



**THE UNITED REPUBLIC OF TANZANIA**  
**MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND**  
**CHILDREN**

**CORONAVIRUS DISEASE 2019 (COVID-19) TREATMENT GUIDELINE**

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## TABLE OF CONTENTS

FOREWORD.....	iii
1. INTRODUCTION .....	1
2. SCREENING AND TRIAGING .....	2
3. INITIAL PATIENT APPROACH .....	4
4. IPC IMPLEMENTATION MEASURES .....	5
5. INVESTIGATION AND TREATMENT OF COVID-19 .....	10
6. RESPIRATORY MANAGEMENT FOR COVID-19 PATIENT .....	2
7. MECHANICAL VENTILATION .....	7
8. NURSING CARE AND MONITORING .....	9
9. PHYSIOTHERAPY GUIDE IN MANAGEMENT OF COVID-19 PATIENTS.....	11
10. NUTRITIONAL RECOMMENDATIONS FOR COVID-19 .....	24
11. PSYCHOSOCIAL INTERVENTIONS.....	27
12. SPECIAL GROUPS.....	30
12.1 MATERNAL, NEWBORN AND CHILD HEALTH SERVICES IN COVID-19.....	30
12.2 SURGERY AND PROCEDURES IN CONTEXT OF COVID-19.....	39
12.3 COMORBIDITIES IN THE CONTEXT OF COVID-19.....	44
12.4 CARE OF THE ELDERLY PEOPLE WITH COVID-19 .....	46
12.5 PSYCHIATRY AND MENTAL ILLNESS IN CONTEXT OF COVID-19.....	47
13. DISCHARGE AND FOLLOW UP .....	48
14. ANNEXES .....	50
Annex 1: Triage form for health facility (adults) .....	50
Annex 2: Triage form for health facility under-fives (<5yrs) .....	51
Annex 4: IPC interventions to be considered during care of COVID-19 patients .....	54
Annex 6: Respiratory support algorithm .....	62
References .....	63

## **FOREWORD**

COVID-19 patient care can be established in all levels, either at the community or in health facility based on the disease severity; starting with primary health care, regional referral hospitals, up to National levels. COVID-19 patient care is for suspected or confirmed cases and should follow the national recommended guidelines for optimal quality of care.

To enable prompt and effective management of COVID-19 patients, availability of all necessary commodities, supplies and equipment in the healthcare facilities is required. In line with the above, health care workers need to be oriented to ensure proper case management and infection control at all levels, which will enable early detection of cases, proper management which will ultimately minimize the rate of complications. In this regard, I urge all health care workers to be observant of signs and symptoms of COVID-19 among patients as spelt clearly in this guideline and adhere to the standard and additional precautions of infection prevention and control during care.

This guideline will facilitate a standardized case management at all levels for all health facilities both public and private. It also clearly outlines the steps needed in management of COVID-19 cases of different severity based on the capacity of a particular facility.

I therefore urge all health care providers to use this guideline for early detection, isolation and effective management of COVID-19. It should also be understood that, this guideline will be reviewed from time depending on situations changes including the various research results and feedback from users.

  
Prof. Abel N. Makubi  
PERMANENT SECRETARY (HEALTH)

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Moreover, I am highly thankful to the technical experts from Emergency Preparedness and Response Unit (EPRU) and the Directorate of Curative Services (DCS) for coordinating the development of this protocol. It is my expectation that this Protocol will provide a guidance on early detection of suspect cases, triaging, isolation and management of cases holistically for both public and private facilities in the country, aiming at providing optimal care which will ultimately lead to early recovery and reduce related complications in conjunction to a number of efforts being undertaken towards disease containment.



Dr. Aifello W. Sichele  
**CHIEF MEDICAL OFFICER**

## 1. INTRODUCTION

The guidance in this document is based on proper case management aspects intended for clinicians involved in the care of patients with suspected or confirmed COVID-19. It is not meant to replace clinical judgment or specialist consultation but rather to strengthen frontline clinical management and the public health response. Considerations for special and vulnerable populations, such as pediatric patients, older people and pregnant women, are highlighted throughout this guideline.

This guideline emphasizes on a coordinated COVID-19 care pathway that's multidisciplinary whereby a patient enters after being screened for COVID-19 and becomes a suspect COVID-19 case, and follows the continuum of care until release from the pathway. The objective is to ensure delivery of safe and quality care while stopping onwards-viral transmission. All others enter the health system in the non-COVID-19 pathway.

Basic psychosocial interventions are essential for supporting the emotional wellbeing of people who have COVID-19, those who have lost someone due to COVID-19, or are family members and carriers who are caring for someone with COVID-19 or have recovered from COVID-19.

Current practice to treat COVID-19 is variable reflecting large-scale uncertainty. Numerous clinical trials are underway looking at various interventions that will inform clinical practice. Providing trustworthy guidance that is comprehensive and holistic for the optimal care of COVID-19 patients, throughout their entire illness, is necessary. The previous version of the *Clinical management of COVID-19* provided recommendations that can be applied when caring for patients during the COVID-19 care pathway

### 1.1. Disease pathophysiology (time course of the disease)

- *Phase I:* Asymptomatic phase (0-5<sup>th</sup> day of the disease progression)
- *Phase II:* Symptomatic; Fever (not frequently reported, but night chills), general body malaise, loss of smell (anoxia), sore throat, muscle pain, back pain, loss of taste (ageusia), headache, cough and diarrhea, vomiting (5<sup>th</sup> to 11<sup>th</sup> day of the disease progression).
- *Phase III:* early pulmonary phase; shortness of breath, (11<sup>th</sup> to 14<sup>th</sup> day of the disease progression)
- *Phase IV:* Pulmonary phase; progressive hypoxia (14<sup>th</sup> day to 28<sup>th</sup> of the disease progression)

## 2. SCREENING AND TRIAGING

- The primary goal of the COVID-19 response is to slow and stop transmission by case Identification, sort and test every suspect case, and provide timely appropriate care to prevent adverse complications and death.
- The recommended location of care will depend on disease severity and be either at a designated health facility or at home. Screening should be done at the entry point of the health facility.
- Health care workers should be on appropriate Personal Protective Equipment (PPE) and any patient being attended should have a mask on and offset face-to-face position or maintain at least one (1) meter between Health Care Worker (HCW) and a patient.
- During the screening, adhere to respectful and compassionate care, ensure privacy, ask open-ended questions, use language understood by the patient, communicate with the contact tracing team and collect collateral information from family members.
- Triage should be done quickly to identify patients who need emergency treatments based on disease severity to optimize patient outcomes (*see table 1 below*), and standardized triage tools should be used. *See Annex 1, 2 &3*

### Symptoms associated with COVID-19

Presenting signs and symptoms of COVID-19 vary widely among patients.

- In general, the majority of patients will present with fever (83–99%), cough (59–82%), fatigue (44–70%), anorexia (40–84%), shortness of breath (31–40%) and myalgias (11–35%).
- In other cases, patients will have non-specific clinical signs such as sore throat, nasal congestion, headache, diarrhea, nausea and vomiting. In several cases loss of smell (anosmia) or loss of taste (ageusia) preceding the onset of respiratory symptoms is a well-documented clinical presentation.
- In some special populations (elderly and immunosuppressed), they may present with atypical symptoms such as fatigue, reduced alertness, reduced mobility, diarrhea, loss of appetite, delirium, and absence of fever.
- Children might not have reported fever or cough as frequently as adults.

**Table 1. Triage according to the severity of COVID-19 Patient**

Disease severity	Triage parameters
[Non-severe COVID-19]	This will include all patients without features of severe or critical COVID-19.
[Severe COVID-19]	<p>Any patient with clinical symptoms and signs of pneumonia with any of the following</p> <ol style="list-style-type: none"> <li>1. Oxygen saturation &lt;90% on room air;</li> <li>2. Respiratory rate               <ol style="list-style-type: none"> <li>a. &gt; 30 breaths/min in adults and children &gt; 5 years' old;</li> <li>b. <math>\geq</math> 60 breaths/min in children &lt; 2 months old</li> <li>c. <math>\geq</math> 50 in children 2–11 months old;</li> <li>d. and <math>\geq</math> 40 in children 1–5 years old;</li> </ol> </li> <li>3. Signs of severe respiratory distress (accessory muscle use, inability to complete full sentences, and, in children, very severe chest wall in drawing, grunting, central cyanosis, or presence of any other general danger signs).</li> </ol>
[Critical COVID-19]	<p>Any patient with clinical symptoms and signs of pneumonia with any of the following:</p> <ul style="list-style-type: none"> <li>▪ <b>ARDS</b> (fulfill all 3 criteria)           <ol style="list-style-type: none"> <li>1. New-onset respiratory symptoms</li> <li>2. Bilateral pulmonary infiltrates (chest x-ray and ultrasound)</li> <li>3. Symptoms not explained by cardiac disease or fluid overload</li> </ol> </li> <li>▪ <b>Sepsis (qSOFA score):</b> <ol style="list-style-type: none"> <li>1. Altered mental status (GCS &lt; 15)</li> <li>2. SBP &lt;100</li> <li>3. RR &gt;22</li> </ol> </li> <li>▪ <b>Septic Shock:</b> Persistent hypotension despite volume resuscitation, requiring vasopressors to maintain MAP <math>\geq</math> 65 mmHg and serum lactate level &gt; 2mmol/L.</li> <li>▪ <b>Acute thrombosis:</b> Acute venous thromboembolism (i.e. Pulmonary embolism), acute coronary syndrome, acute stroke</li> </ul>

### 3. INITIAL PATIENT APPROACH

Infection prevention and control (IPC) is a critical and integral part of the clinical management of patients. Before commencing the assessment, the healthcare worker conducting the assessment must ensure the implementation of IPC measures for patients with suspected or confirmed COVID-19 at all times.

*In summary*, health care providers attending patients with suspected or confirmed COVID-19 must apply standard precautions according to risk assessment for all patients, at all times, when providing any diagnostic and care services. Appropriate precautions include wearing appropriate personal protective equipment (PPE), ensuring the suspected patient is wearing a mask and directed to a designated area for care, as well as keeping an appropriate distance (of at least 1 metre) between patients (*For more details on IPC measures see section 12 below*).

The ABCDE approach provides a framework for the systematic and organized evaluation of acutely ill patients to rapidly identify and intervene for life-threatening conditions:

- **A** – Airway: check for and correct any obstruction to the movement of air into the lungs
- **B** – Breathing: ensure adequate chest movement, check oxygen saturation and respiratory rate.
- **C** – Circulation: evaluate whether there is adequate perfusion to deliver oxygen to the tissues; check for signs of life-threatening bleeding, check pulse rate and blood pressure
- **D** – Disability: assess conscious level with AVPU or Glasgow Coma Scale and assess brain and spine functions, check glucose if GCS <15 or if a patient is weak.
- **E** – Exposure: identify all injuries and any environmental threats and avoid hypothermia

If any of the vital signs are severely deranged, the patient should be regarded as severe or critical and care should be provided immediately and without delay.



#### 4. IPC IMPLEMENTATION MEASURES

IPC is a critical and integral part of clinical management of patients and should be initiated at the point of entry of the patient (Out Patient Department /Emergency department). Standard precautions should always be routinely applied in all areas of health care facilities.

Standard precautions include;

- Hand hygiene
- Use of PPE to avoid direct contact with patients’ blood, body fluids, secretions (including respiratory secretions) and non-intact skin.
- Appropriate handling of sharps
- Safe waste management; cleaning and disinfection of equipment; and
- Cleaning of the environment.

**Table 2. How to implement infection prevention and control measures for patients with suspected or confirmed COVID-19 infection.**

At triage	<ul style="list-style-type: none"> <li>• Give suspect patient a medical mask and direct patient to separate area, isolation room if available.</li> <li>• Keep at least 1-2meter distance between suspected patients and other patients.</li> <li>• Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow for others.</li> <li>• Perform hand hygiene after contact with respiratory secretions</li> </ul>
Apply droplet precautions	<p>Droplet precautions prevent large droplet transmission of respiratory viruses.</p> <ul style="list-style-type: none"> <li>• Use a medical mask if working within 1-2 meter of the patient.</li> <li>• Place patients in single rooms.</li> <li>• If an etiological diagnosis is not possible, group patients with similar clinical diagnosis and based on epidemiological risk factors, with a spatial separation using examination screens.</li> <li>• When providing care in close contact with a patient with respiratory symptoms (e.g. coughing or sneezing), use eye</li> </ul>

	<p>protection (face-mask or goggles), because sprays of secretions may occur.</p> <ul style="list-style-type: none"> <li>• Limit patient movement within the institution and ensure that patients wear medical masks when outside their rooms.</li> </ul>
Apply contact precautions	<p>Droplet and contact precautions prevent direct or indirect transmission from contact with contaminated surfaces or equipment (i.e. contact with contaminated oxygen tubing).</p> <ul style="list-style-type: none"> <li>• Use PPE (N95, eye protection, gloves and gown) when entering room and remove PPE when leaving.</li> <li>• If possible, use either disposable or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers).</li> <li>• If equipment needs to be shared among patients, clean and disinfect between each patient use.</li> <li>• Ensure that health care workers refrain from touching their eyes, nose, and mouth with potentially contaminated gloved or ungloved hands.</li> <li>• Avoid contaminating environmental surfaces that are not directly related to patient care (e.g. door handles and light switches).</li> <li>• Ensure adequate room ventilation. Avoid movement of patients or transport.</li> <li>• Perform hand hygiene.</li> </ul>
Apply airborne precautions when performing an aerosol generating procedure	<ul style="list-style-type: none"> <li>• Ensure that healthcare workers performing aerosol-generating procedures (i.e. open suctioning of respiratory tract, intubation, bronchoscopy, cardiopulmonary resuscitation) use PPE, including gloves, long-sleeved gowns, eye protection, and fit-tested particulate respirators (N95 or equivalent, or higher level of protection).</li> <li>• Whenever possible, use adequately ventilated single rooms when performing aerosol-generating procedures, meaning negative pressure rooms with minimum of 12 air changes per hour or at least 60 litres/second/patient in facilities with natural ventilation.</li> <li>• Avoid the presence of unnecessary individuals in the room.</li> </ul>

	<ul style="list-style-type: none"> <li>Care for the patient in the same type of room after mechanical ventilation commences</li> </ul>
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**Note:** Vaccination is one of the disease preventive measures, upon availability of an approved vaccine beyond reasonable doubt, its use is recommended for early containment of the disease/pandemic, protection of healthcare workers and the general public.

