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Ministry of Health

Use of High Flow Nasal Cannula in Respiratory Failure in Adult Patients with COVID-19 Respiratory Failure

I. Introduction:

a. Background:

Coronavirus disease 2019 (COVID-19) is caused by a novel strain of the coronavirus family (Severe acute respiratory syndrome coronavirus 2), first appearing in China in December 2019 and then causing a worldwide pandemic. The virus has proven to be highly infectious, affecting more than 5 million cases worldwide. COVID-19 patients might develop hypoxic respiratory failure. Early recognition and referral of patients with worsening respiratory function while on conventional oxygen therapies such as simple face masks are important to ensure timely and safe escalation of respiratory support. High Flow Nasal Cannula (HFNC) is a noninvasive respiratory support. It can deliver a mix of air and oxygen with an inspired oxygen fraction (FiO2) ranging between 0.21 and 1.0 at a flow rate up to 60 L/minute. The physiological benefits of HFNC are improved oxygenation, decreased anatomical dead space, decreased metabolic demand of breathing, decreased production of carbon dioxide, superior comfort and improved work of breathing, positive nasopharyngeal and tracheal airway pressure and better secretion clearance. HFNC is a recommended therapy for hypoxia associated with COVID-19 disease, however as this procedure is categorized as a high risk for airborne infection, Health Care Workers (HCWs) should be strict in following the recommended PPE recommendations. Use of HFNC decreases ICU mortality, need of intubation and 90-day mortality in acute hypoxemic respiratory failure.

b. Aim of the Scope:

The Aim of this guideline is to standardize and optimize the usage of HFNC among health care workers

c. Methodology:

The guideline was developed by doing a literature review by 3 reviewers and coming up with the written document. The next step was having a meeting with 20 ICU consultant to review the final version. Conflicts were solved by discussion and voting.

d. Targeted Population:

All adult COVID 19 patients who are requiring high oxygen therapy in the ED, hospital wards, and ICUs

e. **Targeted End User:**

- Adult Emergency Medicine physicians
- Adult Critical Care Medicine physicians
- Adult Critical Care Nurses
- Respiratory Therapists
- Adult Anesthesia physicians.

f. **Conflict of interest:** No conflict of interest.

g. **Funding:** None.

II. Indication of HFNC (refer to figure 1):

a. Acute hypoxemic respiratory failure PO2/FiO2 ratio < 300 mmHg
b. Need for medium and high concentration oxygen therapy.
c. Post extubation support.
d. Treatment and prevention of postoperative respiratory failure.
e. During intubation (pre-oxygenation for intubation, refer to MOH Protocol Airway Management in COVID 19)
f. Patients with do-not-intubate (DNI) status and respiratory failure.

III. Contraindications of HFNC:

a. Low level of consciousness with Glasgow Coma Scale score < 9 (HFNC can be used in these patients to facilitate intubation)
b. Abnormalities or surgery of the face, nose, or airway that preclude an appropriate-fitting nasal cannula
c. Post CPR or respiratory arrest
d. Hemodynamic instability requiring more than one vasopressor
e. Multi-organ failure

IV. General HFNC rules of use:

a. HCWs should use Airborne protection (maximum PPEs with N-95 masks and eye protection).
b. The patient should be treated in a negative pressure room; otherwise in a closed room (with HEPA Filter) if no negative pressure room is available.
c. It is advisable that the patient wears surgical mask on top of HFNC.
d. It can be used in Critical Care Units, ED, and General wards.
e. HFNC does not have a role for patients with an indication for immediate intubation.
f. Frequent clinical (with venous/ arterial blood gases as indicated) evaluation every 1-2 hours to ensure efficacy and safety. The patient on HFNC should be monitored for complications which are relatively rare and include:
    i. abdominal distension
    ii. aspiration
    iii. barotrauma

V. HFNO application and setting:

a. HFNO application decisions are made according to patient conditions and the need for monitoring and or intervention.
b. Clinicians should remain vigilant to signs of respiratory failure that necessitate intubation and mechanical ventilation.
c. It is recommended that targeted patients wear surgical face mask.
d. Set flow rate first at 30-60 L/minute or the maximum flow rate provided by the HFNC machine or tolerated by the patient (Note: maximize the flow rate first in an attempt to keep the set FiO2 ≤ 60%).
e. Set FiO2 (range: 21 to 100%) to target SpO2 92-96% (SaO2 > 94% for pregnant women).
f. Use heated and humidified gases. If the HFNC machine allows, adjust temperature between 31 and 37 ° C to achieve patient's comfort (lower temperature usually leads to more comfort when high flow is used).
g. The flow rate can be subsequently increased in 5 to 10 L/minute increments if:
    i. Respiratory rate fails to improve.
    ii. Oxygenation fails to adequately improve.
    iii. Breathing remains labored.

