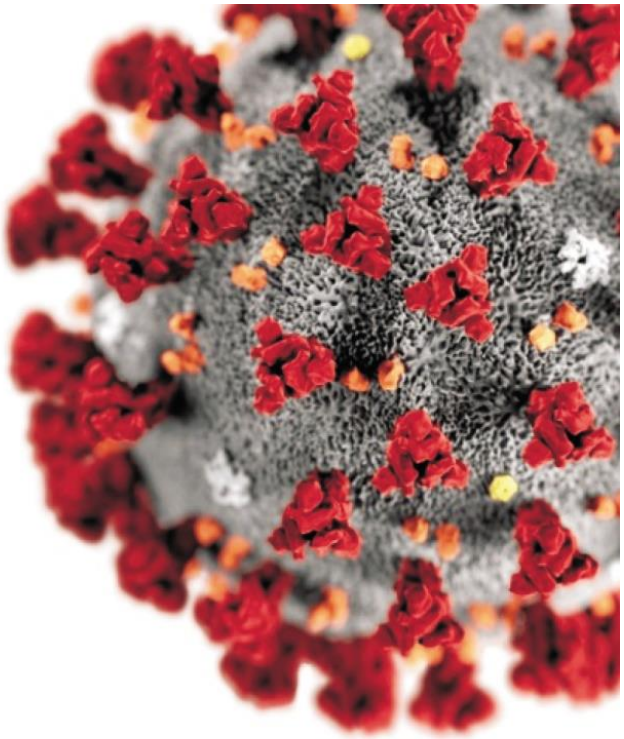

INTERIM

# **Pocket Book** of Clinical Management of **COVID-19** in Healthcare Setting 2077|01|11

Adapted from

**Interim Clinical Guidance for Caring of Patients with COVID-19 in Healthcare Settings**

Prepared by:


Government of Nepal
Ministry of Health and Population
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# PURPOSE OF THE POCKET BOOK

The purpose of this pocket book is to help physicians, other healthcare workers, to properly manage persons with suspected or proven COVID-19 and to bring similarity in case management throughout the country.

# TARGET GROUPS

The intended target audience are physicians, nurses, other healthcare personnel, involved in management of COVID-19 infection.

## 1. TRIAGING OF THE PATIENTS:

**A. Who should be screened?**

All persons including children and adults presenting to the outpatient clinics (OPD) and

Emergency Room (ER) should be screened at the entrance of the hospital in a triage area.

**B. How will the patients presenting to outpatient clinics (OPD) and Emergency Room (ER) be screened and handled?**

## 2. SCREENING QUESTIONNAIRE

All individuals presenting to the OPD or ER entrance should be screened with the following questions:

**a. Symptoms:** Do you have any of the following symptoms?

- Cough? Fever? Shortness of breath? (common)
- Sore throat, headache or body ache? (less common)

**b. Travel history or contact with traveler:** Have you?

- Recently returned from, travel in, or been living in, an affected area in the past 2 weeks?
- Been in close contact in the past 2 weeks with someone returning from an affected area?

**c. Exposures:** Did you have any exposures to any of the following in last 2 weeks?

- Close contact with anyone with fever or respiratory illness of unknown cause
- Known or suspected COVID-positive contact

## 3. TEMPERATURE

All persons presenting to the OPD or ER should be screened with thermometer on the temple of head following non-contact method. (If not a no-touch thermometer, it should be cleaned with 60-70% alcohol or an alcohol swab).

## 4. CASE DEFINITIONS

The criteria for treating someone as a suspected case **is subject to change** depending on the dynamics of the epidemic an d prevalence of cases inside and outside the country. Adapted from the most recent World Health Organization (WHO) criteria, with modifications, case definitions for COVID-19 *for clinical purposes at hospitals* will be as follows:

### 4.1 SUSPECTED CASE

A. A patient with fever or sign/symptoms of respiratory distress (cough or shortness of breath), AND a history of travel to or residence or close contact with a traveler from a location reporting community transmission of COVID-19 disease during 14 days prior to symptom onset;

OR

B. A patient with fever or sign/symptoms of respiratory distress (cough or shortness of breath), AND having been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset; (see definition of contact below)