**Table 3. Risk stratification and recommendations of appropriate PPE in different settings**

NO.	SETTING	ACTIVITY	RISK	RECOMMENDED PPE	REMARKS
1	<b>Help desk/ Registration counter</b>	Provide information to patients	mild risk	Triple layer medical mask and latex examination gloves	physical distancing should be followed
2	<b>Doctors chamber</b>	clinical management	mild risk	Medical mask and latex examination gloves	no generation of aerosols should be allowed
3	<b>Chamber of dental doctors/ENT/Ophthalmology doctors</b>	clinical management	moderate risk	N-95 mask, Goggles, Latex examination gloves	Aerosol generating procedures anticipated. Face shield, when splash is anticipated
4	<b>Pre-anesthetic check up</b>	pre anesthetic check up	moderate risk	N-95 mask, goggles, latex examination gloves	only recommended when examination of oral cavity/ dentures is recommended
5	<b>pharmacy counter</b>	distribution of drugs	mild risk	Triple layered medical mask and latex examination gloves	frequent use of hand sanitizers is advised over gloves
6	<b>sanitary staffs</b>	cleaning of high touch area/surfaces and floors	mild risk	triple layered medical mask and latex examination gloves	frequent use of hand sanitizers is advised over gloves
7	<b>wards/ individual rooms</b>	clinical managements	mild risk	triple layered medical masks and latex examination gloves	patient is stable and no aerosol generating procedures
8	<b>ICU/ Critical care</b>	critical care Management	moderate risk	N-95, goggles, latex examination gloves, face shield, apron	Aerosol generating activities performed. Face shield when splash of body

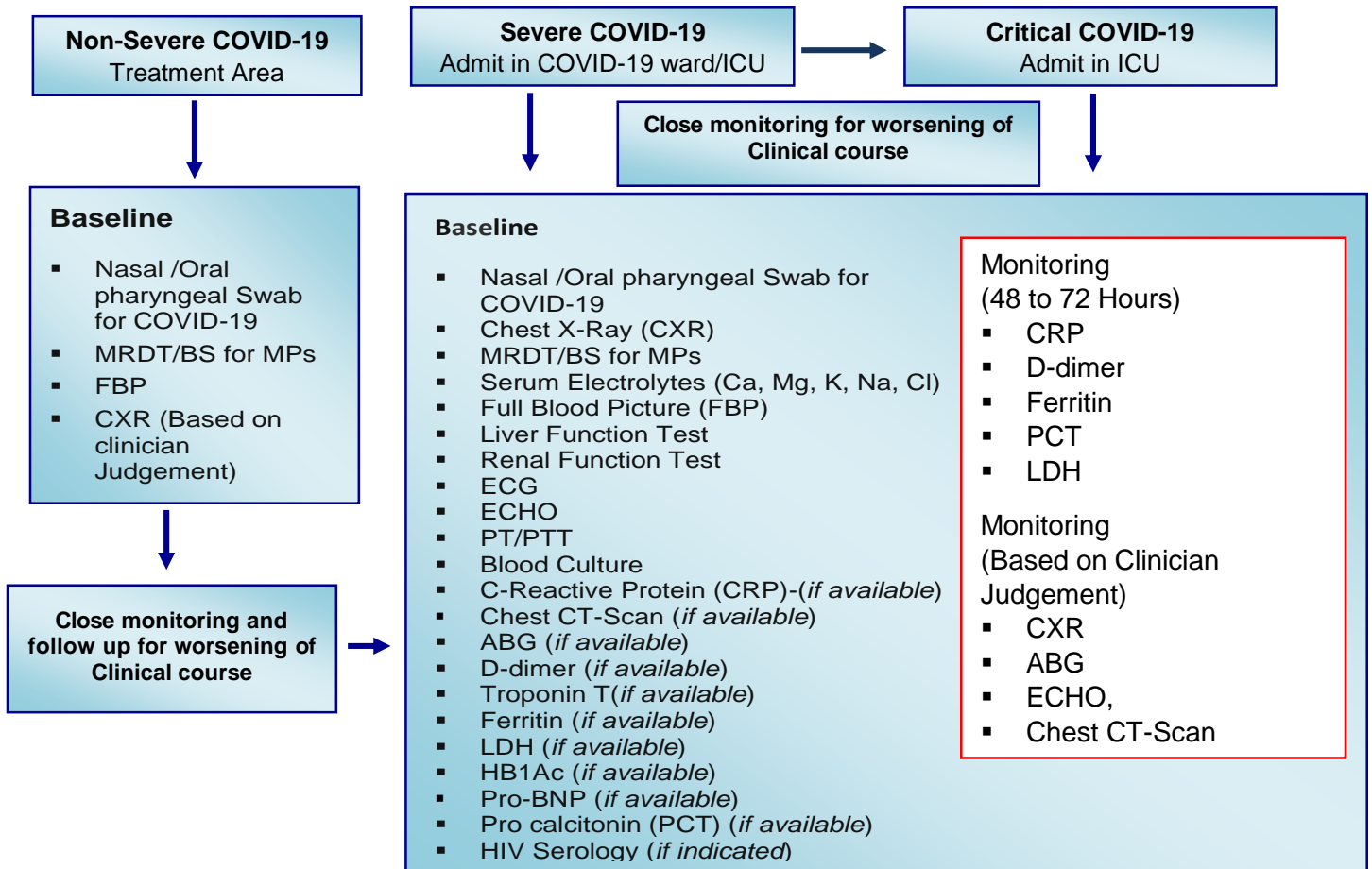
NO.	SETTING	ACTIVITY	RISK	RECOMMENDED PPE	REMARKS
					fluids is expected
9	<b>Ward/ICU and critical care</b>	dead body packaging	low risk	triple layered medical masks and latex examination gloves	Aerosol generating activities performed. Face shield when splash of body fluids is expected
10	<b>Labor rooms</b>	intra-partum care	moderate risk	N-95, goggles, latex examination gloves, face shield, apron	patient is to be masked in labor, if the pregnant woman is resident of containment zone
11	<b>Operation theater</b>	performing surgery and administering general anesthesia	moderate risk	N-95, goggles, latex examination gloves, face shield, apron	patient is to be masked in labor, if the pregnant woman is resident of containment zone
12	<b>Sanitation</b>	cleaning frequently touch surfaces/floors/changing linen	low risk	triple layered medical masks and latex examination gloves	
13	<b>Emergency</b>	attending emergence cases	mild risk	triple layered medical masks and latex examination gloves	no generation of aerosols should be allowed
		attending severely ill patients while performing aerosol generation procedures	High risk	full complement of PPE,(N-95 mask, apron, Gown goggle, Nitrile examination gloves, shoe cover	
14	<b>Routine laboratory</b>	sample collection, transportation and testing( non-respiratory samples)	mild risk	triple layered medical masks and latex examination gloves	

NO.	SETTING	ACTIVITY	RISK	RECOMMENDED PPE	REMARKS
		respiratory samples	moderate risk	triple layered medical masks and latex examination gloves	
15	<b>Radio diagnosis, blood bank etc.</b>	imaging services and blood banking services etc.	mild risk	triple layered medical masks and latex examination gloves	
16	<b>CSSD/Laundry</b>	handling linen	mild risk	Triple layered medical masks and latex examination gloves	
17	<b>Other supportive services including kitchen</b>	Administrative, financial, engineering and dietary services	low risk	face cover	Engineering and dietary services personnel visiting treatment areas will wear PPE appropriate to the specific area
18	<b>Ambulance transfer to the designated hospital</b>	transporting patients not on assisted ventilation,	low risk	triple layered medical mask and latex examination gloves	no aerosol generating procedures are allowed

## 5. INVESTIGATION AND TREATMENT OF COVID-19

It should be noted that there is no cure or “*Magic-bullet*” for the treatment of COVID-19 and no single drug will be effective in treating this complex disease, multiple drugs with different mechanisms of action should be used in specific disease category to achieve a good outcome. The combination of multiple drugs have been shown to impact outcomes in each of categories.

**Figure 1; INVESTIGATIONS**



**Note:** Baseline investigation(s) for severe patients can be done in non-severe patients based on the patient’s risk and clinical judgement.

**Table 4: Management Protocol based on the clinical severity**

SEVERITY	TREATMENT	REMARKS
<p><b>Non-severe COVID-19</b></p>	<ul style="list-style-type: none"> <li>▪ Counsel the patient on danger signs (difficulty in breathing, chest tightness, high grade fever, altered mentation).</li> <li>▪ Instruct on self-isolation.</li> <li>▪ Investigate for other respiratory diseases, underlying disease(s) and treat accordingly.</li> <li>▪ Advise on health balance diet and proper hydration.</li> <li>▪ Advise to return in case of worsening conditions</li> </ul> <p>Supportive treatment should be initiated upon clinician recommendations such as;</p> <ul style="list-style-type: none"> <li>▪ <b>Antipyretics:</b> <i>Paracetamol is usually preferred.</i></li> <li>▪ <b>Vitamin C</b> 500mg OD for 2/52.</li> <li>▪ <b>Vitamin D3</b> 1000-5000IU OD for 2/52</li> <li>▪ <b>Zinc Sulphate</b> 40mg OD for 2/52.</li> <li>▪ <b>Prednisone</b> 0.5 – 1mg/kg can be used for patients with high risk and radiological changes consistent with COVID-19 despite apparent non-severe clinical presentation.</li> </ul> <p><b>Note: Treat other co-existing illnesses as per the standard treatment guideline.</b></p>	<p>No antibiotic combination needed in this group unless bacterial infection is diagnosed.</p>
<p><b>Severe COVID-19</b></p>	<p>Admit/Refer to a designated area with oxygen delivery capacity.</p> <ul style="list-style-type: none"> <li>▪ Oxygen therapy and respiratory support accordingly. (<i>refer chapter 5</i>)</li> <li>▪ Encourage the patient to lie on their front (prone position) if they are comfortable.</li> </ul> <p><b>Corticosteroid administration</b></p> <ul style="list-style-type: none"> <li>▪ <b>IV Dexamethasone 8mg</b> bd for five days, can be prolonged based on clinician’s judgement (if IV formulation is not available use tablets) or</li> <li>▪ <b>IV Methylprednisolone 80mg (or 0.5-1mg/kg) OD.</b></li> <li>▪ <b>IV Hydrocortisone 200 mg</b> stat, then 100mg BD <b>OR Tabs Prednisolone 0.5-1mg/kg OD</b></li> </ul> <p><b>Anticoagulation</b></p> <ul style="list-style-type: none"> <li>▪ Anticoagulation with <b>Enoxaparin (LMWH) 1mg/kg SC OD</b> (Prophylactic dose) or treatment doses according to clinical judgment.</li> </ul>	<p><b>Remdesivir</b> (If available and approved) may be used <b>ONLY</b> in patients with;</p> <ul style="list-style-type: none"> <li>▪ Moderate to severe disease (requiring supplemental oxygen); <b>AND</b> No renal or hepatic dysfunction (eGFR &lt;30 ml/min/m<sup>2</sup>; AST/ALT &gt;5 times ULN (Not an absolute contradiction), <b>AND</b> within 10 days of onset of symptom(s).</li> </ul> <p><b>Recommended dose:</b> 200 mg IV on day 1 followed by 100 mg IV OD for next 4 days.</p> <ul style="list-style-type: none"> <li>▪ <b>NB: NOT to be used in Patients who are NOT on oxygen support or in home settings</b></li> </ul> <p><b>Tocilizumab</b> (If available and approved) may be considered in patients with;</p> <ul style="list-style-type: none"> <li>▪ Severe disease (preferably</li> </ul>

	<ul style="list-style-type: none"> <li>▪ In absence of LMWH or high molecular weight heparin is not available, consider other anticoagulants such as;</li> <li>▪ Tabs. <b>Rivaroxaban</b> 10mg OD</li> </ul> <p><b>Antibiotic administration</b></p> <ul style="list-style-type: none"> <li>▪ Tabs. <b>Azithromycin</b> 500mg OD 5/7 OR Tab. <b>Clarithromycin</b> 500mg bd 5/7</li> </ul> <p><b>PLUS</b></p> <ul style="list-style-type: none"> <li>▪ IV <b>Piperacillin and Tazobactam</b> 4.5gm QID x7/7 <b>OR</b> IV <b>Ceftriaxone &amp; Sulbactam</b> 1.5mg BD 7/7</li> </ul> <p><b>NOTE:</b> Antibiotic should be changed according to Culture Result (whenever available).</p> <p><b>Hydration</b> Maintain hydration through cautious IVF administration.</p> <p><b>PPI administration</b></p> <ul style="list-style-type: none"> <li>▪ IV / PO. <b>Pantoprazole</b> 40mg BD <b>OR</b> IV/PO. <b>Rabeprazole</b> 20mg BD <b>OR</b> PO <b>Esomeprazole</b> 40mg BD <b>OR</b> PO <b>Omeprazole</b> 20mg BD</li> </ul> <p><b>Supportive treatment</b></p> <ul style="list-style-type: none"> <li>▪ Tabs. <b>Vitamin C</b> 500-1000mg OD for 2/52.</li> <li>▪ Tabs. <b>Zinc Sulphate</b> 40mg OD for 2/52.</li> <li>▪ Tabs. <b>Vitamin D3</b> 1000-5000IU OD for 2/52</li> <li>▪ Antipyretics (if indicated): <i>Paracetamol is usually preferred.</i></li> </ul>	<p>within 24 to 48 hours of onset of severe disease/ICU admission) <b>AND</b> Significantly raised inflammatory markers (CRP &amp;/or IL-6) <b>AND</b> No improvement despite use of steroids <b>AND</b> No active bacterial/fungal/tubercular infection <b>AND</b> no severe allergic reaction to Tocilizumab.</p> <p><b>Recommended</b> single dose: 4 to 6 mg/kg (400 mg in 60kg adult) in 100 ml NS over 1 hour.</p>
<p><b>Critical COVID-19</b></p>	<p><b>Treat the same as severe category with the following additions:</b></p> <ul style="list-style-type: none"> <li>▪ <b>Acute Respiratory Distres Syndrome (ARDS)</b></li> </ul> <p><b>Respiratory support including mechanical ventilation</b></p> <ul style="list-style-type: none"> <li>▪ <b>Shock and Septic shock:</b></li> <li>▪ <b>Ionotropic-support:</b> Noradrenaline/adrenaline/dopamine</li> <li>▪ <b>Hydration-</b> Give IV fluids for shock until SBP&gt;90mmHg or MAP &gt;65mmH.</li> <li>▪ <b>Administer IV fluids</b> cautiously and assess responsiveness to avoid overload.</li> </ul> <p><b>Additional Supportive treatment</b></p> <ul style="list-style-type: none"> <li>▪ Manage hypomagnesemia, as may increases the cytokine storm and prolongs QTc: <b>Give Magnesium 2g stat IV</b> (<i>serum magnesium-2.0-</i></li> </ul>	<ul style="list-style-type: none"> <li>▪ There is good evidence for corticosteroids in this group, and for prevention of thromboses using low molecular weight heparin.</li> <li>▪ Ivermectin- No enough evidence of efficacy and it is not recommended in WHO or other clinical guidelines.</li> </ul>



	<p>2.4mmol) then Magnesium 400mg or 300Mg OD for 5/7</p> <ul style="list-style-type: none"> <li>▪ Ensure patient receive appropriate and adequate nutrition (<i>see section 10 for details on nutrition</i>).</li> <li>▪ Provide chest physiotherapy on daily basis (<i>see chapter 8 for details on physiotherapy</i>).</li> <li>▪ Provide psychosocial support to patient and close relatives.</li> <li>▪ Provide psychosocial support to the patient and close relatives.</li> </ul>	
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**Note; Remdesivir, Tocilizumab, Ivermectin and Colchicine have been used with reported limited benefits in COVID-19 patients. These medications are at different phases of randomized clinical trials and their inclusion in care should may be considered with caution based on their specific seletion criteria.**

**Table 5. Routine Care –for intubated patients**

<b>DAILY ICU PATIENT CARE (FAST HUGS BID)</b>		
F	Feeding	<ul style="list-style-type: none"> <li>○ Assure the type of diet the patient is receiving.</li> <li>○ Ensure optimal diet is provided</li> <li>○ If NPO, perform regular assessments if oral feeding is indicated</li> <li>○ If projected to be NPO for a long time, ensure consultation is made for TPN be considered.</li> </ul>
A	Analgesia	<ul style="list-style-type: none"> <li>○ Ensure adequate pain control</li> <li>○ Assess regularly on the need for non-opioid adjuncts</li> <li>○ Consider adding oral analgesics instead of IV infusions</li> </ul>
S	Sedation	<ul style="list-style-type: none"> <li>○ Ensure sedation is minimized as much as possible</li> <li>○ Assess for non-benzodiazepine strategy use.</li> </ul>
T	Thromboembolic prophylaxis	<ul style="list-style-type: none"> <li>○ Ensure the patient is receiving VTE prophylaxis</li> <li>○ Assess for possible VTE adjustment for renal function.</li> </ul>
H	Head of Bed Elevated	<ul style="list-style-type: none"> <li>○ Head elevation to at least 30 degrees.</li> </ul>
U	Ulcer prophylaxis	<ul style="list-style-type: none"> <li>○ Assess for and provide stress ulcer prophylaxis</li> <li>○ Discontinued stress ulcer prophylaxis when indicated</li> </ul>
G	Glycaemic control	<ul style="list-style-type: none"> <li>○ Ensure adequate glycemic control (blood glucose target generally 6-10mmol/L).</li> </ul>
S	Spontaneous breathing trial	<ul style="list-style-type: none"> <li>○ Perform weaning protocol to assess if the patient qualifies for a spontaneous breathing</li> </ul>
B	Bowel regimen	<ul style="list-style-type: none"> <li>○ Assess for bowel routines</li> </ul>
I	Indwelling catheters and lines	<ul style="list-style-type: none"> <li>○ Assess if the central line or arterial line can be removed.</li> <li>○ Regularly assess for the indication of a Foley catheter.</li> </ul>
D	Deescalate Antibiotics	<ul style="list-style-type: none"> <li>○ Assess and judge for patient's antibiotics use, be narrowed or discontinued.</li> </ul>


## 6. RESPIRATORY MANAGEMENT FOR COVID-19 PATIENT




The cornerstone for the management of the hypoxemia COVID-19 patient is the application of oxygen therapy via a variety of delivery methods and target SpO<sub>2</sub>


- SpO<sub>2</sub> ≥ 90% in non-pregnant adults
- SpO<sub>2</sub> ≥ 92% in pregnant patients
- Children with emergency signs (obstructed or absent breathing, severe respiratory distress, central cyanosis, shock, coma or convulsions) should receive oxygen therapy during resuscitation to target SpO<sub>2</sub> ≥ 94%; otherwise, the target SpO<sub>2</sub> is ≥ 92%.


