

## INTENSIVE CARE PREPAREDNESS AND MANAGEMENT FOR COVID-19

### 1. General planning

- a. Patients suspected or confirmed with COVID-19 needing intensive care shall be cared for in isolation rooms either in the Intensive Care Unit (ICU) or in designated isolation room identified in the individual hospital. However, once the capacity of the designated isolation rooms is reached, patients will be managed in the ICU of that hospital.
- b. Patients managed in designated isolation room that is not within the ICU, shall be nursed by the nursing staff from the intensive care unit.
- c. Ideally use airborne infection isolation room (AIIR) i.e. negative pressure isolation room with anteroom for confirmed or possible cases. In the event an AIIR is not available the patient should be placed in a single room with closed doors.
- d. When AIIR or single room capacity is exceeded, patients will be managed in the open ICU.
- e. Coordinate with hospital management and other healthcare professionals to ensure care of non-COVID patients requiring intensive care is managed in other critical care areas.

### 2. Management of patients in intensive care

- a. Coordinated and multidisciplinary management between the intensivist/anaesthesiologist, the infectious disease physician and the hospital administrator is important.
- b. The general management of COVID-19 patients should reflect routine intensive care practices including appropriate utilisation of ICU bed.
- c. Decision-making regarding admission into ICU and continued treatment should take into account likely benefit, potential harm and burden of treatment. Factors such as frailty, advanced illness or comorbidity may lessen the benefit and increase potential harm.

#### 2.1. Non-ventilatory support

- a. Start supplementary oxygen support using simple face mask or non-rebreathing mask if SpO<sub>2</sub> < 92%.

- b. In acute hypoxemic respiratory failure despite conventional oxygen therapy i.e. mild ARDS consider the use of high flow nasal cannula (HFNC) with close monitoring, airborne precautions and preferably use of single rooms. Use the lowest flow to main SpO<sub>2</sub> > 92%.
- c. Consider awake proning in selected patients who remain hypoxemic despite conventional oxygen therapy or HFNC. This is to be undertaken by trained staff with a clear monitoring plan, failure criteria and intubation criteria.
- d. Patients with worsening hypercapnia, acidemia, respiratory fatigue, hemodynamic instability or altered mental status should be considered for early invasive ventilatory support.

## **2.2. Ventilatory support**

- a. For patient receiving mechanical ventilation, a major focus is the avoidance of ventilator-induced lung injury (VILI) while facilitating gas exchange via lung-protective ventilation.
- b. Limit tidal volumes to 6-8ml/kg predicted body weight and plateau pressure to  $\leq 30\text{cmH}_2\text{O}$ .
- c. Prone positioning for at least 16 hours should be considered in severe ARDS i.e. P/F ratio < 100mmHg.
- d. Muscle paralysis may be considered in the early phase of severe hypoxemia in selected patients e.g. patients with ventilator dyssynchrony or in prone position.

## **2.3. Hemodynamic support**

- a. For acute resuscitation of patients in shock, measure dynamic parameters to assess fluid responsiveness.
- b. Administer fluids cautiously. A restrictive fluid administration strategy is generally recommended.
- c. Early use of vasoactive agent (e.g. noradrenaline) if patients remain in shock despite fluid therapy.
- d. Aim for MAP > 60 – 65 mmHg if there is evidence of inadequate tissue perfusion.

- e. ECHO is useful in guiding circulatory status and the diagnosis and management of shock

#### **2.4. Sedation**

- a. Aim for protocolised light sedation unless contraindicated.
- b. Use analgesia-first sedatives (fentanyl or morphine) in mechanically ventilated patients.
- c. If additional sedatives are required, non-benzodiazepines (propofol or dexmedetomidine) are preferred over benzodiazepines due to lower incidence of delirium.

#### **2.5. Nutritional therapy**

- a. Commence enteral nutrition within 24 – 48 hours upon ICU admission.
- b. Volume of enteral nutrition over the last 24-hour should be taken into consideration when maintaining fluid balance.