OR

C. A patient requiring hospitalization for Severe Acute Respiratory Illness (SARI)

OR

D. A healthcare worker who provides direct care to patients and has developed fever OR cough OR shortness of breath

OR

E. A patient with fever or sign/symptoms of respiratory distress (cough or shortness of breath) without alternative explanation/diagnosis to the person's symptoms/signs? (such as congestive heart failure exacerbation, scrub typhus, malaria, Urinary Tract Infection, etc)

### 4.2 PROBABLE CASE

A. A suspected case for whom testing for the COVID-19 virus is inconclusive.

OR

B. A suspected case for whom testing could not be performed for any reason.

### 4.3 CONFIRMED CASE

A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

## 5. DEFINITION OF CONTACT:

A contact is a person who experienced any one of the following exposures during the 2 days before and the 14 days after the onset of symptoms of a probable or confirmed case:

1. Face-to-face contact with a probable or confirmed case within 1 meter and for more than 15 minutes;

OR

2. Direct physical contact with a probable or confirmed case;

OR

Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment;

OR

3. Other situations as indicated by local risk assessments. Note: for confirmed asymptomatic cases, the period of contact is measured as the 2 days before through the 14 days after the date on which the sample was taken which led to confirmation.

# TRIAGE AND **ISOLATION** OF PATIENTS

**Does the person have fever OR sign/symptom of respiratory disease (Cough or Shortness of breath)**

NO

Do not suspect COVID-19 Infection

YES

History of travel to or residence or close contact with a traveler from a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset

OR

Has been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset

OR

Requires hospitalization for Severe Acute Respiratory Illness (SARI)

Is the person a health care worker?

YES

NO

Is there an alternative explanation/diagnosis to the person's symptoms/signs? (such as congestive heart failure exacerbation, scrub typhus, malaria, urinary tract infection, etc.)

NO

YES

Do not suspect COVID-19 inflection

**COVID-19**
SUSPECT

**Severe Infection**
Pneumonia
ARDS
Sepsis/Shock

**Mild Infection**

Hemodynamically stable SpO2≥94% in room air not in respiratory distress

Admit/Isolate

Test -ve

Test +ve

Symptomatic Management

- Continue Isolation (>72hrs afebrile or at least 7 days of symptom onset or two negative tests 24 hrs apart)
- Admission in COVID ward if high-risk for severe disease**
- Contact and droplet precautions
- Symptomatic management

**Admit in isolation/covid wards**

- PR≥30 breaths/min
- SPO2≤93% in room air at rest
- PaO2/FiO2≤300mmHg
- SF ratio≤315 if ABG not available
- High risk for severe disease**

**Admit in ICU**

- Respiratory failure requiring MV
- Presence of shock
- Older patients (>60 years) with comorbidities
- PaO2/FiO2 ≤ 200 or SF ratio ≤ 235 with worsening respiratory distress

Test -ve

Test +ve

- Manage as per hosp protocol
- Repeat sampling if strong clinical suspicion

- Supplemental oxygen (Non-rebreathing mask @10-15lit/m)
- Intubate if worsening distress, SpO2<90%, PaO2/FiO2 <150
- NIV & HFNC to be used with caution, risk of aerosolisation
- Dry nebulisation (salbutamol MDI 4puffs with spacer) SOS
- Oseltamivir if influenza can't be ruled out
- Antibiotics if sepsis/bacterial pneumonia suspected
- Consider hydroxychloroquine if meets criteria
- Restrictive fluid strategy
- Ventilator management as per the ARDSnet protocol
- Use closed suction catheters and HME filters
- Consider proning/paralyzing agents early if PaO2/FiO2<150
- ECMO if feasible

**High risk of severe disease

- Age >60 yrs
- Cardiovascular disease including HTN
- DM & other immunocompromised conditions
- Chronic lung/kidney/liver/CNS diseases

**Discharge Criteria**

**Clinical**
Afebrile >72 hours without antipyretics
Improvement in respiratory symptoms/signs
More than 7 days since the onset of symptoms

**Laboratory**
Afebrile >72 hours
Negative RT-PCR from at least two specimens collected ≥ 24hrs apart

# USE OF PPE DURING CARE OF PATIENTS

## GUIDELINES FOR USE OF PERSONAL PROTECTIVE EQUIPMENT

(Developed by the Expert Team of NMC and Government of Nepal with reference from WHO, published on March 26, 2020)