Titrate oxygen to reach saturation target by means of any oxygen delivery device, either nasal cannula, simple facemask or facemask with reservoir (Non rebreather mask). If the target SpO<sub>2</sub> is not attained, consider CPAP or endotracheal intubation. Caution should be taken with the increased risk of being infected due to aerosolization when intubating.

**Table. 6: Oxygenation and Ventilation**


DEVICE	PICTURE	INDICATION/ DESCRIPTION	SOURCE OF OXYGEN	Comments
<b>Section A: Non Invasive Oxygenation</b>				
Low flow nasal cannula		<ul style="list-style-type: none"> <li>▪ For mild hypoxemia (SpO<sub>2</sub> &lt; 94% &gt; 90%)</li> <li>▪ Oxygen delivered 1-6Lts/min</li> <li>▪ Can deliver up to 22% -45% FiO<sub>2</sub> on 1-6L/min</li> <li>▪ Higher rates of flow (&gt;4L/min) may lead to nasal irritation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oxygen concentrator</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>▪ Oxygen Cylinder</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>▪ Central source from oxygen plant or manifold</li> </ul>	<ul style="list-style-type: none"> <li>▪ Clinical judgment should be used for the indication.</li> <li>▪ Close monitoring is important for decision-making of the type of appliance to be used.</li> <li>▪ General observation, by the use of the same appliance, there is much improvement on Cylinders rather than concentrator</li> </ul>

				(when available) oxygen cylinder is a better option to a concentrator.
Simple facemask		<ul style="list-style-type: none"> <li>For moderate hypoxia (SPO<sub>2</sub>&lt;89%)</li> <li>Can deliver 40%-60% FiO<sub>2</sub> on 6-10L/min</li> <li>Flow &lt;5L/min does not flush out the CO<sub>2</sub> in the mask.</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen concentrator</li> <li>OR</li> <li>Oxygen Cylinder</li> <li>OR</li> <li>Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>Delivers an intermediated flow of oxygen (6-10Lts/min)</li> <li>Clinical judgement including respiratory rate (RR) should be used for the indication.</li> </ul>
Non-rebreather Mask		<ul style="list-style-type: none"> <li>Can provide 85%-95% FiO<sub>2</sub> on 10-15L/min.</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen Cylinder</li> <li>OR</li> <li>Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>Can deliver low and high flow oxygen.</li> </ul>
CPAP facemask		<ul style="list-style-type: none"> <li>These are used to connect patient to non-invasive ventilation device to provide positive pressure or oxygen without need of intubation</li> <li>It may be a full-face mask or just covering nose and mouth.</li> <li>FiO<sub>2</sub> is selected on the device (CPAP or</li> </ul>	<ul style="list-style-type: none"> <li>Oxygen Cylinder</li> <li>OR</li> <li>Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>Delivers high flow oxygen a positive pressure</li> <li>Indicated for complications like pulmonary edema, it should be used regardless of the room condition (To avoid exposure to aerosols all healthcare workers should</li> </ul>

		ventilator machine)		<p>be on N95 and face shield.</p> <ul style="list-style-type: none"> <li>▪ Clinical judgement, and patient's response should be applied.</li> <li>▪ Non-rebreather mask is superior to CPAP for oxygen delivery in COVID-19 patients.</li> </ul>
<p>Bag-valve mask (AMBU Bag)</p>		<ul style="list-style-type: none"> <li>▪ Has self-inflating bag, a valve and a mask</li> <li>▪ Select the size according to age</li> <li>▪ It provides positive pressure ventilation</li> <li>▪ Procedure is called Bag Valve-Mask Ventilation.</li> <li>▪ Provides oxygen up to Fio<sub>2</sub> of 100%</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oxygen Cylinder</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>▪ Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Indicated for patients with signs of typical respiratory failure (no visible active breathing)</li> <li>▪ For temporary use as a bridge until appropriate deliver device or ventilator</li> <li>▪ Adherence to standard and additional IPC precautions should be applied.</li> </ul>

<p>High Flow Nasal Cannula</p>		<ul style="list-style-type: none"> <li>▪ Can administer up to 10-60L of humidified warmed oxygen (2L/kg/min up to 12kg)</li> <li>▪ Can be used in pediatric as well as adult patients</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oxygen Cylinder</li> <li>OR</li> <li>▪ Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Knowledge needed to set up pressure or volume required</li> <li>▪ May be implemented and managed by non-ICU specialists outside ICU</li> <li>▪ Does not require invasive monitoring</li> <li>▪ Does not need as intensive nursing care as for invasive ventilation</li> <li>▪ Can be combined with awake self-prone.</li> <li>▪ May be a lower-resource alternative to mechanical ventilation in some patient</li> </ul>
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**Section B: Invasive Oxygenation**

<p>Mechanical ventilating machine</p>		<ul style="list-style-type: none"> <li>▪ For failure of oxygenation or ventilation despite being kept on Bag Valve Mask Ventilation or CPAP</li> <li>▪ Can provide <math>FiO_2</math> as selected on the machine, as well as positive pressure depending on setting done.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oxygen Cylinder</li> <li style="text-align: center;">OR</li> <li>▪ Central source from oxygen plant or manifold.</li> </ul>	<ul style="list-style-type: none"> <li>▪ It's made for up to 100% oxygen delivery.</li> <li>▪ Complicated, requires well trained staff and full ICU requirements.</li> <li>▪ Standard and additional IPC precautions should be adhered during care of those patients.</li> </ul>
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***Note: The use of prone position may improve oxygenation in hypoxemic patients.***

## 7. MECHANICAL VENTILATION

Patients with hypoxemic respiratory failure may require intubation and mechanical ventilator support. Detailed recommendations on ventilation strategies are beyond the scope of this guideline. Always consult an intensivist if possible, or alternatively a practitioner experienced with mechanical ventilation. Nonetheless, the general principles to consider include:

- Individualize ventilator strategies based on respiratory mechanics and disease progression.
- Use lung-protective ventilation strategies for patients with established ARDS who have low lung compliance.
- Aim for an initial tidal volume of 4-6ml/kg, higher tidal volume up to 8 ml/kg predicted body weight might be needed if minute ventilation requirements are not met in a patient with good lung compliance.
- Strive to achieve the lowest plateau pressure possible. Plateau pressures above 30 cmH<sub>2</sub>O are associated with an increased risk of pulmonary injury.
- Hypercapnia is permitted if meeting the pH goal of >7.15-7.20.
- Application of prone ventilation 12-16 hours a day is strongly recommended for patients with severe ARDS.
- In patients with moderate or severe ARDS, identifying optimal PEEP levels will require titration of PEEP.
- The use of deep sedation may be required to control respiratory drive, achieve tidal volume targets, and assist with patient-ventilator dyssynchrony.
- In patients with moderate-severe ARDS (SPO<sub>2</sub><80%), neuromuscular blockade by continuous infusion should not be routinely used. Continuous neuromuscular blockade may still be considered in patients with ARDS in certain situations: ventilator dyssynchrony despite.
- Sedation, such that tidal volume limitation cannot be reliably achieved; or refractory hypoxemia.
- Avoid disconnecting the patient from the ventilator, which results in loss of PEEP and atelectasis. Use closed system catheters for airway suctioning and clamp endotracheal tube when disconnection is required (for example, transfer to a transport ventilator). A high efficiency particulate filter on the expiratory limb of the ventilator circuit should be used.

### A. MONITORING AND MAINTENANCE OF TARGET SATURATION

Any patient who is on oxygen therapy should be monitored continuously. Monitoring can be done via peripheral Oxygen measurement (SPO<sub>2</sub>) or invasive via measuring partial pressure of Oxygen in arterial blood (PaO<sub>2</sub>) by using an arterial blood gas analyzer machine.

**While monitoring:** If the SpO<sub>2</sub> is 92% or above for two consecutive days and the patient's response to respiratory therapy treatment is unchanged or there have been no changes in FiO<sub>2</sub>, the frequency of monitoring can be reduced. Continued need for monitoring should be evaluated.

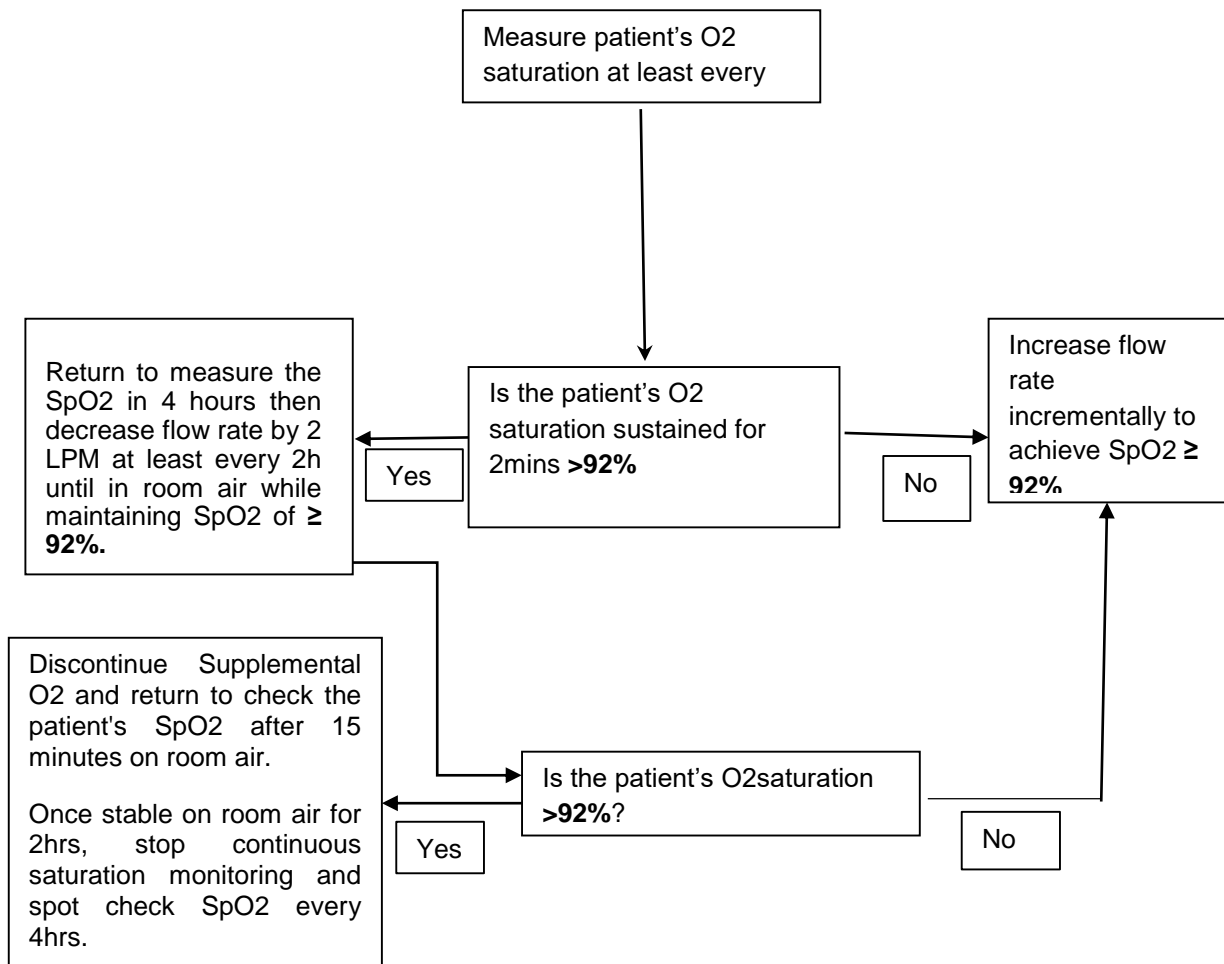


**Weaning patients of oxygen therapy:** This is done by reducing the volume of oxygen delivered to patients with a time interval while observing the SpO<sub>2</sub> and other vital signs. Unless clinically contraindicated, weaning oxygen therapy should be attempted as soon as possible. Criteria for weaning oxygen therapy includes

- The patient should appear clinically stable (SPO<sub>2</sub>>92%).
- Improved work of breathing.
- Improved level of consciousness (LOC) = alert, color = pink, behavior = normal.
- Resolved hypoxemia/hypoxia (PaO<sub>2</sub><60mmHg/SPo<sub>2</sub> <92%).
- Managed other underlying causes of hypoxemia

For complications/toxicity of oxygen and managing oxygen complications refer to Ministry of Health Oxygen therapy guideline 2021.

**Figure 2: Oxygen weaning steps**



## 8. NURSING CARE AND MONITORING

Patients with COVID-19 need nursing care regardless of disease severity starting from the initial assessment and triaging, sample collection, care of patients with mild-to-moderate symptoms, care of the critically-ill patient, and care of the dead body. There is no licensed cure for COVID-19 but patients are managed with symptomatic and supportive interventions, therefore during patient care a nurse is obliged to ensure that a patient receives the right care during caring patient of COVID-19 all care providers should adhere to the following hints as a part to reserve human kind;

- On proper PPE receive the patient and relatives in a facility
- Introduce self to patient and relative
- Orient the patient and relative on important facility/unit area, visit hours, ward round, equipment etc.
- Involve patient on plan of care
- Obtain consent before each procedure
- Attend emergency complain
- Inform patients about their care and alternative
- Ensure confidentiality and privacy are maintained during service delivery care
- Ensure spiritual needs and culture of the patient/client by considering COVID19 IPC standards.
- When relatives are visiting the patient in a facility, covid19 IPC Standards should be applied. (Putting on a mask, hand hygiene etc.),
- Inform patients about their rights and responsibilities
- Inform patient where to seek help or submit complain
- Give feedback of patient’s information when needed
- In case of death, last office procedures and precautions to both health care workers and relatives should be maintained

**Table 7: Common problems for patient with COVID-19 and suggested nursing interventions.**

NO	NURSING DIAGNOSIS	INTERVENTION NEEDED
1	Difficulty in breathing related to disease process	Deliver oxygen, refer chapter 5. Position the patient on semi fowler or prone position Consider nebulization Administer corticosteroids as prescribed
	Anxiety-related to fear of complication of COVID-19 viruses	Comprehensive counseling of patient and relatives

2	Hypoxia related to poor oxygen supply to the brain	Deliver oxygen
3	Airway obstruction related to secretion	Suctioning and chest physiotherapy Maintain right/left lateral position
4	Pain-related to disease complication	Give analgesics as prescribed Perform non-pharmacological pain management
5	Hypoglycemia related to loss of appetite (Tested or suspected to below).	Monitor blood glucose Feed, assist feeding or encourage feeding Resuscitate the patient in the case is unable to feed orally with 5%, 10% or 50% Dextrose.
6	Immobility related to loss of energy	Encourage/assist in feeding Change the patient position at the interval of 2 hours Physiotherapy intervention
7	Infection-related to complication of COVID-19	Administer prescribed antibiotics Ensure patient and environmental hygiene Offer clean hospital linen daily and PRN All linen to be washed within health facilities
8	Unpleasant smell related to sweats and long stay without general body cleanliness like bath and oral hygiene	Encourage bath/oral hygiene, assist bath/oral hygiene or bath the patient

**Note:** Point of care testing should be done without waiting for a Clinician (Urine dipstick, RBG, etc.). Nursing care documentation of all the procedures and necessities done to patients is highly emphasized.