VI. Weaning of HFNC:

a. When O2 goals are acheived and the patient is clincially improving (decrease in respiratory rate and respiratory distress): reduce FiO2 gradually by 5-10% every 2-4 hours.
b. When FiO2 ≤ 40% is reached, flow can be gradullay redcued by 5-10 L/min every 2-4 hours.
c. Switching to conventional O2 therapy should be considered when FiO2 < 35% and flow < 20 L/min.

VII. Signs of Failure of HFNO (one of the following)

a. Increase respiratory rate.
b. Presence of thoracoabdominal asynchrony as early as 15-30 minutes after the beginning of HFNC therapy.
c. Failure to adequately improve oxygenation within 2 hours after the initiation of HFNC.

VIII. Annex

a. **Decisions for intubation: (Figure1)**
Intubation should be done if no response to HFNC as per MOH Protocol Airway Management in COVID 19)

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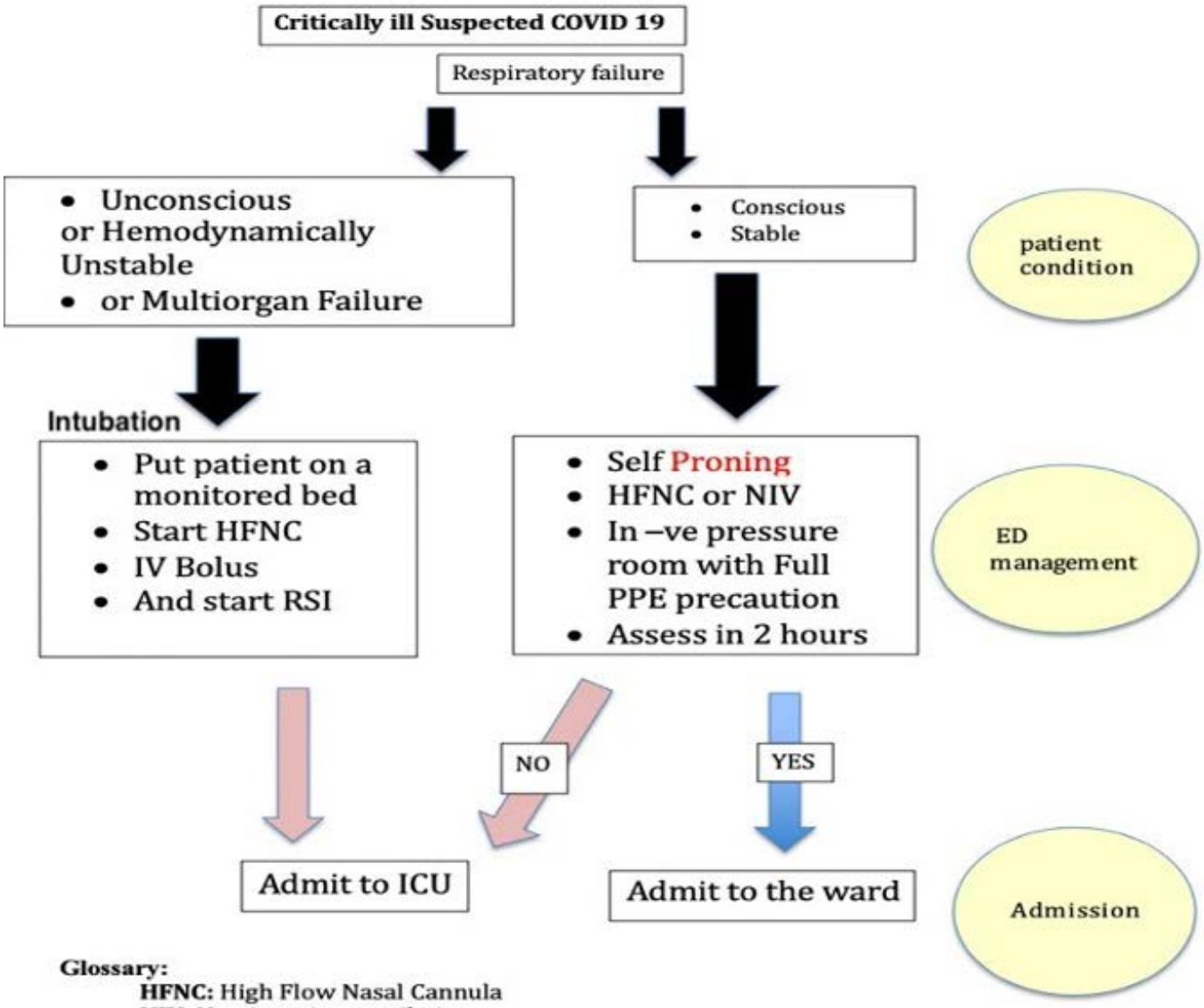
Clinical pathway for COVID 19 suspected patients with respiratory failure:



Glossary:

HFNC: High Flow Nasal Cannula
NIV: Non invasiva ventilation
RSI: Rapid sequence intubation
PPE: Personal protective equipment

IX. References

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