**A. For Aerosol Generating procedures**:

Dental procedures, bronchoscopy, Upper GI Endoscopy, ENT procedures, Nebulization, Intubation of a patient, CPR, Non-invasive ventilation, endotracheal suctioning, when obtaining nasopharyngeal or oropharyngeal swab, etc. **in Covid-19 suspected or confirmed cases health personnel need to use the following protective equipment:**

a. N-95 mask
b. Goggles or visor
c. Gloves (loose gloves acceptable)
d. Water resistant OR standard disposable gowns
e. Cap: Regular disposable
f. Closed shoes/boots

**B. For Non aerosol generating covid-19 suspected or confirmed patients: Health personnel need to use the following protective equipment:**

a. Surgical mask (seal the top edge with tape) *
b. Goggles or visor
c. Gloves (loose gloves acceptable)
d. Water resistant or standard disposable gowns
e. Cap: Regular disposable

**C. For Physician/Staff running the fever/screening clinics the following PPE is recommended:**

a. Surgical mask, (seal the top edge with a tape) *
b. Goggles or visor
c. Water resistant or standard disposable gowns
d. Regular disposable Cap
e. Gloves (loose gloves acceptable)

**D. For escorts or drivers, the following PPE is recommended:**

a. Surgical masks
b. Gloves
c. If physical contact is expected, depending on circumstances, a gown PLUS goggles or face shield are also recommended, otherwise need to maintain minimum 2-meter distance from the patient.
d. The patient should be given surgical mask and instructed to perform hand-hygiene.₩

**E. For Laboratory staff; depending upon the chance of splash:**

a. surgical mask
b. Gown
c. Loose Gloves
d. Eye protection (if risk of splash)

**F. For all staff, including health care workers** involved in any activity that does not involve contact with COVID-19 patients and working in other areas of patient transit (e.g. wards, corridors). **No PPE required**.

**For Everyone:**

Maintain 3-6 feet distance while visiting patients, if no need to touch the patient.
Mandatory hand-hygiene after each use of PPE and between patients.

- Mandatory surface cleaning of bed or furniture with 0.5% Chlorine disinfectant (Virex* or similar) between each patient in OPD or in an inpatient setting.

***Use N-95 masks if close contact with COVID-19 suspect or confirmed case expected.**

# DISEASE CLASSIFICATION

The disease is classified into following categories according to the severity

1. **Mild Illness**
2. **Pneumonia**
3. **Severe pneumonia**
4. **ARDS**
5. **Sepsis**
6. **Septic shock**

| | |
|---|---|
| **Mild Illness** | • Patients uncomplicated upper respiratory tract viral infection may have non-specific symptoms such as fever, fatigue, cough (with or without sputum production), anorexia, malaise, muscle pain, sore throat, dyspnea, nasal congestion, or headache. Rarely, patients may also present with diarrhea, nausea, and vomiting (3, 11-13).<br>• The elderly and immunosuppressed may present with atypical symptoms. Symptoms due to physiologic adaptations of pregnancy or adverse pregnancy events, such as dyspnea, fever, GI-symptoms or fatigue, may overlap with COVID-19 symptoms. |
| **Pneumonia** | • **Adult** with pneumonia but no signs of severe pneumonia and no need for supplemental oxygen.<br>• **Child** with non-severe pneumonia who has cough or difficulty breathing + fast breathing: fast breathing (in breaths/min):<br>• <2 months: ≥ 60; 2–11 months: ≥ 50; 1–5 years: ≥ 40, and no signs of severe pneumonia. |
| **Severe pneumonia** | • **Adolescent or adult:** fever or suspected respiratory infection, plus one of the following: respiratory rate > 30 breaths/min; severe respiratory distress; or SpO2 ≤ 93% on room air (adapted from 14).<br>• **Child** with cough or difficulty in breathing, plus at least one of the following: central cyanosis or SpO2 < 90%; severe respiratory distress (e.g. grunting, very severe chest indrawing); signs of pneumonia with a general danger sign: inability to breastfeed or drink, lethargy or unconsciousness, or convulsions (15). Other signs of pneumonia may be present: chest indrawing, fast breathing (in breaths/min): < 2 months: ≥ 60; 2–11 months: ≥ 50; 1–5 years: ≥ 40 (16). While the |

