



# Prince Sultan Military Medical City

## Controlled Document, Not to be Reproduced

Departmental Policy	Dept: Intensive Care Services	Policy No: 1-2-9451-01-037 Version No: 01
<b>Title: Helmet Non-Invasive Ventilation Support</b>		<b>JCI Code: COP</b>
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## **1. INTRODUCTION**

- 1.1. The World Health Organization (WHO) has declared the SARS-CoV-2 infection-related disease (coronavirus disease 2019; COVID-19) a pandemic. The main clinical manifestation of COVID-19 patients is represented by an acute hypoxic respiratory failure secondary to bilateral pulmonary infiltrates that in many cases, results in an acute respiratory distress syndrome (ARDS) and requires both non-invasive and invasive ventilator support.
- 1.2. One of the methods of non-invasive ventilation is through Helmet (H-CPAP), which helps keep the airway and lungs open and treat hypoxemia.

## **2. PURPOSE**

- 2.1. The aim is to provide all Respiratory care specialist and ICS staff with a well-organized approach to optimize the use of helmet for patient with Acute Hypoxic Failure (AHRF).

## **3. APPLICABILITY**

- 3.1. All patients in PSMMC requiring non-invasive ventilation.

## **4. RESPONSIBILITIES**

- 4.1. It is the responsibility of ICS Director and RCD Director to implement and monitor the compliance of this policy.
- 4.2. All ICS physicians and respiratory care practitioner are responsible for the implementation of this policy.

## **5. POLICY**

- 5.1. Patient should be in negative room pressure and managed with airborne precaution.
- 5.2. Arterial blood gas should be done after initiation of therapy by maximum 1 hour. Then ABG frequency should be adjusted based on patient status and RCD policy & procedure.
- 5.3. The minimum inspiratory flow for Helmet NIV is 50 L/M to prevent rebreathing CO<sub>2</sub> inside the helmet.
- 5.4. HEPA filter should always be connected to the expiratory limb.



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## 6. DEFINITION OF TERMS

- 6.1. Helmet is a clear plastic hood that contains the patient's head and is joined to a soft rubber collar. Pipes connectors are placed on two sides of the helmet for expiratory and inspiratory limbs of the circuit. The helmet is generally secured to the patient by armpit braces. All the helmets are latex-free and available in different sizes.

## 7. PROCEDURES

### 7.1. **Patient education:**

- 7.1.1. Explain the mask structure and application to the patient.
- 7.1.2. Explain the feelings that might be experienced upon mask application (see appendix A)

### 7.2. **Choosing the helmet size:**

- 7.2.1. The helmet comes in different sizes: small medium, large (see appendix B)
- 7.2.2. Seal can be trimmed for added comfort.
- 7.2.3. The silicon edges should be smooth and straight.

### 7.3. **Prior helmet application:**

- 7.3.1. Apply thick duoderm around the patient neck and under armpits to prevent pressure ulcer.
- 7.3.2. Check the leak via holding the neck collar closed tightly and start the ventilator for leak inspection.
- 7.3.3. Ear plug or headphones can be used to prevent noise induced by helmet
- 7.3.4. Perform oral care/suctioning if indicated
- 7.3.5. Tie the hair to the back of the head as needed.
- 7.3.6. For patient comfort, rolled towel can be used behind the back of the neck inside the hood.

### 7.4. **Helmet application:**

- 7.4.1. Should apply by two providers standing at each side of the bed.
- 7.4.2. Be careful to any inserted central lines on the neck.
- 7.4.3. Ensure that neck collar is folding upwards inside the helmet against the neck.
- 7.4.4. Run a finger along the inside of the seal to ensure the silicon is sealed and flat against the neck wall.



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7.4.5. The pressure inside the helmet will result in upward movement of the helmet that's why the helmet is required to stabilize via one of the following ways:

- 7.4.5.1. Under arm straps: these can be applied for short period, prolong application might result in pressure ulcer and pain.
- 7.4.5.2. Bedrails: is an alternative option especially if prolonged therapy is required.