## **9. PHYSIOTHERAPY GUIDE IN MANAGEMENT OF COVID-19 PATIENTS**

Physiotherapy is the essential discipline involved in a multidisciplinary group of active hospital services and intensive care units particularly at this time where the whole world has been at a standstill of the present global pandemic of coronavirus (COVID-19) which causes morbidity, death, and changes in personal roles.

The main cause of morbidity and death to these patients is pneumonia and respiratory failure which necessitates artificial ventilation and other techniques that can improve respiratory function. One of these techniques is chest physiotherapy which has shown to improve gas exchange, reverse pathological progression and reduce the need of artificial ventilation when provided earlier in other respiratory conditions (Wilson, Morrison, Robinson, (2019); Wong,2000).

A physiotherapist is expected more often to have a role of promoting both respiratory and mobilization/rehabilitation of critically ill patients in acute wards and the Intensive Care Unit (ICU). In particular, cardiorespiratory physiotherapy is focused on the management of acute and chronic respiratory conditions and aims to improve physical recovery following an acute illness.

The benefits of Physiotherapy in the respiratory treatment and physical rehabilitation of patients with COVID-19 definitely may be identified when patients present with airway secretions that they are unable to independently clear. Although a productive cough is a less common symptom (34%) of patients with COVID-19 may be indicated to physiotherapy to clear out secretions that are difficult to be independently cleared out (Guan, et al.2020).

The physiotherapists practicing in acute conditions and ICU patients is expected to promote airway clearance to a patient who shows signs of inadequate ventilation using physiotherapy techniques including the use of prone positions to optimize oxygenation (Australian and New Zealand Intensive care society, 2020). Early intervention of physiotherapy after the acute phase of Acute respiratory distress syndrome (ARDS) is very crucial issue hence critical care patients in ICU, managed with intensive medical management that includes prolonged protective lung

ventilation, sedation and use of neuromuscular blocking agents are more exposed to ICU acquired weakness (ICU-AW) (Kress & Hall,2014).

The ICU-AW contributes to patients' immobility, hypostatic pneumonia and the accumulation of secretions. Physiotherapy role on critical care conditions COVID-19 will target on airway clearance, and promoting of respiratory system and mobilization. Likewise, to survivors of critical illness associated with COVID-19, the physiotherapist will target on promoting home-based necessary functional abilities through providing exercises, mobilization, and rehabilitation to an optimal level of functions.

With the above facts, the physiotherapist is required to be aware of variations and mode of transmission of COVID-19 from other respiratory viruses as it appears that human-to-human transmission occurs approximately 2 to 10 days before the individual becoming symptomatic (World Health Organization, 2019; Guan, et al.2020). Large droplets from coughing, sneezing, or a runny nose land on surfaces within two meters of the infected person and are transferred to another person through hand contact on a contaminated surface then touching the mouth, nose, or eyes.

Thus, it has been unusual when dealing with the COVID-19 pandemic as a collaborative team in the management; we propose to adhere to the IPC international guidelines as stipulated from the World Conference of Physical Therapists (World Health Organization, 2020).

Therefore, this document outlines the basic guidelines for physiotherapy management and recommendations to guide clinical physiotherapy practice for COVID-19 conditions.

**PURPOSE:** The purpose of this document is prepared to provide information to physiotherapists and acute healthcare facilities about the potential role of physiotherapy in the management of hospital admitted patients with confirmed and/or suspected COVID-19.

## **A. PHYSIOTHERAPY WORKFORCE PLANNING AND PREPARATION RECOMMENDATIONS**

- i) There must be a separate team for managing COVID-19 patients to facilitate rotations and minimize overstaying.
- ii) Recommended staff ratio is 1 physiotherapist for 5 patients for 8hrs/40HRS per week
- iii) Staff who at risk should not be exposed to COVID-19 patients.
- iv) It is only a trained physiotherapist with knowledge and skills of using PPE and handling COVID-19 who will be located in an isolation ward.
- v) Nebulisation in an isolation ward to non-intubated patients is not allowed hence found to be the source of aerosol and transmission of infection to health workers in the immediate vicinity.
- vi) Humidification and non-invasive ventilation should be conducted upon agreement with the physician.
- vii) Physiotherapy intervention is only recommended when there are significant functional limitations and respiratory compromise.
- viii) Aerosol Generating Procedures (AGPs) if available will be allowed to the patients with COVID-19 in need and will be conducted in a negative pressure room or a single room with a door closed by a few staff all wearing PPEs.
- ix) It is advised to minimize people coming in and going out of the room during the procedure.
- x) Avoid sharing facilities and prevent moving equipment from infectious to non-infectious areas
- xi) Due to increased workload and risk of anxiety, both at work and home, reassurance and support of staff is highly recommended
- xii) Minimize auscultation procedures
- xiii) Implement triage strategies, reschedule non-urgent care and consider digital service delivery
- xiv) During physiotherapy procedures use PPE and provide patient with tissues, surgical face mask and alcohol hand rub.

## Preliminary patients check

Physiotherapy has an integral part of critical care management aiming at preventing and managing the pulmonary and reducing the immobilization complications by focusing on early rehabilitation. On this particular pandemic it is mandatory to consider the following before physiotherapy managements to patients with COVID-19: -

- Cardiovascular and respiratory factors like new onset of cardiac arrhythmia, myocardial ischemia and pneumothorax
- No new onset of cardiac arrhythmia or myocardial ischemia
- Heart rate >40 or <120bpm
- Systolic blood pressure >90 or <180 mmHg
- Respiratory rate >10 or <40bpm
- Oxygen saturation  $\geq$  SPO<sub>2</sub>90%
- Hemoglobin level (Hb),
- GCS less13

## Physiotherapy intervention according to severity of COVID-19 patient

Although most techniques and physiotherapy intervention mentioned below have been reported to be effective, there is inadequate knowledge of evidence to support their significance as reported. However, different approaches proven the significance can be used depending on individual patient's response. Due to the above evidence patients should be advices to continue with prescribed program even long after recovery for avoidance of symptoms reoccurrence and risk.

**Table 8: Physiotherapy interventiouns for each categories of COVID-19**

SEVERITY	INTERVENTION	REMARKS
Non severe COVID-19	Perform baseline measurement. Incentive spirometer and maximum breath in and hold technique can be used. Provide home program <ul style="list-style-type: none"><li>▪ Deep breathing exercise (maximum inhalation)</li><li>▪ Chest expansion exercise</li></ul>	Patients should. <ul style="list-style-type: none"><li>▪ Perform prescribe program in isolation (butterfly exercises and relaxed breathing exercises)</li><li>▪ Should not wear mask during the program</li></ul>

	<ul style="list-style-type: none"> <li>▪ Endurance exercise</li> <li>▪ In case of productive cough instructs the patients to do huffing /coughing technique</li> <li>▪ Instruct Active cycle of breathing technique(ACBT)</li> <li>▪ Circulatory exercises</li> </ul>	<ul style="list-style-type: none"> <li>▪ Should return to the clinic when baseline measurements decreases</li> <li>▪ Observe cough and huffing etiquette</li> <li>▪ Observe cough and huffing etiquette.</li> </ul>
<b>Severe COVID-19</b>	<ul style="list-style-type: none"> <li>▪ Encourage relaxed breathing</li> <li>▪ Perform thoracic mobilization exercise like vibration and positive expiratory pressure</li> <li>▪ Positioning: The protocol for position, COVID-19 awake repositioning /prone protocol 12 to 16 hours full prone</li> <li>▪ 30 minutes to 2 hours' right side lying.</li> <li>▪ 30 minutes to 2 hours propped-up sitting.</li> <li>▪ 30 minutes to 2 hours left side lying</li> <li>▪ Diaphragm mobilization passive/active exercises</li> </ul>	<p>Encourage prone position most of the time. The minimum time being 12hours</p> <p>Sufficient human resource is required for procedures</p> <p>Discourage supine position</p> <p>Look out for any sign of thrombo embolisms</p> <p>Observe cough and huffing etiquette</p> <p>Pumping exercises</p>
<b>Critical COVID-19</b>	<p>Positioning:</p> <ul style="list-style-type: none"> <li>▪ <b>If on facemasks:</b> position the patients on prone and side lying by 2 to 4hours.</li> <li>▪ <b>If on CPAP:</b>long sitting/chest 60-degree bed inclination.</li> <li>▪ <b>Intubated patients:</b> prone positioning for 12- 16 hours with involvements of intensivists, anesthetist and ICU nurses.</li> <li>▪ Diaphragm mobilization(Passive/active).</li> </ul>	<p>Close observation of the oxygen saturation during bedside activities. especially when saturation of a patient falls during bedside activities for more than 3% or saturation <math>\leq</math> 96%.</p>



## **Equipment's needed**

- This may vary depends on the patient's condition
- Incentive spirometer/TriFlow Incentive spirometer (single patient use)
- Pillows
- Monitors (pulse oximeter, BP machine) N95 masks.

## **Physiotherapist's protection needs:**

- i) Gloves, including the elbow length gloves,
- ii) N95masks
- iii) Apron- surgical gown
- iv) Protective glasses/face shield
- v) Observation of coughing/huffing etiquette

## **Patients with indications for physiotherapy**

- i. Patients who have been confirmed or suspected to have COVID-19 and concurrently or subsequently develop exudative consolidation, mucous hyper secretion, and/or difficulty clearing secretions.
- ii. Patients at significant risk of developing or with evidence of significant functional limitation only with clinical secondary to ICU-AW.
- iii. Physiotherapy will be indicated to patients in need of air clearance with mild symptoms, pneumonia, co-existing respiratory or neuromuscular co morbidity.
- iv. Physiotherapy will be indicated to patients with mild symptoms of pneumonia with evidence of exudative consolidation and breathing difficulties in air clearance and secretion clearance
- v. Regular meeting of the Physiotherapists and senior medical staff should is encouraged for prompt determination of the indications for physiotherapy review in patients with confirmed or suspected COVID-19 and screening according to set/agreed guidelines.

## **SIMPLE AIRWAY CLEARANCE TECHNIQUES**

**Airways clearance techniques;** Consider the following techniques;

- Active cycle of breathing techniques,
- Positioning

- Manual and /or ventilator hyperinflation,
- Vibrations/compression technique
- Positive expiratory pressure (PEP) therapy.
- Forced expiration technique
- Huffing/Coughing
- Butterfly exercises

**In case of respiratory failure or need of airway clearance:** Consider the following techniques;

- Non-invasive ventilation (NIV)
- Inspiratory positive pressure breathing (IPPB)

The test of incremental respiratory endurance should not be considered as a first-line airway clearance technique.

**Techniques to facilitate secretion clearance:** consider the following techniques;

- Assisted or stimulated cough maneuvers
- Airway suction
- Postural drainage facilitated with vibration, positioning/compression.
- Forced expiration/ huffing technique
- Encourage mobilization via walking of selected Covid-19 patients.
- Rotate positions including lying on either side and sitting upright

### **RESPIRATORY FUNCTIONAL TRAINING.**

Active cycle breathing technique (ACBT). A circulation consists of three parts;

- Breathing control
- Thoracic expansion movements
- Forced expiratory technology

### **SELF-PRONE POSITIONING**

Patients should be made aware of other available airway clearance technique options like positioning. Prone positioning has been shown to improve oxygenation in spontaneously breathing, non-intubated, COVID-19, and NON-COVID-19 patients with hypoxemic acute respiratory failure. Some studies have demonstrated that the application of self-prone

positioning with HFNC may help avoid intubation. Recruitment of the posterior lung segments due to reversal of atelectasis. Prone positioning has been shown to improve oxygenation in spontaneously breathing, non-intubated NON-COVID-19 patients with hypoxemic acute respiratory failure. Consequently, its potential value in the management of patients with COVID-19 pneumonia has been explored. A management strategy involving early intervention and awake prone positioning with high-flow nasal cannula or non-invasive mechanical ventilation to prevent alveolar collapse resulted in lower intubation and mortality rates has been observed in different health care facilities. The available meta-analyses show that prone position can decrease mortality in ARDS patients when performed in the initial hours of disease manifestation, in patients with severe impaired oxygenation and for a long time (Mora-Arteaga, Bernal-Ramírez, and Rodríguez.2015). Some studies have demonstrated that the application of self-prone positioning with HFNC may help avoid intubation.

**Figure 3: Prone positioning**



## ASSIST PATIENT TO PRONE POSITION

- Explain procedure/benefit
- Get consent from the patient
- Ensure oxygen therapy and basic respiratory support secure with adequate length on the tubing
- Pillows may be required to support the chest
- Reverse Trendelenburg position may aid comfort
- Monitor oxygen saturations If drop then ensure O<sub>2</sub> connected and working
- Sedation must not be administered to facilitate prone positioning

*NB: For ICU intubated patients' needs a closer monitoring*



## PHYSIOLOGICAL EFFECTS OF PRONE POSITIONING

The physiological benefits of prone positioning that should apply to all patients regardless of whether they are intubated or not, include:

- Improved Ventilation/Perfusion (VQ) matching and reduced hypoxemia (secondary to more homogeneous aeration of lung and ameliorating the ventral-dorsal trans-pulmonary pressure gradient – more uniform lung ventilation, better distribution of air flow and better matching of areas that receive oxygen and appropriate blood flow).
- Reduced shunt (perfusion pattern remaining relatively constant while lung aeration becomes more homogenous – better matching of areas that have blood flow to receiving oxygen).
- Recruitment of the posterior lung segments due to reversal of atelectasis; Improved secretion clearance.

## DIFFERENT APPROACHES TO POSITIONAL ADJUSTMENT IN COVID-19

Various approaches have been attempted.

- Complete pronation (with the patient lying on their abdomen, ideally for 16-18 hours per day) as in prone intubated patients would be optimal. However, this can be difficult in many patients e.g. with haemodynamics instability.
- Another approach is to rotate positions, including lying on either side and sitting bolt upright which may be easier for many patients to tolerate. Some health care facilities encourage mobilization via walking of selected Covid-19 patients.
- Prone positioning for a few hours with a return to supine position may lead only to transient improvements in oxygenation. Longer-lasting benefit might result from longer periods of pronation, or strategies involving ongoing rotation between several different positions. The key principle is to avoid spending much time in a flat, supine position.

Awake pronation appears to be a safe, inexpensive, and versatile strategy which can be used at all levels across a variety of different healthcare settings. As one suggested approach, we suggest following the UK Intensive Care Society's prone positioning recommendations as outlined below.