| | |
|---|---|
| | diagnosis is made on clinical grounds; chest imaging may identify or exclude some pulmonary |
| **Acute respiratory distress syndrome** (ARDS) *(17-19)* | • **Onset:** within 1 week of a known clinical insult or new or worsening respiratory symptoms.<br>• **Chest imaging** (radiograph, CT scan, or lung ultrasound): bilateral opacities, not fully explained by volume overload, lobar or lung collapse, or nodules.<br>• **Origin of pulmonary infiltrates:** respiratory failure not fully explained by cardiac failure or fluid overload. Need objective assessment (e.g. echocardiography) to exclude hydrostatic cause of infiltrates/oedema if no risk factor present.<br>• **Oxygenation impairment in adults** *(17, 19):*<br>o Mild ARDS: 200 mmHg < PaO2/FiO2[a] ≤ 300 mmHg (with PEEP or CPAP ≥ 5 cmH2O, or non-ventilated)<br>o Moderate ARDS: 100 mmHg < PaO2/FiO2 ≤ 200 mmHg (with PEEP ≥ 5 cmH2O, or non-ventilated)<br>o Severe ARDS: PaO2/FiO2 ≤ 100 mmHg (with PEEP ≥ 5 cmH2O, or non-ventilated)<br>o When PaO2 is not available, SpO2/FiO2 ≤ 315 suggests ARDS (including in non-ventilated patients).<br>• **Oxygenation impairment in children:** note OI = Oxygenation Index and OSI = Oxygenation Index using SpO2. Use PaO2-based metric when available. If PaO2 not available, wean FiO2 to maintain SpO2 ≤ 97% to calculate OSI or SpO2/FiO2 ratio:<br>o Bilevel (NIV or CPAP) ≥ 5 cmH2O via full face mask: PaO2/FiO2 ≤ 300 mmHg or SpO2/FiO2 ≤ 264<br>o Mild ARDS (invasively ventilated): 4 ≤ OI < 8 or 5 ≤ OSI < 7.5<br>o Moderate ARDS (invasively ventilated): 8 ≤ OI < 16 or 7.5 ≤ OSI < 12.3<br>• **Severe ARDS (invasively ventilated): OI ≥ 16 or OSI ≥ 12.3.** |

[a] If altitude is higher than 1000 m, then correction factor should be calculated as follows: PaO2/FiO2 x barometric pressure/760.

| | |
|---|---|
| **Sepsis** *(5, 6)* | • **Adults:** life-threatening organ dysfunction caused by a dysregulated host response to suspected or proven infection.[b] Signs of organ dysfunction include: altered mental status, difficult or fast breathing, low oxygen saturation, reduced urine output (5, 20), fast heart rate, weak pulse, cold extremities or low blood pressure, skin mottling, or laboratory evidence of coagulopathy, thrombocytopenia, acidosis, high lactate, or hyperbilirubinemia.<br><br>• **Children:** suspected or proven infection and ≥ 2 age- based systemic inflammatory response syndrome criteria, of which one must be abnormal temperature or white blood cell count. |
| **Septic shock** *(5, 6)* | • **Adults:** persisting hypotension despite volume resuscitation, requiring vasopressors to maintain MAP MAP ≥ 65 mmHg and serum lactate level > 2 mmol/L.<br><br>• **Children:** any hypotension (SBP < 5th centile or > 2 SD below normal for age) or two or three of the following: altered mental state; tachycardia or bradycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children); prolonged capillary refill (> 2 sec) or feeble pulse; tachypnoea; mottled or cool skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia (21). |

[b] The SOFA score ranges from 0 to 24 and includes points related to six organ systems: respiratory (hypoxemia defined by low PaO2/FiO2); coagulation (low platelets); liver (high bilirubin); cardiovascular (hypotension); central nervous system (low level of consciousness defined by Glasgow Coma Scale); and renal (low urine output or high creatinine). Sepsis is defined by an increase in the sepsis-related SOFA score of ≥ 2 points. Assume the baseline score is 0 if data are not available *(22)*.

Abbreviations: ARI acute respiratory infection; BP blood pressure; bpm beats/minute; CPAP continuous positive airway pressure; FiO2 fraction of inspired oxygen; MAP mean arterial pressure; NIV non-invasive ventilation; OI Oxygenation Index; OSI Oxygenation Index using SpO2; PaO2 partial pressure of oxygen; PEEP positive end-expiratory pressure; SBP systolic blood pressure; SD standard deviation; SIRS systemic inflammatory response syndrome; SOFA sequential organ failure assessment; SpO2 oxygen saturation.