### 7.5. Vent set up:

NIV – ICU Ventilator	NIV – BIPAP V60
- Select NIV on the ventilator - Set up the ventilator on CPAP+PS	- Set up the BIPAP on (S/T) mode
- Set PEEP at 8 cmH <sub>2</sub> O (increase gradually for the target SpO <sub>2</sub> ≥ 92%)	- Initial EPAP at 8 cmH <sub>2</sub> O
- Initial PS 8 (increase within 2-3 min gradually to maintain RR < 30 bpm and decrease WOB)	- Initial IPAP 16-20 cmH <sub>2</sub> O - Maintain Δ P during adjustment
- PIP shouldn't exceed 22 cmH <sub>2</sub> O	- IPAP shouldn't exceed 24 cmH <sub>2</sub> O
- Set O <sub>2</sub> 100% and titrate for targeted SpO <sub>2</sub> - Set Ti 1.5 sec - Trigger 2 L/m - Flow/ cycling off 50 % - Inspiratory rise time 50 ms or equivalent based on vent type - Set ventilator alarms safely based on patient values	- Set O <sub>2</sub> 100% and titrate for targeted SpO <sub>2</sub> - Set Ti 1.5 sec - Set rise time at 2  Set BIPAP alarms safely based on patient values

### 7.6. Adjustment:

7.6.1. PEEP/EPAP shouldn't exceed 14 cmH<sub>2</sub>O.

7.6.2. Increase PS/IPAP to achieve the following:

- 7.6.2.1. Tidal volume of 1000 to 1500 ml (note: only 50% - 75% of volume delivered is distributed to the helmet).
- 7.6.2.2. RR < 30/min.
- 7.6.2.3. Flow > 50L.
- 7.6.2.4. Mv of 20-25 L/min.

### 7.7. Patient monitoring:

7.7.1. Monitor vital signs prior, after and during use (HR, RR, SpO<sub>2</sub>, and BP).

7.7.2. Use the approved ventilator sheet in RCD policy (policy No: 4-1-9451-01-007/02).



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- 7.7.3. ABG within 1 hour of application, then frequency will be based on patient status and RCD policy.
- 7.7.4. All ventilator setting and patient values should be documented (mode, Mv, RR, Vt, PEEP, PS, Ti, flow, trigger)
- 7.7.5. Patient assessment using SOAP should be documented.

### 7.8. **Patient care:**

#### 7.8.1. **Patient can drink water through the access port.**

- 7.8.1.1. Per-oxygenate on 100 % for 2 -3 min.
- 7.8.1.2. Rubber stopper straw. (it will cause system leak, monitor SpO2).
- 7.8.1.3. Insert the straw, instruct the patient to seal the lips around the straw.
- 7.8.1.4. Add water into the cup to the other end of straw.
- 7.8.1.5. Remove the cup first, then the straw.
- 7.8.1.6. Reapply the rubber stopper.

#### 7.8.2. **Secretion clearance:**

- 7.8.2.1. Pre-oxygenate on 100 % for 2 -3 min.
- 7.8.2.2. Remove rubber stopper (it will cause system leak, monitor SpO2).
- 7.8.2.3. Insert the yank Auer, and perform suctioning.
- 7.8.2.4. Reapply the rubber stopper.

### 7.9. **Weaning & discontinuation:**

- 7.9.1. Wean FIO2 to 50% - 60%.
- 7.9.2. Then PEEP/EPAP by 2 cm H2O every 1-3 hours maintaining SpO2  $\geq$  92%.
- 7.9.3. Lower PS/IPAP by 2 every 1- 3 hours if RR < 30/min.
- 7.9.4. If RR < 30/min and SpO2  $\geq$  92% on FIO2  $\leq$  50% , PEEP  $\leq$  8 cm H2O , PS < 10, Helmet can be discontinued and patient switched to face mask 6L or Nasal Cannula 4L.

### 7.10. **Helmet NIV failure criteria**

- 7.10.1. Saturation remains < 90% despite of maximum FiO2 and PEEP.
- 7.10.2. RR > 35/min despite high PS/IPAP.
- 7.10.3. Ongoing acidosis pH < 7.25.
- 7.10.4. Worsening patient condition / developing severe respiratory distress.
- 7.10.5. If patient's comfort & tolerance cannot be achieved.



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### 8. ORIGINATING DEPARTMENT/S

- 8.1. Intensive Care Services.
- 8.2. Respiratory Care Department.