#### **2.6. Venous thromboprophylaxis**

- a. All patients should receive pharmacological prophylaxis with LMWH (e.g. SC enoxaparin 40mg daily) within 24 hours of admission unless contraindicated. In patients with creatinine clearance < 30ml/min, consider UFH 5000U q8H or q12H.
- b. Consider increasing prophylactic dosing of LMWH (e.g. SC enoxaparin q12H) or a larger dose once daily in severe COVID-19 patients. This decision should be considered on a case to case basis balancing both risk of thrombosis and bleeding. In patients with creatinine clearance <30ml/min, consider UFH.

#### **2.7. Stress ulcer prophylaxis**

- a. Administer stress ulcer prophylaxis in patients with risk factors i.e. mechanical ventilation >48 hours, coagulopathy, renal replacement therapy, acute liver failure and high dose steroids etc.

- b. Drugs used:
  - i. No previous GI ulcers: IV ranitidine
  - ii. Previous GI ulcers or on proton pump inhibitors: IV pantoprazole or omeprazole or
  - iii. esomeprazole
- c. Discontinue when risk factors have resolved and patient is tolerating enteral feeding

## **2.8. Glycemic control**

- a. Maintain blood glucose between 8 – 10mmol/L using protocolised insulin therapy.

## **2.9. Liberation from ventilatory support**

- a. Standard weaning protocol should be followed.
- b. HFNC or NIV may be considered post-extubation but must be provided with strict airborne precautions and preferably in a single room.

## **2.10. Early mobilisation**

- a. Assess patients within 24 – 48 hours of ICU admission for early mobilisation.
- b. Level of activity and mobilisation should be guided by the patient's conscious state, strength, and endurance as well as the assessment of safety.

## **2.11. Antibiotics, antivirals, and Immuno-modulatory treatment**

- a. Any empiric antibiotic therapy or antiviral therapy for influenza should be rapidly de-escalated or discontinued if there is no evidence of bacterial infection.
- b. Start IV dexamethasone 6mg daily for 7 – 10 days in patients requiring oxygen therapy including those mechanically ventilated. If dexamethasone is not available, the alternative is iv hydrocortisone 50mg 6hourly.

### 3. Infection prevention and control in ICU

#### 3.1. Personal Protective equipment (PPE)

- a. All healthcare workers (HCW) to wear designated scrubs.
- b. Alcohol-based hand rubs and disinfectants, gloves, gowns and mask shall be readily available.
- c. HCW must adhere to standard, contact and airborne precautions including the use of eye protection.
- d. Practice appropriate hand hygiene before and after all procedures.
- e. Personal protective equipment (PPE) shall be used before entering the room. This includes:
  - Fit-tested particulate respirator i.e. N-95 or higher level of protection
  - Head cover
  - Long sleeve, fluid resistant gown
  - Eye protection with face shield or goggles
  - Gloves
- f. Personal items are not allowed into the room. This includes rings, watches hand phones, pens etc.

#### 3.2. Healthcare workers (HCW)

- a. All HCW should receive education on the appropriate use of PPE.
- b. HCW should strictly follow the procedures for the wearing (donning) and the safe removal (doffing) of PPE in correct sequence.
- c. Limit the number of HCW present in the room to the minimum required without compromising care of the patient.
- d. HCW providing care to COVID-19 cases, to be actively monitored for development of symptoms and provided the appropriate care from occupational safety and health administration (OSHA).
- e. Hospitals should maintain a record of all HCW providing care for confirmed COVID-19 cases.

**3.3. Patient care equipment**

- a. Use disposable respiratory equipment wherever possible.
- b. Reusable equipment shall be disinfected in accordance with local policy and manufacturers guidelines.
- c. Items that cannot be appropriately cleaned and disinfected should be discarded upon patient transfer or discharge.

**4. Oxygen delivery devices and humidifiers**

- a. For non-intubated patients requiring oxygen therapy, non-humidified oxygen can be delivered via nasal prongs or simple face mask. These low flow oxygen systems do not need to be humidified.
- b. Generally higher the flow rate, greater the risk of aerosolization.
- c. The use of non-invasive ventilator or high flow nasal cannula also poses the risk of aerosolisation and therefore discourage to be used in open areas. If used, place patient in a negative pressure isolation room or in a single room.

