.5 Patient Interface

6.1.6 Nasal Mask

6.1.7 Head Gear

6.1.8 BiPAP disposable humidifier tubing (optional)

6.1.9 Humidifier (optional)

6.1.10 Manometer (optional)

6.2. Identify potential candidate for BiPAP

6.2.1. Spontaneously breathing patient

6.2.2. Patient demonstrates clinical evidence of acute and/or chronic pulmonary disorder resulting in hypercapneic respiratory failure, increased WOB, SOB, upper airway obstruction, COPD spectrum. disorders of oxygenation where positive pressure ventilation with CPAP pressures and alveolar recruitment are evident

6.2.3. Those patients exhibiting any of the following criteria will be excluded from BiPAP and an Alternate Therapy must be chosen:

I. Respiratory Arrest

II. Uncontrolled Arrhythmias

III. Airway Obstruction

IV. Unable to Clear Secretions

V. Uncooperative

VI. Facial Trauma

VII. Systolic BP < 90 mmHg

6.3. Obtain baseline parameters

6.4. Obtain and assemble equipment

6.4.1. Properly fit nasal mask interface (a mask which is improperly fitted to the patient cause's anxiety or results in discomfort that will only impede the effective management of the patient)

6.4.2. Put manometer in line to confirm delivered pressures

6.4.3. Provide appropriate FIO2 as needed

Remember a mask which is improperly fitted to the patient, cause's anxiety, or results in discomfort will only impede the effective management of the patient.

6.5. Obtain initial orders/settings for BiPAP and verify patient's orders sheet for specific instructions.

6.8.1. Verify patient's name, DOB, and bed location.

6.8.2. Proceed to patient's bed, introduce yourself, and explain what you are about to do.

6.8.3. Check the patient's name and DOB verbally and by the patient's wristband.

6.8.4. Offer reassurance

6.6. For BiPAP, sample parameters to set

6.6.1 S/T Mode

6.6.2 IPAP/EPAP 10 / 4

6.6.3 Respiratory Rate 8

6.6.4 If available, Rise Time = Adjust of patient comfort

6.7. Set available alarms to appropriate levels

6.8. Continue to monitor patient's respiratory parameters and perform clinical assessments:

6.8.1. Assess patient's level of dyspnea, accessory muscle usage, paradoxical chest wall movement, respiratory rate, heart rate, systemic pressures, skin color, perfusion status, temperature

6.8.2. Assess patients mental status (patient awake, alert, and demonstrates an ability to follow and perform simple commands when instruction is provide)

6.8.3. Chest auscultation: assess breath sounds and air movement

6.8.4. Assess for effectiveness of cough effort in promoting airway clearance

6.8.5. Assess secretions (frequency, amount , color, and texture)

6.8.6. Optimize medical management of patient

6.8.7. Monitor patient comfort

6.8.8. Obtain ABG's and Chest X-Rays as needed

6.8.9. Monitor & Assess Ventilation Assistive Device System and Interface. a. Adjust Ventilation Assistive Device settings to patient ventilatory and oxygenation needs.

6.8.10. Adjust alarms and verify alarm settings accordingly.

6.9. For patient ventilatory needs, Gradually Adjust IPAP and Optimize patient ventilator synchrony

6.9.1. Optimize VT and/or PCO2

6.9.2. Minimize accessory muscle usage/WOB

6.9.3. Alleviate dyspnea/SOB

6.9.4. Decrease respiratory rate

6.10. For patient oxygenation needs:

6.10.1. Gradually Adjust EPAP(and IPAP) and Adjust FIO2 or O2 lpm - SpO2 > 90%

6.10.2. Monitor Therapy Goals

6.10.3. Does patient demonstrate significant improvement in ABG's and respiratory symptoms?

6.10.4. Is patient stabilized? -Transfer stabilized patient to Unit /Floor

6.10.5. If patient shows no improvement after 1 hour elapsed, advise physician that patient's current respiratory status may warrant the physician considering intubation and placement of the patient on mechanical ventilation

6.11. Mode Selection:

6.11.1. BiPAP can operate in the following four (4) modes, to be determined jointly by the physician and respiratory therapist based on the appropriate patient testing and monitoring

I. Spontaneous Mode (S): Patient is in command of the frequency and depth of his breathing pattern.

II. Spontaneous/ Timed Mode (S/T): If the patient fails to initiate an inspiration, the unit will cycle IPAP based on a preset interval determined by the synchronized rate (BPM) control.

III. Timed Mode (T): The unit cycles between IPAP and EPAP levels based on the timing intervals as determined by the rate (BPM) and inspiratory time. (%IPAP) respirations.

IV. Continuous Positive Airway Pressure (CPAP): The pressure set on the corresponding dial will be delivered continuously.

6.12. If the patient's condition fails to improve within 30 min, intubation and mechanical ventilation is indicated. Major criteria (any one of the following) are as follows:

6.12.1 Respiratory arrest

6.12.2 Loss of consciousness with respiratory pauses

6.12.3 Gasping for air

6.12.4 Psychomotor agitation requiring sedation

6.12.5 Heart rate less than 50 bpm with loss of alertness

6.12.6 Hemodynamic instability with systolic blood pressure less than 70 mm Hg

7. Responsibilities

7.1. Respiratory Therapists are responsible for:

7.1.1. Contacting appropriate physician for orders upon initiation and with any changes outside original parameters set by physician.

7.1.2. Performing mask fitting.

7.1.3. Monitoring and adjustment of the NIV equipment

7.1.4. Perform mask trouble shooting

7.1.5. Adjust settings as per orders. (Machine settings to be performed by RRT only)

7.1.6. Discontinue BiPAP on direction of physician.

7.1.7. Clean and disinfect NIV equipment upon discharge or discontinuation of therapy.

7.1.8. Document application and scheduled monitoring of NIV

7.2. Nursing Staff are responsible for:

7.2.1. Care and monitoring of the patient

7.2.2. Notifying the RRT of the doctors' order to initiate NIV and the type.

7.2.3. Assisting in re-applying, adjusting, repositioning and removing the mask interface as required.

7.2.4. Notifying the Practitioner and RRT of any acute change in patient status for reassessment.

7.2.5. Notify RRT with any concerns regarding the equipment and set up

7.2.6. Adjust oxygen as needed to keep oxygen saturation in the limits ordered by Practitioner and notify RRT with increasing O2 requirements.

7.2.7. Assess skin frequently around mask. (Provide daily skin care and apply appropriate barrier/dressing if needed where the device meets the patient's skin.

8. Document History and Version Control

Document History and Version Control			
Version	**Description of Amendment**	**Author**	**Review Date**
01	Initial Release	Respiratory Care Services Team	May 2024
02			
03			
04			
05			

Written by	**Reviewed by**	**Approved by**
Respiratory Care Services Team	Khalsa Al Siyabi	Dr. Kadhim Sulaiman

9. Related Documents:

There are no related documents for this policy.

10. References:

Title of book/ journal/ articles/ Website	Author	Year of publication	Page
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