**Table 9: Contraindication of prone positioning**

Absolute contraindications	Relative Contraindications
Respiratory distress (RR 35, PaCO <sub>2</sub> 6.5, accessory muscle use)	Facial injury
Immediate need for intubation	Neurological issues (e.g. frequent seizures)
Haemodynamic instability (SBP < 90mmHg) or arrhythmia	Morbid obesity
Agitation or altered mental status	Pregnancy (2/3rd trimesters)
Unstable spine/thoracic injury/recent abdominal surgery.	Pressure sores / ulcers

YES	NO
<p><b>CONTINUE PRONE POSITIONING PROCESS</b></p> <p>Change positions every 1-2 hrs. aiming to achieve a prone time as long as possible</p> <p>When not prone aim to be sat at between 30-60 degrees' upright</p> <p>Monitor oxygen saturations after every position change</p> <p>rate down oxygen requirements as able</p>	<p><b>IF DETERIORATING OXYGEN SATURATIONS:</b></p> <p>Ensure oxygen is connected to patient</p> <p>Increase inspired oxygen</p> <p>Change patients position</p> <p>Consider return to supine position</p> <p><b>Escalate to critical care if appropriate</b></p> <p><i>Discontinue if no improvement with change of position, Patient unable to tolerate position, looks tired and using accessory muscles</i></p>

**OXYGEN SATURATIONS FOR 15 MINUTES**

SaO<sub>2</sub> 92-96% (SaO<sub>2</sub> 88-92% if risk of hypercapnia respiratory failure) and NIL obvious distress

**DISCHARGE**

It is important to know that, to some patient’s symptoms may persist long after recovery of COVID- 19 and led to some dysfunctions as follows;

- **Respiratory dysfunction.** Long-lasting symptoms often include: coughing, tightness in the chest, shortness of breath, muscle aches that may be accompanied with respiratory muscle weakness and impaired lung functions. (ref: airway clearance techniques)
- **Physical dysfunction.** Presents with general body weakness, fatigue, muscle soreness and some **may be accompanied by muscle atrophy and decreased muscle strength.** (ref: physical function training- aerobic exercise program designed)
- **Mental dysfunction.** There are emotional problems such as fear, anger, anxiety, depression and difficulty in concentrating or feel like they aren’t as sharp as they used to be. (Consult the Psychologist/Counselor)

- **Barriers to activities of daily living (ADLs) and social participation.** Unable to complete dressing/ undressing, toileting, bathing etc. inability to achieve normal interpersonal communication and return to work. (Consult the Occupational therapist)

## **PHYSICAL FUNCTION TRAINING**

### **EQUIPMENTS REQUIRED**

All equipment related for physiotherapy cardio respiratory care, mobilization, exercises and rehabilitation such as;

- 1 Tilting table
- 3 Office chairs
- 3 Rollator /wheeled walking
- 1 Cycle ergometer
- 1 Steps/blocks
- 1 Treadmill
- Timer
- Additional respiratory equipment e.g. Incentive spirometer
- Physiotherapists personal protective gears (PPE) e.g. face shade, gloves, long sleeves gowns, hair cover for AGP etc.

### **Aerobic exercises**

Formulate aerobic exercise prescriptions for patients with combined underlying diseases and legacy dysfunction including:

- Stepping, Jogging, Brisk walking, Swimming, Skipping and
- Other sports

It is advisable to exercise moderately without the feeling of fatigue the next day after exercises, starting from the low intensity and gradually progressing to 20-30 min each time, 3-5 times a week. For the patients to be in prone position;

- i) Ensure starting the procedure 1hour after meal
- ii) For those who easily fatigue, intermittent exercises can be used.

## **STRENGTH TRAINING**

Use sand bags, thera band, dumbbells or bottled water for progressive resistance training, 3-5 days per 15-20 moves per group, 1-2 groups per day week.

### **Occupational therapy**






- Occupational therapist must be provided with the required Personal Protective Equipment in order to be safe from contracting COVID-19 during their practice.
- Occupational therapist should abide to all protective measures while attending patients.
- In patients will be initially assessed if they can comply with social distancing protocol during major ward round and while at the ward before attending OT interventions.
- Protective measures such as social distancing, hand sanitization and mask wearing should be well addressed to the patients.
- All therapeutic equipment should be regularly sanitized before any intervention.
- Individual sessions/interventions of patient will be done with social distancing highly observed.
- The individual interventions should not exceed an average of 30 minutes.
- Patients who are capable to implement therapeutic activities at home, they will be assigned graded task to do at home and reviewed in monthly basis.
- Patients who have not contracted COVID-19 should be educated about protective measures.
- Having more than one session in a therapy room should be avoided.
- Group therapy sessions should be done cautiously by considering the number of patients not exceeding five clients and preventive measures should be adhered to such as wearing face masks, observing social distancing and washing / sanitization of hands and therapy equipment.
- Home visits are not recommended during the COVID-19 outbreak.



## 10. NUTRITIONAL RECOMMENDATIONS FOR COVID-19

In order to improve immune function for reducing severity of COVID-19 effects, it is recommended to ensure that infected person meet daily nutrition requirement through taking adequate balanced meals from different food groups.

**Table 10: Food group and their examples**

S/N	Food groups	Examples
1	<b>Cereals, roots, tubers and plantains (green banana):</b>	
2	<b>Foods of animal origin, legumes and nuts</b>	
3	<b>Vegetables</b>	
4	<b>Fruits</b>	
5	<b>Sugar, honey, fat and oils</b>	

**Table 11. Dietary management of common illness associated COVID-19**

	Illness	Dietary recommendation
1	Fever	-Drink plenty of safe drinking water at least 8 glasses to decrease body temperature and prevent dehydration -Increase intake of citrus fruits juices - Eat small frequent meals as tolerated high in energy and protein
2	Colds, flu and cough	-Eat Vitamin C rich foods such as lemons, lime, and oranges, tomatoes, tamarind, baobab fruit, plums, mangoes, guavas and wild fruits -Eat plenty of green vegetables

		-Drink plenty of fluids -Add ginger, cinnamon, lemon juice, garlic, turmeric and onions to drinks and foods
3	Sore throat	-Eat soft, mashed foods such as rice, carrots, scrambled eggs, potatoes, bananas, soups and porridge -Eat warm temperature foods. -Avoid spicy, salty or sticky foods. -Avoid sugary foods that cause yeast to grow -Drink plenty of fluids -Avoid alcohol and cigarettes; these worsen the sore throat conditions -Gargle saline water
4	Nausea and vomiting	-Eat small frequent meals -Avoid an empty stomach; nausea is worse on an empty stomach. -Do not lie down immediately after eating -Eat soups, bland foods and dry foods such as bread calm the stomach
5	Loss of taste	-Eat small frequent meals -Include spices to enhance flavor of food -Eat dry foods such as cracker and bread -Chew food well and move it around the mouth to stimulate receptors
6	Anemia	-Eat Iron, Vitamin B12 and Folic acid rich foods such as animal products (eggs, fish, meat, liver), green leafy vegetables (amaranth, sweet potato leaves), legumes (beans), nuts, and fortified cereals -Eat meals rich in vitamin C such as fresh tomatoes, baobab fruit oranges, beetroot, guavas; Vitamin C helps the body absorb iron from plant-based foods -Avoid drinking tea or coffee within 2 hours before or after meals because they interfere with iron absorption
7	Diarrhea	-Eat small frequent meals -Avoid fatty foods -Avoid high spicy food -Increase K+ rich foods with reference to pts medical condition -Decrease fiber intake -Avoid eating raw vegetable -Avoid eating high sugary foods - Avoid drinking fresh milk

**a. Fluid retention**

- Patients with fluid retention require sodium and fluid restriction.
- Depending on the diuretics prescribed, increased dietary intake of potassium may be required
- The use of parenteral lipids or calorically dense enteral feedings may help the meet energy needs.
- Other Co-morbidities

Patients with other disease such as cardiovascular or renal disease, cancer, or diabetes mellitus should be nutritionally managed with their specific nutrient requirement.

**b. Nutrition consideration for critically ill patients with COVID-19**

- Consider medical nutrition therapy for all patients staying in the ICU, mainly for more than 48 hours
- General clinical assessment could include report of unintentional weight loss or decrease in physical performance before ICU admission, body composition, muscle mass and strength,
- Oral diet shall be preferred over Enteral Nutrition or Parenteral Nutrition in critically ill patients who are able to eat, and if not possible, initiate early enteral nutrition and if possible within 48 hours.
- In case of contraindications to oral and Enteral Nutrition, Parenteral Nutrition should be initiated within three to seven days
- To avoid overfeeding, early full Enteral Nutrition and Parenteral Nutrition shall not be used in critically ill patients but shall be prescribed within three to seven days.
- Hypocaloric nutrition (not exceeding 70% of Estimated Energy) should be administered in the early phase of acute illness and increased from day 3 to day 7 to 80-100% based on stability and tolerance of the patient.
- Antioxidants as high dose monotherapy should not be administered without proven deficiency.
- To enable substrate metabolism, micronutrients (i.e. trace elements and vitamins) should be provided daily with Parenteral Nutrition.
- Enteral Nutrition should be delayed if there is uncontrolled shock, hypoxemia, hypercapnia or acidosis upper GI bleeding, high-output intestinal fistula or gastric residual volume is above 500 ml.

## 11. PSYCHOSOCIAL INTERVENTIONS

### For Suspects/Patients with COVID-19 and Family members

Suspected and confirmed cases of the COVID-19 may experience fear of severe disease consequences and the infection. Consequently, they may experience denial, anxiety, fear, stress, loneliness, depression, insomnia, and despair, which may lower treatment adherence. Some of these cases may even have increased risk of serious distress. Suspected isolated cases may suffer from anxiety due to uncertainty about their health status and develop obsessive-compulsive symptoms, such as repeated temperature check. However, isolation could cause family disintegration, societal rejection, financial loss, discrimination, and stigmatization.

The following intervention will be provided by social workers, clinical psychologists and trained counsellors.

- a. Assessment and initial counselling session  
This should be done immediate after admission and during investigation. Session will involve;
  - Assessing the patient's and family member's knowledge about COVID-19 pandemic
  - Assessing anxiety, stress, depression and suicide risk due to COVID-19 pandemic
  - Assessing social resources
  - Building psychological resilience for dealing with clinical procedures, receiving results and addressing psychosocial issues due to COVID-19 pandemic.
- b. Provide Psychological First Aid (attend immediacy issues identified) to individuals in distress so they feel calm and supported to cope better with their challenges.
- c. Provide appropriate psychological intervention in dealing with anxiety, stress, depression, suicidal thought and other psychosocial conditions while continue to observed for any psychiatric changes (when occurs) and managed accordingly
- d. Prevent and address stigma and discrimination
- e. Ensure that client's social network (family members and significant others) are oriented about COVID-19 and safety precautions before linking with the patient.
- f. Encourage family members to regulate their emotions before contact with client and provide necessary support through the available safety procedures.
- g. Make a discharge plan, for those patients who have accomplished their treatment. This will involve a collaboration with survivor's, patient's family, neighbourhood and inform them about the health status of the patient.
- h. Making follow-up to discharged patients in order to observe their conditions, in case there is any changes immediately action should be taken
- i. Collaborating with professionals from other discipline in delivering comprehensive care,

## **Mode of Intervention**

These services can be delivered through “in-person” session such as being in the same physical space or “remote” through the use of telepsychology/tele psychiatry where different technologies may be used in various combinations and for different purposes. For example, videoconferencing and telephone may also be utilized for direct service while email and text is used for non-direct services (e.g. scheduling).

## **For Carers in the COVID-19 Response**

Many people will feel stressed and exhausted while working in the COVID-19 response. This is natural given the difficult demands. Everyone reacts differently to stress. You may experience some of the following:

- Physical symptoms: headaches, difficulty sleeping and eating
- Behavioral symptoms: low motivation to work, increased use of alcohol or drugs, disengaging from religious/spiritual practices
- Emotional symptoms: fear, sadness, and anger.

If you feel the above symptom, practice the following techniques to manage stress on a daily basis. Choose those that work best for you personally. If you do not manage to do this one-day, be kind to yourself and try again the next day.

- a. Stay up to date with accurate information about COVID-19 and follow safety measures to prevent infection. Take “breaks “from COVID-19 media when needed.
- b. Eat well, get enough sleep and exercise physically every day.
- c. Do an activity you enjoy or find meaningful every day (e.g. art, reading, prayers, talking to a friend).
- d. Take five minutes out of your day to talk to a friend, family member or other trusted person about how you are feeling.
- e. Talk to your manager, supervisor or colleagues about your well-being at work, particularly if you are worried about working in the COVID-19 response.
- f. Establish daily routines and stick to them
- g. Minimize your use of alcohol, drugs, caffeine or nicotine. These might seem to help in the short term, but they can lead to lower mood, anxiety, difficulty sleeping and even aggression as the effects wear off. If you are consuming too much of any of these substances, you can cut down by reducing the amount available in your house and finding other ways to manage stress, such as those mentioned here.
- h. At the end of each day, make a short list (in your head or on paper) of ways you were able to help others or things you are grateful for, such as” I helped by being kind to someone who was upset” or “I’m grateful for support from my friend”.
- i. Be realistic about what you can and cannot control. Visualizing circles of control may help with this.
- j. Try an activity to relax – see what works for you. You may already have some activities you use now or have used in the past. You can also try: slow breathing,

stretching, dancing, praying or doing yoga; progressive muscle relaxation such as walking, jogging, running

**Note:**

If stress is consistently persisting or stopping, you from doing your daily activities (e.g. going to work) then seek professional support.

## 12. SPECIAL GROUPS

### 12.1 MATERNAL, NEWBORN AND CHILD HEALTH SERVICES IN COVID-19

Most women attending RMNCAH services are healthy and are advised to maintain stringent physical distancing. It is recognized that women may have significant anxiety about the possibility of contracting COVID-19 by attending RMNCAH services. Similarly, health workers may be worried that they acquire an infection from their clients. Therefore, health facilities should ensure that women are protected from contracting COVID-19 while receiving services by putting strict infection prevention and control guidance and reinforcing appropriate use of PPE.

Particular consideration should be given while providing care to women with co-morbidities. Women should be encouraged to wear masks during hospital visits. Patient status should clearly have communicated during any handover, shared waiting areas should be avoided and if admitted they should be in a side room.

Principles below are listed as a hierarchy of infection prevention and control measures at a health facility /ward level. (Note that this list is not exhaustive but includes key principles and illustrates a useful approach to preventing and controlling COVID-19).

The hierarchy of control measures is:

- a. Early recognition or reporting of cases
- b. Early assessment or triaging of cases
- c. Implementing control measures, including
  - Maintaining separation in space and or time between suspected and confirmed COVID-19 patients
  - Educating staff, patients and visitors about standard precautions and TBPs
  - Prompt implementation of TBPs to limit transmission
  - Restricting access of ill visitors to the facility, generally minimize visitors to a facility
  - Instructing staff members with symptoms to stay at home and not come to work until symptoms resolve
  - Isolation rooms or ward bays should ideally have a defined area for staff to put on and remove PPE, and suitable bathroom facilities.
  - Only essential staff should enter the room and visitors should be kept to a minimum.
  - All non-essential items from the clinic/scan room should be removed prior to the woman's arrival.
  - All clinical areas used must be cleaned after use, as per national IPC guidelines.

### **a) Caring for Women During and after Pregnancy in Context of COVID-19**

The following are the general principles of care during antenatal, delivery and postnatal period:

- Continuity of care models i.e. midwifery care will reduce the number of caregivers in contact with women and decrease the chances of COVID-19 spread in hospitals. Continuity of midwifery care should be encouraged and provided.
- Midwives have the right to fully access for all Personal Protective Equipment (PPE), sanitation and a safe and respectful working environment
- Deploying midwives away from maternity services to work in public health or general medical areas during COVID-19 pandemic is likely to increase poor maternal and newborn outcomes hence preparation in advance is of paramount importance
- Maternity services shall continue to be prioritized as an essential core health service.