**5. Tracheal intubation**

- a. Should be performed in a negative pressure isolation room whenever feasible. If this is not available, then a single room with doors closed should be used.
- b. Strictly adhere to the use of PPE.
- c. Whenever possible, only experienced doctors shall attempt intubation. (spread of infection at the time of intubation appears to be associated with difficult intubation and prolonged manual ventilation).
- d. Rapid sequence induction shall be used. Avoid awake fiberoptic intubation. Ensure the patient is adequately paralysed before attempting laryngoscopy.
- e. Consider using video laryngoscopy over direct laryngoscopy if available and the operator is trained in its use.
- f. A viral filter shall be fitted between the facemask and manual resuscitator bag.

- g. Minimise manual ventilation. If essential, it shall be carried out by two personnel; one holds the mask tightly against the patient's face while the other squeezes the bag gently.
- h. Inflate the cuff of endotracheal tube before ventilating the patient.
- i. Turn on the ventilator only when it is connected to the endotracheal tube.
- j. Re-sheath the laryngoscope immediately post intubation (double glove technique). Use disposable laryngoscope blades if available.
- k. Clean and disinfect procedure room immediately after the procedure.

## **6. Invasive ventilation**

- a. Ventilators shall be identified only for use of patients with COVID- 19.
- b. All ventilators shall be fitted with viral filter. The filter is to be placed between the distal end of the expiratory tubing and the ventilator.
- c. Use disposable breathing circuits.
- d. The ventilatory circuit shall not be disconnected unless absolutely necessary. If there is a need to disconnect the circuit, ventilators shall be put on either on standby mode or turned off temporarily. ETT may be clamped temporarily during disconnection.
- e. Do not change ventilatory circuits on a routine basis.
- f. Mechanical ventilation creates high gas flows. Tracheal cuff pressures should be checked frequently and kept inflated at pressures of 25- 30 cmH<sub>2</sub>O to create a good seal against the tracheal wall.
- g. Avoid water humidification.
- h. Use a heat and moisture exchanger with viral filter (HMEF) at the Y-piece of the breathing circuit.
- i. HMEF will need to be changed periodically. Each change results in patient circuit disconnection for a short period of time where expired airborne particles will not be filtered.

- j. Use closed in-line tracheal suctioning systems. Do not disconnect from ventilator and manually ventilate patients during suctioning. Instead apply 100% oxygen on the ventilator during suctioning.
- k. Use metered dose inhalers (MDI) instead of small volume nebuliser if nebulisation is required.
- l. Consider paralysing patients during bronchoscopy to minimise coughing.

**7. Aerosol-generating procedures (AGP)**

*(this includes tracheal intubation, extubation, open tracheal suctioning, tracheostomy care, bronchoscopy and CPR)*

- a. Avoid or minimise the performance of AGP without compromising patient care.
- b. Limit the number of HCW present during the procedure to only those essential for patient care and procedural support.
- c. AGP should ideally take place in a negative pressure isolation room.
- d. PPE worn during AGP include:
  - Fit-tested particulate respirator i.e. N-95 or Powered Air Purifying Respirator
  - Head cover
  - Long sleeve, fluid resistant gown
  - Eye protection with face shield or goggles
  - Gloves
- e. Clean and disinfect procedure room surfaces promptly after the procedure.

**8. Environmental cleaning**

- a. Staff engaged in environmental cleaning and waste management should wear the appropriate PPE.
- b. Increase frequency of cleaning high touch surfaces to at least every nursing shift.
- c. Cleaning and disinfection procedures must be followed consistently and correctly.



- d. Adhere to the terminal cleaning protocol in accordance to local policy for cleaning of the patient's room after discharge.

**9. Transport of patients**

- a. Transport outside the ICU should be avoided as much as possible. Risk of transport should be balanced against benefit.

**10. Visitors**

- a. Visitors should be kept to the absolute minimum.
- b. A register for visitors should be maintained.