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### Appendix (A)

Patient Name:

MRN:

Date:

Time:

### Patient instruction prior hood application form

English	Arabic
<ul style="list-style-type: none"> <li>• Do you have Ear problems?</li> <li>• Do you have vision problems?</li> </ul>	<ul style="list-style-type: none"> <li>• هل يوجد لديك مشاكل في السمع؟</li> <li>• هل يوجد لديك مشاكل في النظر؟</li> </ul>
<b>Advantages:</b>	<b>المميزات:</b>
<ul style="list-style-type: none"> <li>• This device is going to increase your oxygen saturation.</li> <li>• Will improve difficulty of breathing.</li> <li>• No sedation needed.</li> <li>• You will be awake.</li> <li>• No pain.</li> <li>• Capability of using headphones connected to your phone.</li> <li>• You can drink sips of water.</li> </ul>	<ul style="list-style-type: none"> <li>• هذا الجهاز سيعمل على تحسين نسبة الأكسجين لديك.</li> <li>• سيسخن من جهد التنفس.</li> <li>• لا تحتاج الى تخدير.</li> <li>• سوف تكون واعي.</li> <li>• لا يسبب ألم.</li> <li>• القدرة على استخدام السماعات وايصالها بالهاتف الخاص بك.</li> <li>• يمكنك شرب القليل من الماء.</li> </ul>
<b>Disadvantages:</b>	<b>العيوب:</b>
<ul style="list-style-type: none"> <li>• Noisy to your ear, we will use earplugs to help you.</li> <li>• The Feeling is like airplane landing pressure.</li> <li>• In the First 30 min, you will feel high flow running.</li> <li>• Relax, try to breath with flow.</li> <li>• After a while, you will adapt with it.</li> <li>• It will run continuous for first few hours then we can interrupt for rest and eating.</li> </ul>	<ul style="list-style-type: none"> <li>• سيكون مزعج للإذن، سوف نقوم بوضع سدادات للإذن لتنحيف ذلك.</li> <li>• قريب من شعور الضغط في الطائرة في حالة الهبوط.</li> <li>• في الثلاثين دقيقة الأولى سيكون هناك هواء عالي السرعة.</li> <li>• حاول ان تهدأ، تنفس مع الجهاز.</li> <li>• بعد مده قليله ستكتيف مع الجهاز.</li> <li>• في الساعات الأولى سيكون استخدام الجهاز متصل، بعد ذلك يمكننا التوقف للراحة والأكل.</li> </ul>



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### Appendix (B)

#### Subsive Oxygen Treatment Hood Neck Seal Information

Neck seals are offered in either latex or silicone. Measure the individual's neck circumference, and then reference the below sizing guide.

Material	Size	Neck circumference (inches)	Neck circumference (cm)	Note
Latex	S	8.5" - 11"	21.5cm - 28cm	Trim for comfort
Latex	M	9" - 13"	23cm - 33cm	Trim for comfort
Latex	L	11" - 13"	28cm - 33cm	Trim for comfort
Latex	XL	13" - 17"+	33cm - 43cm+	Trim for comfort
Latex	Universal	11" to 16.5"	28cm - 42cm	Trim for comfort
Silicone	S	11"	28cm	Trim for comfort
Silicone	M	13"	33cm	Trim for comfort
Silicone	L	15"	38cm	Trim for comfort
Silicone	XL	17"	43cm	Trim for comfort

#### Neck Seal Care Guidance

Both latex and silicone neck seals are durable though must be handled with care. Overstretching, sharp objects, and/or poor trimming can cause the seal to tear.

- Do not stretch the seal more than is required to place it on an individual.
- Use two hands to stretch the seal from inside the opening. Two individuals (4 hands) is even better.
- Once in place, run a finger along the inside of the seal to ensure it lays flat against the individual's neck for comfort – avoid folds over or under, or rolling the seal.
- Avoid sharp objects such as finger nails and rings.
- Use a product such as talcum powder to minimize frictional strain on the seal and for personal comfort. Talcum can be used under the seal if it will be worn for a long period of time to minimize sweat or irritation.

#### Neck Seal Trimming

All seals can be trimmed for added comfort. When trimming seals, use sharp scissors. Cut edges should be as smooth and straight as possible. Do not trim across trim lines. Avoid sharp edges and nicks.