### Who is at high risk of developing severe illness?

- Age ≥60 years
- Underlying Cardiovascular disease including hypertension, Diabetes, Chronic Respiratory Disease including Asthma
- Other conditions like End Stage Renal Disease, Hepatic disorders, Blood disorders, Neurological disorders, Immune suppressed like HIV, chemotherapy
- Oxygen Saturation ≤93% on room air **or** Respiratory Rate ≥ 24/min
- Lab findings like D-Dimer > 1µg/ml in patients with respiratory illness

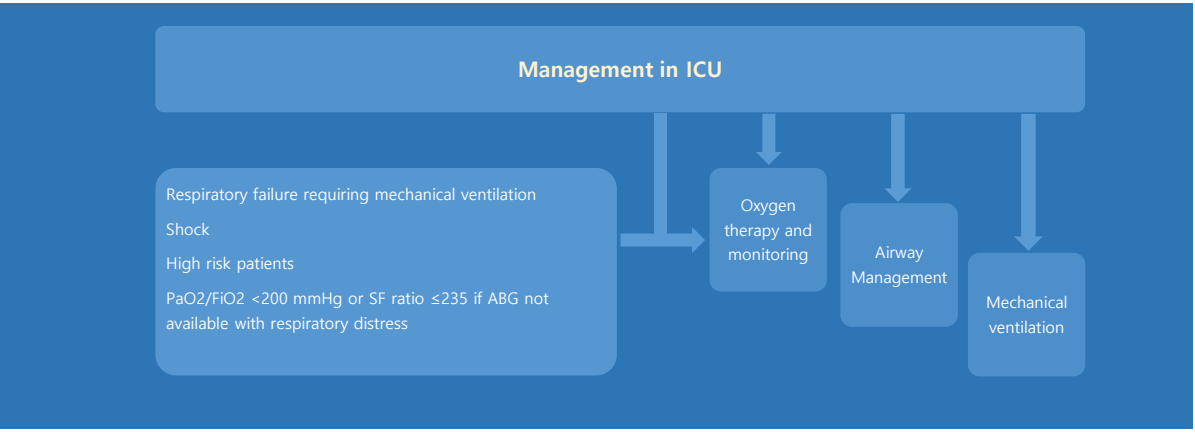
### How will mild COVID-19 be managed?

- Isolation in hospitals (As per government policy currently)
- Symptomatic treatment with Paracetamol
- AVOID NEBULIZATION, but if required, use DRY NEBULIZATION with all precautions

### How will severe COVID-19 including pneumonia be managed?

*(See criteria for severe pneumonia in the table)*

**Management of Severe COVID-19 (refer to Table for criteria of severity)**




*Please refer to Interim Clinical Guidance for COVID-19, page 11 for details*

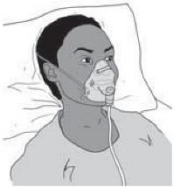
# HOW TO GIVE OXYGEN

## How to deliver increasing oxygen

Place prongs inside the nostril.
Hook tubing behind ears.
Flow rates higher than 5 litres will dry mucous membranes.

- Start **oxygen at 5 litres/ minute**
- Use nasal prongs
- Assess response

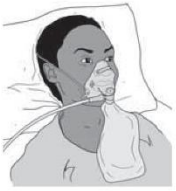
- **If increasing respiratory distress or $SpO_2$ <90**



Secure mask firmly on face over nose and mouth.
Pull strap over head.

- Use face mask
- **Increase oxygen to 6–10 litres/ minute**
- Assess response

- **If increasing respiratory distress or $SpO_2$ <90**



Make sure bag is full to deliver highest oxygen concentration.
An empty bag is dangerous.