### **Antenatal Care During COVID-19**

- Just like general population, pregnant women with history of contact should be monitored closely.
- There is no evidence that pregnant women present with increased risk of severe illness or fetal compromise. However, due to changes in their bodies and immune systems, pregnant women can be badly affected by some respiratory infections. Therefore, it is important to take precautions to protect themselves against COVID-19 and report any symptoms to the disease to healthcare worker.
- There is no evidence yet of mother to child transmission reported. To date, the virus has not been found in samples of amniotic fluid or breast milk
- Under this guidelines, its recommended that all women should have access to safe, high-quality Antenatal Care (ANC) including Malaria in Pregnancy (MiP) services
- The aim of ANC guidance is to ensure providers can deliver respectful and individualized ANC services that promote the safety of a woman and her fetus, families and health care workers (HCW) during the COVID-19 pandemic.
- All pregnant women, including those with confirmed or suspected COVID-19 infections, have the right to high quality care before, during and after childbirth.
- Health facility staff should collaborate with Community Health Workers (CHWs) to ensure messaging to the community highlights the need to continue with routine preventive care services, such as Reproductive Maternal Newborn Child and Adolescents Health in the context of COVID-19
- CHW may be instrumental during COVID-19 pandemic when there is community movement restrictions. In such situation CHW may assist client screening at home



for any problem and escort to neighbor health facility if needed, provide essential supplies at home and commodities such as condom and oral contraceptive pills.

- Depending on the situation and in order to decongest clinics, ANC visits for mothers without clinical problems may be adjusted, instead of coming monthly, clients may be given appointment for a spacing of 2 months or more while linked to CHW for regular checkup at home including ensuring adequate ANC such as SP, FeFo, LLINs, Mebendazole/ Albendazole

**Table 12. Summary of recommendations of Care During Pregnancy**

<p>During pregnancy it is advised to:</p> <ul style="list-style-type: none"><li>▪ Minimize face-to-face contacts with client and a minimal of four (4) virtual contacts</li><li>▪ Schedule for low risk women, where face-to-face appointments can be replaced with remote assessments are detailed in table 2. As far as possible, scans, preventive measures, ANC assessments and laboratory investigations should be provided within a single visit, involving as few staff as possible.</li><li>▪ Provide ANC medicine packages such as SP, FEFO, mebendazole, etc by use of no hand touching techniques.</li><li>▪ Consider scheduling the post-dates appointment on a day where induction of labor can be commenced (after 41+0, in line with National guidelines).</li><li>▪ As many as 50% of ANC clients may have conditions that necessitate additional appointments or multi-disciplinary care. All contacts that do not require additional interventions like laboratory, radiological or others should be provided remotely via CHW or when available via mobile phone.</li><li>▪ All pregnant women should be screened for danger sign (by quick check) followed by screening and triage for COVID-19</li><li>▪ Must bear in mind that malaria can present along with COVID-19, all pregnant women should be routinely screened for malaria.</li><li>▪ Provide information to danger signs, signs of labor, birth preparedness, and complication readiness plans.</li><li>▪ If risk assessment identifies potential or actual complications more frequent contacts need to occur and these may need to be face-to-face.</li><li>▪ Health care providers should provide information and education to pregnant women to address fears/rumors/misconceptions around COVID-19.</li><li>▪ Health care provider should identify and make inquiry on GBV using GBV standard protocols and provide first line support to GBV survivors;</li><li>▪ Listen closely without judgement;</li><li>▪ Enquire about needs and concerns;</li><li>▪ Validate experience;</li><li>▪ Support them to connect with additional services;</li><li>▪ In case of rape, provide minimum package of post rape management as per protocol.</li></ul>
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## **Intrapartum Care in the Context of COVID-19**

Generic screening and triage should be used for every client on the first ANC clinic visit, labor and delivery wards

### **Labor Room Preparedness**

- Majority of women presenting in labor will have no respiratory symptoms, and labor room shall keep normal provision of services. However, the labor rooms must keep readiness to IPC practices by:
  - Have sufficient supplies of all PPE supplies (masks, gloves, goggles, gowns, hand sanitizer, soap and water, cleaning supplies).
  - All surfaces should be cleaned thoroughly with chlorine 0.5%. Staff should follow regular hand hygiene practices by hand washing before and after any procedure.

### **For all women**

- Triage and screening need to take place for all women and their birth companion before entering the health facility as outlined in previous sections.
- Routine IPC precautions need to be instituted to every labor and birth conducted.
- In obstetric and newborn emergencies, care of the mother or newborn should not be delayed.
- Women should be encouraged to delivery at the health facility and inform the HCW at maternity for any respiratory or other COVID-19 related symptoms.
- All women should be managed in line with National Guideline for Gender and Respectful Maternity Care Mainstreaming and Integration Across RMNCAH Services.

### **Intrapartum patients suspected or confirmed to have COVID-19 infection**

- If patient is not having danger signs, and birth not eminent and transport exists, consider transfer of patient to the maternity unit at the designated COVID-19 treatment unit.
- If patient is in the second stage of labor with symptoms and signs suggestive of COVID-19 infection or if confirmed to be COVID-19 positive and transfer to HIDTU not possible, it is important for her and the baby to be isolated.
- All women suspected or confirmed to have COVID-19 infection in labor and delivery shall wear mask to prevent spread of infection via nasal - droplets.
- Health care workers assisting women in labor and delivery suspected or confirmed to be COVID-19 infected shall wear PPE as recommended by the guidelines.
- Mode of delivery needs to be individualized based on obstetric indications and not be influenced by the presence of COVID-19
- Management of women suspected or confirmed to have COVID-19 infection shall be conducted in isolation room for the entire stay of the patient.

- Where women do not have access to a single room, it is still essential to find a way of separating sick women from not infected women to reduce the risk of virus transmission
- Women with moderate-severe symptoms of COVID-19 should be monitored using hourly fluid input-output charts in order to avoid the risk of fluid overload.
- If a newborn born to a COVID-19 suspected or confirmed mother fails to establish spontaneous breathing, health care providers should use separate set of equipment to resuscitate the baby.
- If an infected woman requires a caesarian section all staff in theatre should wear full PPE as recommended by COVID-19 IPC Guidelines.
- Mothers and babies have the right to remain together at all times, even if the baby is born small, premature or with medical conditions that require extra care.
- There is no evidence to suggest that steroids for antenatal corticosteroids given to mothers to prepare for preterm delivery cause any harm in the context of COVID-19.

### **Referral in labor for COVID-19 patient**

- Prepare transport equipment and drugs in anticipation of medical emergencies that may occur on the route, such as sudden cardiovascular collapse or hypotension.
- All staff transporting the patient should be on PPE as recommended by COVID-19 Guidelines.
- Ensure that the patient is wearing mask during transportation
- If a bag valve mask (BMV) is required during transport, provide only gently bagging to reduce aerosolization in the event of worsening hypoxia.
- Avoid unnecessary breathing circuit disconnection during transportation

<b>EXPECTING NORMAL DELIVERY</b>	<b>DELIVERING BY CAESAREAN SECTION</b>
<ul style="list-style-type: none"> <li>▪ If possible, put the woman in isolation room equipped for managing patients who test positive for COVID-19</li> <li>▪ Monitor labor as per guideline using partograph</li> <li>▪ Ensure vacuum extraction equipment at hand in case of maternal distress (respiratory) during second stage of labor</li> <li>▪ Tell the mother to wash her hand and the breast with soap and water and start skin-to-skin and breast-feeding practices while putting on mask</li> <li>▪ Provide psychosocial support to a woman in labor and companion specifically by</li> </ul>	<ul style="list-style-type: none"> <li>▪ Obtain an informed consent</li> <li>▪ Observe normal preparations for caesarean delivery</li> <li>▪ Patient must have face mask in the theatre</li> <li>▪ HCWs should wear PPEs</li> <li>▪ Spinal anesthesia is preferred unless there are contraindicated</li> <li>▪ When intubation and general anesthesia is required, rapid induction, using short acting muscle relaxant preceded by generous oxygenation, and by-passing need for bag and mask to minimize aerosol generation.</li> </ul>

providing facts related to COVID-19 and available services	
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**Postnatal care in the context of COVID-19**

Generic screening and triage should be used to every client on the first contact in postnatal ward and clinic. Postnatal care (PNC) should be individualized according to the woman and newborn’s needs.

**Discharge after delivery**

- For normal delivery with no any complication to the mother and newborn, discharge is recommended to be given after 6 hours.
- For normal delivery with no any complication to the mother and newborn, but living far away from the facility, consider discharge after 12 hours.
- For caesarean section deliveries and complicated births, the decision for discharge shall be individualized.
- Additional discharge counselling in the setting of COVID-19 infected mother includes:
  - Take basic IPC precautions to protect themselves such as hand washing with soap or sanitizer.
  - Delay discharge up to 24 hours due to risk of thromboembolism in pregnancy which may complicated the COVID-19 infection
  - Seek medical care in case of symptoms of COVID-19
    - Advise on signs and symptoms
    - Advise on COVID-19 prevention/home care/ and home remedies
    - Advise on signs of severe COVID-19 and how and where to seek medical care
    - *If possible – take the phone number of all patients and the facility should develop a system (assign a nurse with phone budget to call all patients and follow up every three days and document findings).*

**Ambulatory postnatal care**

- The minimum recommended number of contacts is three: at day 1, day 5 and day 10
- Prioritize face to face visiting for women with:
  - Known psycho-social vulnerabilities
  - Operative birth
  - Premature/low birthweight baby
  - Other medical or neonatal complications including post COVID-19
  - Where continuity models of care are in place PNC visit after 10 days can take care at home by CHWs or phone calls and attend for routine care for the baby at 6 weeks

- If the pandemic progresses to worse situation consider to institute home visits by using electronic solutions or CHWs to reach women at home.

**b) Feeding and caring for infants and young children of mothers with COVID-19**

Mothers with suspected or confirmed COVID-19 should be encouraged to initiate and continue breastfeeding. From the available evidence, mothers should be counselled that the benefits of breast-feeding substantially outweigh the potential risks of transmission.

**Table 13. Summary of recommendations when mother with COVID-19 who is caring for an infant**

	<b>Intervention</b>
Mother Infant contact at Birth	<p>Mothers should not be separated from their infants unless the mother is too sick to care for her baby. If the mother is unable to care for the infant another competent family caregiver should be identified</p> <p>Mother and infant should be enabled to remain together while rooming-in throughout the day and night and practice skin-to-skin contact, including kangaroo mother care, especially immediately after birth and during establishment of breastfeeding, whether they or their infants have suspected or confirmed COVID-19 infection</p> <p>Neonates born to mothers with suspected or confirmed COVID-19 should be breastfed within 1 hour of birth. Mothers should apply appropriate IPC</p> <p>Early and uninterrupted skin-to-skin contact between mothers and infants should be facilitated and encouraged as soon as possible after birth, while applying necessary measures for IPC. This applies also to infants who are born preterm or low birth weight</p> <p>If the newborn or infant is ill and requires specialist care (such as neonatal unit), arrangements should be made to allow the mother free access to the unit, with appropriate measures</p> <p>Earlier initiation of breastfeeding results in greater benefits. This may be relevant to mothers who give birth by caesarean section, after an anesthetic, or those who have medical instability that precludes initiation of breastfeeding within the first hour after birth</p>
During early childhood	<p>Infants should be breastfed exclusively during the first 6 months after birth, as breastmilk provides all the nutrients and fluids they need</p> <p>From 6 months of age, breastmilk should be complemented with a variety of adequate, safe and nutrient-dense foods</p> <p>Breastfeeding should continue up to 2 years of age or beyond. Breastfeeding counselling, basic psychosocial support and practical feeding support should be provided to all pregnant women and mothers with infants and young children if</p>

	<p>they or their infants and young children have suspected or confirmed COVID-19 infection</p>
<p>If feeding is interrupted</p>	<p>In situations when severe illness in a mother prevents her from caring for her infant or prevents her from continuing direct breastfeeding, mothers should be encouraged and supported to express milk, and the breastmilk provided safely to the infant, while applying appropriate IPC measures</p> <p>In the event that the mother is too unwell to breastfeed or express breastmilk, explore the viability of feeding with donor human milk. If this is not possible, consider appropriate breastmilk substitutes, informed by feasibility, safety, sustainability, cultural context, acceptability to mother and service availability</p> <p>Mothers who are not able to initiate breastfeeding during the first hour after delivery should still be supported to breastfeed as soon as they are able. Assistance should be provided after recovery for re lactation to re-establish a milk supply and continue breastfeeding.</p>
<p>Practices the mother should perform during all infant and childcare</p>	<p>Perform frequent hand hygiene with soap and water or alcohol-based hand rub, especially before contact with her child</p> <p>Perform respiratory hygiene: sneeze or cough into a tissue and immediately dispose of the tissue. Hands should immediately be washed with soap and water or alcohol-based hand rub.</p> <p>Clean and disinfect surfaces with which the mother has been in contact</p> <p>Wear a medical mask until symptom resolution and criteria for release from isolation have been met.</p> <p>Additionally, breastfeeding mothers should be helped to clean her chest with soap and water if she has been coughing on it before breastfeeding. She does not need to wash her breasts prior to every breastfeed.</p> <p>While mothers are recommended to wear medical masks, if the mother does not have a medical mask, she should still be encouraged to continue breastfeeding as the benefits of breastfeeding outweigh the potential risks of transmission of the virus when breastfeeding while applying other IPC measures.</p>
<p>Best practices for breast-feeding</p>	<p>Health facilities providing maternity and newborn services should enable a mother to breastfeed for as often and for as long as she wishes. Minimizing disruption to breastfeeding will require health care practices that enable a mother to breastfeed</p> <p>All mothers should receive practical support to enable them to initiate and establish breastfeeding and manage common breastfeeding difficulties. This support should be provided by appropriately trained health care professionals and community-based lay and peer breastfeeding counsellors</p>

	<p>There should be no promotion of breastmilk substitutes, feeding bottles and teats, pacifiers or dummies in any part of facilities providing maternity and newborn services, or by any of the staff</p> <p>Health facilities and their staff should not give feeding bottles and teats or other products that are within the scope of the International Code of Marketing of Breast-milk Substitutes and its subsequent related WHA resolutions, to infants</p> <p>If the mother is too unwell to breastfeed or express breastmilk, explore the best alternatives to breastfeeding a newborn or young infant, in priority order, as follows: 1) donor human milk should be fed if available from a human milk bank; 2) if supplies are limited, prioritize donor human milk for preterm and low birthweight newborns; 3) breastmilk substitutes may be used as a last resort</p>
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### **c) Paediatric care in Outpatient Departments**

HO recommends triaging of all children coming to the health facilities to identify those with respiratory tract infections. Common symptoms of COVID-19 infection include fever, cough and difficulty in breathing. Therefore, triaging children with any respiratory tract infection is compulsory.

All health workers should be trained in protocols for COVID-19 screening, triage and isolation of all children arriving with common symptoms of cough, fever, and difficulty in breathing within the last 14 days. Health care workers should be trained in IPC including appropriate PPEs use in line with Guidelines.

### **RECOMMENDATIONS**

1. Group all children identified at the point of triage who have respiratory symptoms to one area at least 1- 2 meters away from the other children in the waiting area and process them rapidly ensure social distancing is observed in the waiting area.
2. Screen and isolate all children with suspected COVID-19 as per the case definitions.
3. Children with signs and symptoms of pneumonia as per Integrated Management of Childhood Illness clinical algorithms should be prioritized for COVID -19 testing.

### **d) Adjustments to be done when managing newborns and Children in the context of COVID-19**

#### **Neonatal Care Units**

No vertical transmission has been documented. Breast milk samples from the mothers who were COVID-19 patients were negative for SARS-CoV-2 (Cui et al., 2020; Zhu et al., 2020). However, health care workers need to take precautions so as not to transmit the virus to the newborn babies.

Breastfeeding protects against common causes of death and morbidity, also in the post-neonatal period and throughout infancy and childhood.

## **RECOMMENDATIONS**

1. Appropriate PPE should be used correctly by all healthcare personnel, both when attending the mother and when examining or caring for the baby.
2. Where appropriate, early discharge of baby with a good condition with a parent or caregiver should be facilitated.
3. Infants born to mothers suspected, or confirmed COVID-19 infection, should be breastfed while applying necessary precautions for IPC.
4. Symptomatic mothers who are breastfeeding or practicing skin-to-skin contact or Kangaroo Mother Care should be admitted in a designated room ***NOT in neonatal care unit***. A mother should wear a mask when breastfeeding or attending her child and perform hand hygiene before touching the baby with frequent disinfection on used surfaces.
5. In the event that the mother is too unwell to breastfeed or express breast milk, appropriate breast milk substitutes can be used.
6. Babies of COVID-19 confirmed or suspected mothers requiring admission to the Neonatal Care Unit (NCU) should be assessed and admitted in a designated area/room. *If NO room is available, ensure space of 2m between babies and nurse in an incubator.*
7. Minimize unnecessary clinical investigations for babies born to suspected /confirmed COVID-19 positive mothers.
8. All babies requiring respiratory support like CPAP should be nursed in an incubator if available.
9. Continue to promote, protect and support breastfeeding for all sick and preterm babies in neonatal care unit.
10. No visitors should be allowed in the isolation unit/room for the entire duration of the admission in the isolation unit.
11. All equipment used in neonates of COVID-19 positive mothers should be decontaminated and sterilized as per National IPC guidelines.

### **12.2 SURGERY AND PROCEDURES IN CONTEXT OF COVID-19**

Some adjustment in our routine surgical practices are necessary so as to address the conservation of critical resources such as ventilators and Personal Protective Equipment (PPE), as well as limiting exposure of patients and staff to the COVID-19.

The priorities below will guide surgeons/physicians on how best to provide surgical /anesthetic services and procedures to save a life, preserve organ function, and avoid further harms from underlying condition.



There are different levels of urgency related to patient needs, and judgment required to discern between these. However, if the numbers of COVID-19 patients requiring care escalates, the surgical care of patients should be limited to those whose needs are;

- Imminently life threatening (loss of life, limb etc.)
- Caesarean Sections
- Patients with malignancy requiring curative surgery where option of radiation or chemotherapy to prevent progress does not exist

All other procedures should preferably be delayed until after the peak of the pandemic.

- All COVID-19 confirmed positive surgeries should preferably be performed on the special allocated Operation Theatre room or OT.

**a. In theatre**

- Minimal number of staffs in theatre
- Full PPE including visitors for all staff in theatre
- Stop positive ventilation in theatre during procedure and for at least 20 minutes after the patient has left theatre
- Only senior and skilled anesthesiologists to intubate and extubate. Endeavour must be to ensure smooth extubation
- Smoke evacuation for diathermy / other energy sources
- Patients are intubated and extubated in theatre – staff immediately present should be at a minimum. Cases requiring postoperative ventilation should be deferred whenever feasible till after the peak of the pandemic is over, both to reduce exposure of healthcare workers and to keep resources like ventilators available for pandemic.

**b. Operational Principles**

These guidelines provide decision support for the perioperative management of patients requiring anesthesia and surgical services. They are prioritized in the context of PPE availability, PPE reuse capability, and testing capacity.

- All perioperative patients will be clinically screened for symptoms of COVID-19 (new cough, shortness of breath, fever in the last 7 days; known exposure to COVID-19 positive person)
- The surgical team should adhere to the universal precautions in all occasions; assume every surgical patient is COVID-19 positive and therefore protect yourself and protect others
- Patients will be categorized as asymptomatic, asymptomatic with exposure risk, or symptomatic
- Pre-symptomatic patients may shed SARS-CoV-2 from the nasopharynx and oropharynx

- Pre-symptomatic patients require appropriate considerations and PPE for Aerosol Generating Procedures (AGP) including intubation
- All patients undergoing urgent, time sensitive, and elective procedures should preferably undergo laboratory testing for COVID-19
- Time allowing, all medically necessary time-sensitive cases and elective cases will be asked to adhere to COVID-19 measures including physical distancing, self-quarantine for 2 weeks until day of their surgical procedure.
- It is recognized that emergency cases and some urgent cases may be time prohibited with respect to testing and physical distancing; appropriate PPE and workflow will be required

### c. **Standard COVID-19 PPE**

#### **Augmented COVID-19 PPE**

- Team members don full contact, droplet, and airborne PPE. This includes PAPR/CAPR plus gown and double gloves.

#### **High-Risk Surgeries:**

These procedures require all team members to use Standard **COVID-19 PPE** unless patient tested negative for COVID-19 within 72hours then SOP for OR

- All thoracic surgery requiring lung isolation or tracheal / pulmonary resection
- Flexible Bronchoscopy of lower airways through ETT – Diagnostic (DLT and blocker placement), BAL, brushing, biopsy, trans bronchial biopsy or similar.
- GI Endoscopy, TEE, ECT, cardioversion
- Scheduled cesarean section or other planned regional anesthetic with high likelihood of requiring conversion GA (mask or intubation)

#### **Ultra-High-Risk Surgeries:**

These procedures require all team members to use of **Augmented COVID-19 PPE** unless patient tested negative for COVID-19 within 72 hours then SoP for OR

- Any procedures on the glottis, oropharynx, nasopharynx, mastoid, or sinuses
- Any ENT/OMFS procedures using cautery, laser, drill or saw use within airway/oral cavity
- Any procedures utilizing operative rigid laryngoscopy or rigid bronchoscopy
- Any procedures on the subglottic airway involving incision of the airway (tracheostomy), dilation of the airway, laser or electrocautery debridement of the airway.

**a. Scenario when COVID-19 Laboratory Testing is absent**

SCENARIO	ANESTHESIA PROVIDER PPE	SURGEON/NURSING PPE	NOTES
<ul style="list-style-type: none"> <li>▪ Asymptomatic. No exposure. Low risk procedure emergent or urgent</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>▪ Asymptomatic with positive exposure, no symptoms after 14 days quarantine urgent low risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> </ul>	<ul style="list-style-type: none"> <li>▪ SOP if not present for intubation otherwise the same as anesthesia providers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minimize number of providers' present</li> <li>▪ 15 minutes wait time {following intubation for entry}</li> <li>▪ 15 minutes wait time for egress following extubation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Asymptomatic, No exposure, emergent high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ PPE to be worn by all members throughout procedure</li> <li>▪ Minimize number of providers present</li> </ul>
<ul style="list-style-type: none"> <li>▪ Asymptomatic positive exposure emergent procedure</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>▪ Symptomatic emergent procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Presume positive</li> <li>▪ PPE to be worn by all members throughout procedure</li> <li>▪ 15 minutes wait time for egress following extubation or leave intubated based on the medical condition</li> <li>▪ Minimize number of providers' present</li> <li>▪ COVID unit post op for R/O</li> </ul>

**b. Scenario when COVID-19 Laboratory Testing is Performed**

SCENARIO	ANESTHESIA PROVIDER PPE	SURGEON/NURSING PPE	NOTES
<ul style="list-style-type: none"> <li>▪ Asymptomatic, No exposure, urgent high risk procedure</li> <li>▪ COVID negative</li> </ul>	<ul style="list-style-type: none"> <li>▪ SOP</li> </ul>	<ul style="list-style-type: none"> <li>▪ SOP</li> </ul>	<ul style="list-style-type: none"> <li>▪ Post op home or non COVID unit</li> </ul>
<ul style="list-style-type: none"> <li>▪ Asymptomatic, No exposure, urgent high risk procedure</li> <li>▪ COVID positive</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minimize number of providers' present</li> <li>▪ 15 minutes wait time {following intubation for entry}</li> <li>▪ 15 minutes wait time for egress following extubation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Symptomatic urgent procedure</li> <li>▪ Outpatient</li> <li>▪ COVID positive</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minimize number of provider's present</li> <li>▪ 15 minutes wait time {following intubation for entry}</li> <li>▪ 15 minutes wait time for egress following extubation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Symptomatic urgent procedure</li> <li>▪ Inpatient</li> <li>▪ COVID positive</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ N95 plus face shield/goggles or PARP/CARP</li> <li>▪ Gown</li> <li>▪ Double gloves</li> <li>▪ Augmented PPE indicated if ultra-high risk procedure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Minimize number of providers' present</li> <li>▪ 15 minutes wait time {following intubation for entry}</li> <li>▪ 15 minutes wait time for egress following extubation</li> <li>▪ Proceed to COVID unit</li> </ul>

## 12.3 COMORBIDITIES IN THE CONTEXT OF COVID-19

### RENAL DISEASES

Perform renal replacement therapy to Patients with COVID-19 infection who develop:

- Acute kidney injury with:
- Life threatening changes in fluid,
- Electrolytes and acid base balance OR
- Worsening of existing chronic kidney disease

Patients who are already on maintenance hemodialysis should be able to continue with hemodialysis therapy.

Bedside hemodialysis therapy should be done in dedicated area for dialysis therapy in COVID-19 ICU

- If no available dedicated area for dialysis portable reverse osmosis water in a tank will serve the purpose for the dialysis.
- If more dialysis is expected in selected area, dialysis machine may be left in the same area for future dialysis.
- Heparin injection will be used for patients with stable bleeding indices as per standard hemodialysis guidelines
- Saline infusion will be used in place of heparin injection in patients who are newly initiated on hemodialysis or for patients with contraindication for use of heparin injection

Health care workers should be on full PPE's while performing dialysis and relate procedures and while discarding used consumables.

Equipment that may come into contact with patients or potentially contaminated material should be disinfected according to standard protocols.

### CARDIOVASCULAR DISEASES

Cardiac conditions that are considered include:

- Hypertension
- Myocardial diseases
- Arrhythmias
- Valvular heart diseases

General management principles:

- Clinical assessment of severity: BP, oxygen saturation, level of consciousness
- Monitoring of symptoms progression i.e. worsening of DIB, desaturation, confusion.
- Symptomatic treatment will include pain and temperature management
- Supportive care
- Prevention of complications

Baseline investigations:

12 lead ECG, Echo, Chest radiography, D-Dimer, Prothrombin time (PT), Activated partial thromboplastin time (aPTT), fibrinogen, ferritin, lactate dehydrogenase, Doppler for suspected DVT, MRDT, RBG, HbA1c for newly diagnosed diabetics, FBP, CRP, Troponin I&T, BNP, Electrolytes, ABG, Bilirubin, ALT, AST, serology for HIV, HBC and HCV, serum creatinine and Urea, sepsis workup.

## **DIABETES MELLITUS**

Hyperglycemia is common in critically ill patients, even in the absence of pre-existing Diabetes Mellitus and is associated with an increased morbidity and mortality.

A good glycemic control is an important requirement in patients with Covid-19 as is associated with reduced morbidity and mortality.

- Blood glucose levels should be checked in all covid-19 patients
- Ketones in urine should be checked if RBG>12mmol/L
- Blood pH and bicarbonate levels are to be checked if ketones are  $\geq 3$ mmol/L
- Insulin administration should be with an insulin pump or infusions (drips) using validated protocols to minimize the risk of hypoglycemia
- Daily monitoring of serum potassium as hypokalemia is common in insulin treatment.

Health care worker should be on full PPE's. Equipment that may come into contact with patients or potentially contaminated material should be disinfected according to standard protocols.

## **RESPIRATORY DISEASES**

Treatment of concomitant lung diseases such as PTB, ILD, COPD, Asthma, and PTLD is not different in people with or without COVID-19 infection. No cautions on drug-drug interactions are indicated at present.

- Treatment for PTB/CLD should continue uninterrupted.
- A positive result for COVID19 infection does not exclude the possibility of concomitant TB. Healthcare workers need to consider the possibility of TB in a patient with COVID-19 if the course of the illness after the first weeks suggests so, e.g. progression to hemoptysis, persistent fever, night sweats or weight loss. A careful history and Chest radiography or imagery may help differentiate TB from other pathologies
- Restrict the use of nebulizers for inhalation therapy. Nebulizer is to be used only in the following situations:
  - Patients with severe, life-threatening respiratory disease (e.g., those with severe or impending respiratory arrest, or those with hypoventilation or ventilation compromise, continuous nebulization, end-stage chronic obstructive pulmonary disease, cystic fibrosis); or
  - Patients who are uncooperative or are unable to follow the directions required for using a metered-dose inhaler with spacer; or
  - Patients with a history of poor response to metered-dose inhaler with spacer.

- Smoking cessation should be advocated to all COVID-19 suspects/cases.

## **HUMAN IMMUNODEFICIENCY VIRUS (HIV)**

Although the risk of Covid-19 in those living with HIV is yet to be determined, it is important to consider co-infection treatment modalities.

- The risk may be exacerbated with age and other comorbidities such as TB, post TB bronchiectasis, diabetes and COPD>
- For patients already on antiretroviral therapy (ART), ensure that the patient obtains an adequate supply of all drugs, including prophylaxis as required.
- For patients newly diagnosed with HIV, ART should be started as soon as the patient is ready.
- Distinguishing Covid-19 from PJP may be extremely difficult. Empiric coverage with cotrimoxazole is suggested while Covid-19 is being ruled out.

### **12.4 CARE OF THE ELDERLY PEOPLE WITH COVID-19**

- It is recommended that older people be screened for COVID-19 at the first point of access to the health system, be recognized promptly if they are suspected to have COVID-19 and treated appropriately according to established COVID-19 care pathways. This should occur in all settings where older people may seek care; included but not limited to facility-based emergency units, primary care and prehospital care settings
- Identify if there is an advance care plan for patients with COVID-19 (such as desires for intensive care support) and respect their priorities and preferences. Tailor the care plan to be in line with patients expressed wishes and provide the best care irrespective of treatment choice.
- Its recommended reviewing of medication prescriptions to reduce polypharmacy and prevent medicine interactions and adverse events for those being treated with COVID-19
- Ensure multidisciplinary collaboration among physicians, nurses, pharmacists, physiotherapists, nutritionists, occupational therapists, social workers, mental health, community workers and other health care professionals when available in the decision-making process to address multi morbidity and functional decline.

## PSYCHIATRY AND MENTAL ILLNESS IN CONTEXT OF COVID-19

### A. Inpatient handling

- Every patient with mental illness is at a very high risk for *COVID-19* infection.
- Maximize precautions during handling of any patient.
- From the Emergency Medicine Department or casualty or outpatient department (OPD) for cooperative patients all vitals and respiratory symptoms screening should be done before bringing patients to psychiatry
  - Review ward activities: patients contact durations, unnecessary attendance and increase physical distance.
  - Attending acute patients' arrivals: distance from patients to care providers-screen for any respiratory/somatic/fever complaints prior to the consent of the episode.
  - Shorten time for hospitalization and clerkship- details from care givers, patients will be assessed while in the ward.
  - To see patients in acute ward (only one doctor with one nurse) to see the patient at a time.
  - Decongest staff at the acute ward
  - Daily disinfection of surfaces in the wards
  - Restrict number of visitors-only one at a time, reduce
- Liaison consultations: once consulted ask and ensure patient is thoroughly investigated and screened for respiratory symptoms. If is a suspect adhere to the safety measures, if collateral information is required relatives can be contacted through phone
- Rehabilitative services-if patient is suspected at occupation therapy center should be transferred to Hospital for thorough investigations and confirmation.
- Handling outpatients at the OPD-every patient/care should sanitize, get tested for temperature before entering the OPD. Need to find a means to minimize patients and relatives' congestion at the records and the OPD/pharmacy waiting space
- During consultation only the patient if very necessary only one caregiver should enter the consultation room. Maintain distance of at least 2 meters from the patient/relative and the doctor
- Medications: avoid use of benzodiazepines for COVID-19 suspects/positive cases as it worsens the respiratory distress. Short acting *benzo* like *lorazepam* or *alprazolam* are mostly preferred. But short acting injectable benzodiazepines are not available.
- Handling medical students during rotation-every medical student should wear mask during major ward rounds.
- Antipsychotics like haloperidol seem to increase severity for COVID-19 symptoms, atypical antipsychotics like *olanzepine*, *quitipine* mostly preferred.