- Use face mask with reservoir
- Increase oxygen to 10–15 litres/minute
- Make sure bag inflates
- Call for help from district clinician
- Assess response

- **If increasing respiratory distress or $SpO_2$ <90**

**or**

- **If not improving with BVM on high flow oxygen**

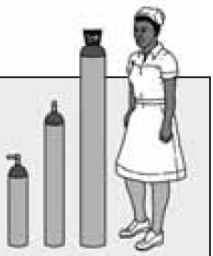
- Consider Critical Care or Refer to Higher Center

*Figure 1: Oxygen Delivery to Sick Patient*

**LITRES IN FULL $O_2$ TANK**

**BY HEIGHT OF TANK/CYLINDER LETTER**

*Rate of oxygen administration:*
*Top row: How long will a tank of this size last.*
*Bottom row: How many tanks required for 24 hours of oxygen administration.*



| Rate of oxygen administration for one patient | $O_2$ tank **C** 170 litres 14 inches | $O_2$ tank **D** 340 litres 18 inches | $O_2$ tank **E** 680 litres 31 inches | $O_2$ tank **F** 1360 litres 34 inches | $O_2$ tank **G** 3400 litres 49 inches | $O_2$ tank **J** 6800 litres 57 inches |
|---|---|---|---|---|---|---|
| **2 litres/min** | 1 hr 25 min | 2 hr 50 min | 5 hr 40 min | 11 hr 20 min | 28 hr 20 min | 56 hr |
| | 16 tanks | 8 ½ tanks | 4 tanks | 2 ½ tanks | 1 tank | ½ tank |
| **5 litres/min** | 34 min | 1 hr 8 min | 2 hr 16 min | 4 hr 30 min | 11 hr 20 min | 23 hr |
| | 48 tanks | 21 tanks | 10 tanks | 5 tanks | 2 tanks | 1 tank |
| **8 litres/min** | 21 min | 42 min | 1 hr 24 min | 2 hr 50 min | 7 hr | 14 hr |
| | 72 tanks | 34 tanks | 17 tanks | 8 tanks | 4 tanks | 2 tanks |
| **10 litres/min** | 17 min | 34 min | 1 hr 8 min | 2 hr 16 min | 5 hr 40 min | 11 hr |
| | 96 tanks | 42 tanks | 21 tanks | 10 tanks | 4 tanks | 2.2 tanks |

*Figure 2: Guidance on oxygen tank and consumption*

## Treatment of Co-infections:

Ceftriaxone or Amoxycillin-Clavulanic Acid if Bacterial Pneumonia or sepsis suspected

- Add Azithromycin for atypical coverage of pneumonia;
    - Substitute with Doxycycline if allergic to macrolides or if hydroxychloroquine is initiated.
- Add Oseltamivir if influenza cannot be ruled out or test is positive.
- When viral etiology confirmed, **empiric antibiotic therapy should be deescalated or stopped** on the basis of microbiology results and clinical judgement.

## Fluid Management

- Restrictive fluid to ensure tissue perfusion
- Closely monitor **fluid Intake/ Output**

## DVT Prophylaxis

- If no contraindications using Enoxaparin, Dalteparin, Fondaparinux or
- Unfractionated Heparin.

**Management of ARDS in Adults (PaO2/ FiO2< 150mm Hg)**

- Endotracheal intubation followed by mechanical ventilation following all precautions
- Early Proning within 12 hours without pulmonary vasodilator trial for adults- for 12-16 hours per day (needs experienced team to carry out this)
    - Contraindicated in spinal cord injury and open chest
- Titrate PEEP and FiO2
- Adopt permissive hypercapnia (Target pH> 7.2)
- Conservative Fluid Management without tissue hypoperfusion
- Use Closed suction catheter for airway suctioning and clamp Endotracheal tube while disconnecting. Consider paralysis during airway manipulation
- Use Ventilator Bundle strictly (Appendix 6, Interim Clinical Guidance for COVID-19)
- Avoid continuous sedation and neuromuscular block when possible

*(Refer to Appendix 5 of Interim Clinical Guidance for COVID 19 for management of refractory hypoxemia and ventilator adjustment)*

### Management of ARDS in Children

- Target: Plateau Pressure < 28 cmH2O and pH: 7.15- 7.30
- Adapt Tidal Volumes to disease severity
- Early proning for extended duration (24-48 hours) may be needed
- Restrictive fluid strategy
    - If signs of fluid overload, diuresis with Furosemide may be needed
- Strict Intake/ output monitoring with Foley catheter recommended

### Management of Septic Shock

*(Refer to Interim Clinical Guidance for COVID 19 for more details)*

<table>
<tr><th></th><th>Adults</th><th>Children</th></tr>
<tr><td rowspan="2">Fluid</td><td>500 ml of Normal Saline or Ringer's Lactate as rapid bolus in first 15 minutes reassessing signs of fluid overload after each bolus</td><td>10-20ml/kg Normal Saline or Ringer's Lactate as a bolus in the first 30 minutes and reassess signs of fluid overload after each bolus</td></tr>
<tr><td colspan="2">If no response or fluid overload happens reduce or discontinue fluid administration</td></tr>
<tr><td>Vasopressors- when shock persists during or after fluid resuscitation</td><td>Target: MAP≥65 mmHg and improvement in markers of perfusion<ul><li>Norepinephrine (Drug of choice)</li><li>Add Epinephrine and/or Vasopressin if required</li></ul></td><td><ul><li>Epinephrine (Drug of choice)</li><li></li></ul></td></tr>
<tr><td>Antibiotics</td><td colspan="2"><ul><li>As described above</li></ul></td></tr>
</table>

### Management of Pregnant and lactating women

- Pregnant women are **NOT** at higher risk or at risk of severe illness.
- **There is little evidence** of mother-to-child transmission when infected in 3rd trimester.
- SARS-CoV-2 **not been** identified in breastmilk of infected mothers.

- Counsel on safe infant feeding and appropriate infection prevention measures to prevent COVID-19 virus transmission.

- Infants born to mothers with suspected, probable, or confirmed COVID-19 should be fed according to standard infant feeding guidelines, while applying necessary precautions for infection prevention and control
- Symptomatic mothers who are breastfeeding or practicing skin-to-skin contact or kangaroo mother care should practice respiratory hygiene, including during feeding perform hand hygiene before and after contact with the child, and routinely clean and disinfect surfaces which the symptomatic mother has been in contact with.
    - If required, expressed breast milk can be used

## Antivirals

There is no currently proven antiviral medication for COVID-19. These therapeutic strategies are based on collective clinical experience and anecdotal usage in other countries dealing with epidemic. These drugs should be used only in consultation with experts, whenever possible.

Prophylaxis with Chloroquine or Hydroxychloroquine for healthcare workers is **NOT** supported by clinical evidence as of now.

**Convalescent plasma**

- Wait for the guidance from Ministry of Health and Population

**Antihypertensive medications:**

Continue to take ACEI/ARB unless they develop hypotension.

**Management of myocarditis:**

Refer to cardiologist for appropriate management.

**Nutritional Support:**

- Start enteral feeding early.
- Nasogastric or orogastric tube feeding in intubated patients
- Consider parenteral nutrition if enteral feeding is not tolerated despite prokinetics use or if enteral feeding is contraindicated.

### Extracorporeal membrane oxygenation (ECMO) therapy:

In patients with refractory hypoxemia in spite of management including lung protective mechanical ventilation and prone positioning.

### Criteria for discharge

Meet both clinical and laboratory criteria. Patients must continue home isolation for 2 additional weeks.

- Clinical criteria:
  - Resolution of fever >72 hours without antipyretics, **and**
  - Improvement in respiratory signs and symptoms (cough, shortness of breath and oxygen requirement), **and**
  - At least 7 days have passed since the initial onset of symptoms
- Laboratory criteria:
  - Negative results for COVID-19 nucleic acid (PCR) testing from at least 2 respiratory tract specimens collected ≥ 24 hours apart

### Home Isolation:

- Continue 2 weeks of isolation at home after discharge.
- They should be provided with a surgical mask as available at the time of discharge and instructed about appropriate precautions to be taken at home.

# CRITICAL CARE MANAGEMENT INCLUDING VENTILATOR

Critical care management including ventilator adjustment and Adapted from Brigham and Women's Hospital COVID-19 Critical Care Clinical Guidelines

**Ventilator adjustment and daily management**

**Changing ventilation parameters**

1. Follow ARDSnet ventilation recommendations where possible:
   Tidal volumes should be 4-6 cc/kg using IBWto minimize volumes (and thus ventilator-associated injury).
2. Minute ventilation (respiratory rate x tidal volume) typically drives pH and PCO2: Titrate ventilator parameters to pH, not PCO2.
   - To achieve low tidal volumes, tolerate hypercapnia (functionally no limitation unless clinical sequelae) and acidemia (pH > 7.2).
   - Because tidal volumes are low, the respiratory rate often has to be high to accommodate; typical RR is 20-35 breaths/minute.
3. pH goal is normally 7.25-7.45:
   - If pH > 7.45, decrease respiratory rate
   - If pH 7.15-7.30, then increase respiratory rate until pH > 7.30, or PaCO2 < 25 (maximum RR= 35 breaths/minute)
   - If pH < 7.15, then increase respiratory rate to 35 breaths/minute If pH still < 7.15, then perform the following:
     a. Tidal volume may be increased by 1 mL/kg until pH > 7.15 (until plateau pressure reaches 30 cm H2O or tidal volume reaches 8 ml/kg)
     b. Deep sedation advancing to RASS -5 if needed
     c. If no improvement, initiate continuous paralysis
     d. If still no improvement, initiate prone ventilation (may improve V/Q matching and better ventilation)

**Changing oxygenation parameters**

1. Minimize oxygen toxicity: PEEP and Fi02 drive oxygenation

- The goal is to deliver a partial pressure of oxygen to perfuse tissues (PaO2 > 75, Sp02 >92%) while limiting lung injury from high distending pressures (Ppl< 30) and hyperoxia (FiO2 < 75, SpO2 < 96%)
- Lower limit goals for PaO2 / SpO2 are widely debated; PaO2 > 55 and SpO2 >88% are also commonly used.

2. Optimize PEEP:
    - Initial PEEP should be set as explained in the PEEP table below.
3. Adjust Fi02:
    - Adjust Fi02 after optimizing PEEP.
    - Goal FiO2 < 75%; if FiO2 > 75%; patient requires ventilator optimization.
    - It is reasonable to put a desaturating patient temporarily on 100% Fi02, but remember to wean oxygen as rapidly as possible
4. Check plateau pressure:
    - Check plateau pressure with every change in tidal volume, PEEP, or clinical deterioration (worsening oxygenation) but not as part of routine practice
    - If plateau pressure is > 30 cm H20, then decrease tidal volume by 1 ml/kg (minimum 4 mL/kg).
    - If plateau pressure is < 25 H20 and tidal volume < 6 mL/kg, then increase tidal volume by 1 mL/kg until plateau pressure is > 25 cm H2O or tidal volume = 6 mL/kg.
    - If plateau pressure is < 30 cm H20 and patient is breath stacking or dyssynchronous, then increase tidal volume in mL/kg increments to 7 mL/kg or 8 mL/kg so long as plateau pressure is < 30 cm H20.

# REFRACTORY HYPOXEMIA PATHWAY

If patient is hypoxic (Pa02 <55) on Vt = 6 ml/kg, ideal PEEP and Fi02 >75%, perform the following in this order:

1. Optimize volume status by diuresis or RRT if possible.
   *If no improvement, then:*
2. Deep sedation, advancing to RASS -5 if needed.
   *If no improvement, then:*
3. Initiate continuous paralysis using available paralyzing agents, titrated to patient-ventilator synchrony).
   *If no improvement then:*
4. Initiate prone ventilation (see below); high consideration for use early in severe ARDS (<36 hours from ARDS onset, start discussion of proning when P:F< 150, prone within 12 hours of FiO2 > 75%)
   *If no improvement then:*
5. Consider ECMO if available

| Titrate FiO2 and PEEP for oxygenation for BMI<35 as per the ARDSnet LOW PEEP table | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FiO2 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 |
| PEEP | 5 | 5 | 8 | 8 | 10 | 10 | 10 | 12 | 14 | 14 | 14 | 16 | 18 | 18-24 |

| Titrate FiO2 and PEEP for oxygenation for BMI>35 as per the ARDSnet HIGH PEEP table | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FiO2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.5-0.8 | 0.8 | 0.9 | 1.0 | 1.0 |
| PEEP | 5 | 8 | 10 | 12 | 14 | 14 | 16 | 16 | 18 | 20 | 22 | 22 | 22 | 24 |

### Ventilator Bundle

Head-of-bed elevation 30 - 45°
Daily sedative interruption
Daily spontaneous breathing trial
Deep vein thrombosis prophylaxis
Stress ulcer prophylaxis (in patients with high risk of gastrointestinal bleeding)
Subglottic secretion drainage in patients likely to be ventilated for more than 48 hours

Government of Nepal
Ministry of Health and Population
Department of Health Services
Epidemiology and Disease Control Division