### 13. DISCHARGE AND FOLLOW UP

Criteria for discharging patients home from isolation facility:

10 days after symptom onset, plus at least 3 additional days without symptoms (including without fever and without respiratory symptoms)

*For example, if a patient had symptoms for two days, then the patient could be released from isolation after 10 days + 3 = 13 days from date of symptom onset; for a patient with symptoms for 14 days, the patient can be discharged (14 days + 3 days =) 17 days after date of symptom onset; for a patient with symptoms for 30 days, the patient can be discharged (30+3=) 33 days after symptom onset).*

**NOTE:** discharge does not require COVID-19 retesting:

#### Post Hospital Discharge management

a) Patients have an increased risk of thromboembolic events post-discharge. Extended thromboprophylaxis should be considered in high-risk patients.

Risk factors includes:

- Increased D dimer (> 2 times ULN)
- Increased CRP (> 2 times ULN) [253]
- Age > 60
- Prolonged immobilization

b) **The post-COVID-19 conditions** includes malaise, headaches, generalized fatigue, painful joints, dyspnea, chest pain and cognitive dysfunction. Up to 50% of patients experience prolonged illness after COVID-19.

- The conditions may persistent for months after the acute infection and almost half of patients report reduced quality of life. The neurological symptoms may be related micro-and/or macro vascular thrombotic disease, which appears to be common in severe COVID-19 disease.
- Similar to patients who have recovered from septic shock, a prolonged (many months) immune disturbance with elevated pro- and anti-inflammatory cytokines may contribute to the post-COVID-19 syndrome. Consequently, A CRP should be measured prior to discharge and a tapering course of corticosteroids should be considered in those with an elevated CRP.
  - It should be noted that much like omega-3 fatty acids corticosteroids have been demonstrated to increase expression of pro-resolving lipids including Protectin D1 and Resolvin D4.
- Other interventions that should be considered include:
  - **Atorvastatin 40mg** daily (increase resolving synthesis)

- **Melatonin** for its antioxidant properties and stabilization of the circadian rhythms.
  - Adequate vitamin D.
- a) **Post-COVID-19 pulmonary sequelae.** An unknown number of patients who have recovered from COVID-19 organizing pneumonia will develop pulmonary sequela and other respiratory conditions with associated limitation of activity and pulmonary function.
  - b) Advise patient to maintain mental health, avoid misinformation and seek professional help if anxiety is overwhelming
  - c) Important measures to be taken by the patient while at home (7 to 14days)
    - WEAR A MASK when in contact with others
    - Establish social distancing; stand/sit about 2meters away from others
    - Limit attendance at large gatherings
    - Avoid contact with those who are ill
    - Practice self-care
      - Good sleep, balanced diet, exercise
    - Mindfulness/Meditation/Relaxation activities.
    - All patients should attend internal medicine/pulmonology clinic within 2/52 after discharge for assessment and follow-up.
    - All patients shall do pulmonary function test on the first clinic visit (baseline) and subsequently for follow up (on clinician judgement). Refer to a higher facility if the tests are not available.

## 14. ANNEXES

### Annex 1: Triage form for health facility (adults)

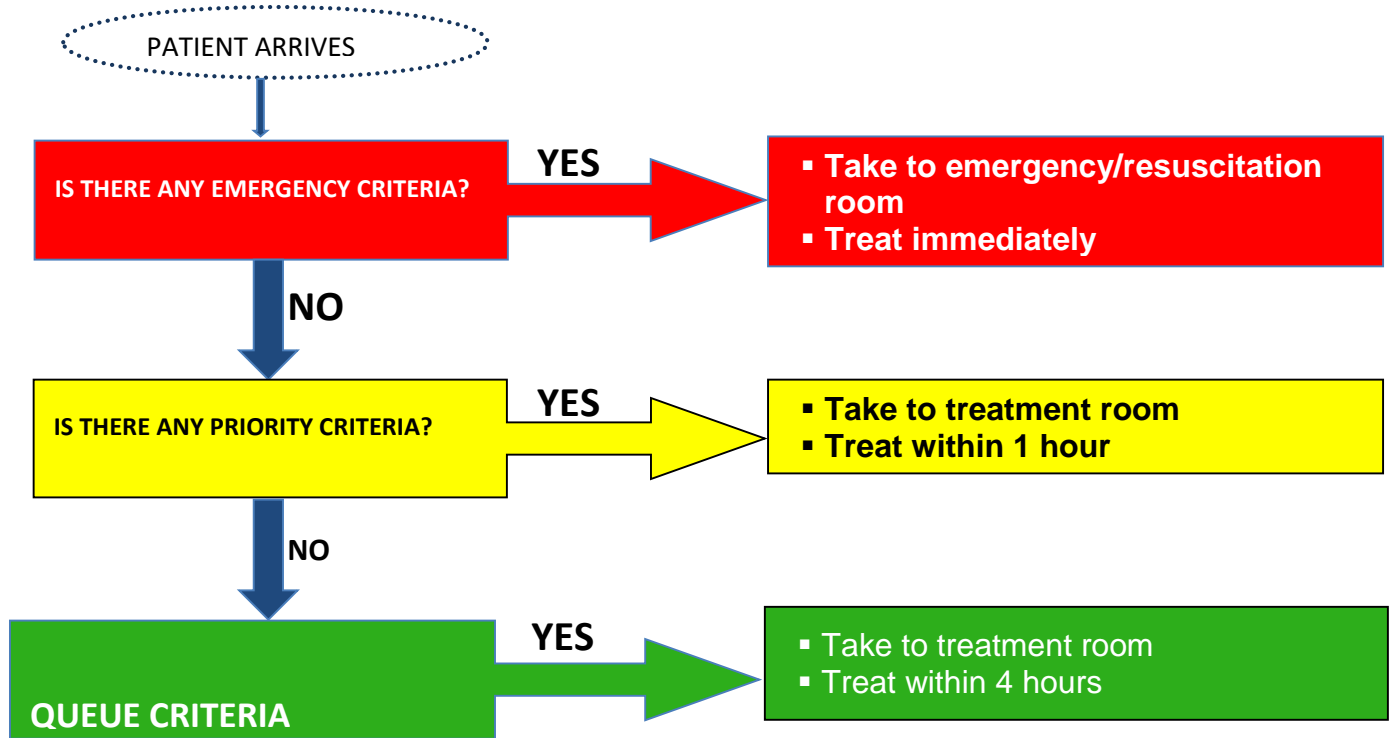
DETAILS OF THE FACILITY		PATIENT DETAILS			
HEALTH FACILITY NAME .....		Hospital reg. Number .....			
REGION.....		Surname .....			
DISTRICT.....		Other names .....			
P.O Box .....		Address ( <i>district of domicile</i> ) .....			
Tel: +255 .....		Phone contact.....			
Allergies (Yes/No)		Date of Birth ...../...../..... (If No age: Child / Adult			
If yes mention .....		Sex .....			
		Religion .....			
TRIAGE					
Date: _____		Time: _____		Providers name: _____	
Chief Complaint		Medical			
		Trauma			
VITAL SIGNS	BP ____/____	Pulse ____/min	RR ____/min	SPO <sub>2</sub> ____%	Temp: ____°C
TRIAGE CATEGORY					
EMERGENCY Criteria					Tick here if Yes
<input type="checkbox"/>	Unresponsive / Altered mental status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with vaginal bleeding
<input type="checkbox"/>	Noisy breathing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Severe abdominal pain
<input type="checkbox"/>	SpO <sub>2</sub> <90%	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Seizures (history or active)
<input type="checkbox"/>	Respiratory distress	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Severe headache
<input type="checkbox"/>	Capillary refill>3 sec	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Visual changes
<input type="checkbox"/>	Hear rate <50 or > 150)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with SBP≥160 or DBP ≥110
<input type="checkbox"/>	Active bleeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Active labour
<input type="checkbox"/>	Active convulsions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pregnant with Trauma
<input type="checkbox"/>	Poisoning or dangerous chemical exposure*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Acute chest pain
<input type="checkbox"/>	Violent or aggressive behavior	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Facial burn
<input type="checkbox"/>	SBP≥180 or DBP ≥110	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
PRIORITY Criteria					Tick here if Yes
<input type="checkbox"/>	Vomits everything or ongoing diarrhea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Severe pain
<input type="checkbox"/>	Unable to feed or drink	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Visible acute limb deformity/dislocation
<input type="checkbox"/>	Severe pallor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Open fracture
<input type="checkbox"/>	Recent fainting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Burns except facial burn
<input type="checkbox"/>	Sexual assault	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Exposure requiring time- sensitive prophylaxis (example: animal bite, Snake bite , needle-stick injury)
<input type="checkbox"/>	Acute general weakness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Referral patient (no emergency criteria)
<input type="checkbox"/>	Acute focal neurological deficit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	New rash worsening over hours or peeling
<input type="checkbox"/>	Acute visual disturbance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Old age (>60yrs)
QUEUE Criteria					Tick here if Yes
<input type="checkbox"/>	Patient with no Emergency or priority criteria indicated in above tables				

**Annex 2: Triage form for health facility under-fives (<5yrs)**

DETAILS OF THE FACILITY		PATIENT DETAILS			
HEALTH FACILITY NAME .....		Hospital reg. Number .....			
REGION.....		Surname .....			
DISTRICT.....		Other names .....			
P.O Box .....		Address ( <i>district of domicile</i> ) .....			
Tel: +255 .....		Phone contact.....			
Allergies (Yes/No)		Date of Birth ...../...../.....			
If yes mention .....		Sex .....			
		Religion .....			
TRIAGE					
Date: _____		Time: _____		Providers name: _____	
Chief Complaint		Medical			
		Trauma			
VITAL SIGNS	BP ____/____	Pulse ____/min	RR ____/min	SPO <sub>2</sub> ____%	Temp: ____°C
TRIAGE CATEGORY					
EMERGENCY Criteria					Tick here if Yes
<input type="checkbox"/>	Unresponsive / Altered mental status			<input type="checkbox"/>	Unable to feed or drink
<input type="checkbox"/>	Lethargy			<input type="checkbox"/>	Acute visual disturbance
<input type="checkbox"/>	Irritability			<input type="checkbox"/>	Facial burn
<input type="checkbox"/>	Noisy breathing			<input type="checkbox"/>	
<input type="checkbox"/>	SpO <sub>2</sub> <90%			<input type="checkbox"/>	
<input type="checkbox"/>	Respiratory distress (use of accessory muscles, nasal flaring, intercostal recession)			<input type="checkbox"/>	
<input type="checkbox"/>	Capillary refill>3 sec			<input type="checkbox"/>	
<input type="checkbox"/>	Hear rate <60 or >200 (as per chart)			<input type="checkbox"/>	
<input type="checkbox"/>	Active bleeding			<input type="checkbox"/>	
<input type="checkbox"/>	Active convulsions/twitching			<input type="checkbox"/>	
<input type="checkbox"/>	Poisoning or dangerous chemical exposure*			<input type="checkbox"/>	
<input type="checkbox"/>	Temp <36°C or > 38°C			<input type="checkbox"/>	
<input type="checkbox"/>	Severe dehydration			<input type="checkbox"/>	
<input type="checkbox"/>	Vomits everything			<input type="checkbox"/>	
PRIORITY Criteria					Tick here if Yes
<input type="checkbox"/>	Child with ongoing diarrhea			<input type="checkbox"/>	Open fracture
<input type="checkbox"/>	Severe pallor			<input type="checkbox"/>	Burns except facial burn
<input type="checkbox"/>	Severe abdominal pain			<input type="checkbox"/>	Sexual assault
<input type="checkbox"/>	Acute focal neurological deficit			<input type="checkbox"/>	Exposure requiring time- sensitive prophylaxis (example: animal bite, Snake bite, needle-stick injury)

	New rash/skin lesions worsening over hours			Child with malnutrition
	Any child less than 2 months old			
	Child with some dehydration			
	Severe pain			
	Visible acute limb deformity/dislocation			
	Referral patient (no emergency criteria)			
<b>QUEUE Criteria</b>				<b>Tick here if Yes</b>
	Patient with no Emergency or priority criteria indicated in above tables			

### Annex 3: Triage algorithm



## **Annex 4: IPC interventions to be considered during care of COVID-19 patients**

### **1. Disinfection for Floor and Walls**

- i. Visible pollutants shall be completely removed before disinfection and handled in accordance with disposal procedures of blood and bodily fluid spills;
- ii. Disinfect the floor and walls with 0.5% chlorine-containing disinfectant through floor mopping, spraying or wiping;
- iii. Make sure that disinfection is conducted for at least 30 minutes;
- iv. Carry out disinfection three times a day and repeat the procedure at any time when there is contamination
- v. To avoid the possible generation of aerosols of ARI pathogens, use damp cleaning (moistened cloth) rather than dry dusting or sweeping.
- vi. During wet cleaning, cleaning solutions and equipment soon become contaminated; change cleaning solutions, cleaning cloths and mop heads frequently, according to health-care facility's policies.
- vii. Ensure that equipment used for cleaning and disinfection is cleaned and dried after each use.
- viii. Launder mop heads daily and dry them thoroughly before storage or reuse.
- ix. To facilitate daily cleaning, keep areas around the patient free of unnecessary supplies and equipment.
- x. Do not spray (i.e. fog) occupied or unoccupied rooms with disinfectant; this is a potentially dangerous practice that has no proven disease-control benefit.
- xi. To facilitate cleaning, and to reduce the potential for generation of aerosols caused by use of a vacuum cleaner, accommodate patients in uncarpeted rooms or areas where possible. If vacuuming is necessary, use a vacuum cleaner that is equipped with a high-efficiency particulate air (HEPA) filter, if available

### **2. Disposal of Fecal Matter and Sewage**

- i. Before being discharged into the municipal drainage system, fecal matter and sewage must be disinfected by treating with chlorine-containing disinfectant (for the initial treatment, the active chlorine must be more than 40 mg/L). Make sure the disinfection time is at least 1.5 hours;
- ii. The concentration of total residual chlorine in the disinfected sewage should reach 10 mg/L.

### **3. Liquid Spill Management**

- i. Put Signage
- ii. Promptly clean and decontaminate spills of blood and other potentially infectious materials.
- iii. Wear all PPE mentioned above.

- iv. Using a pair of forceps and gloves, carefully retrieve broken glass and sharps if any, and use a large amount of folded absorbent paper to collect small glass splinters. Place the broken items into the puncture proof sharps container.
- v. Cover spills of infected or potentially infected material on the floor with paper towel/ blotting paper/newspaper. Pour 1 % freshly prepared sodium hypochlorite.
- vi. Leave for 30 minutes for contact
- vii. Place all soiled absorbent material and contaminated swabs into a designated waste container.
- viii. Then clean the area with gauze or mop with water and detergent with gloved hands.

**4. Frequently touched areas:**

- i. Door handles, Bed side & railings, Table tops, Food trolley, Light switches & telephone & key boards, Medicine cup boards, IV pole knobs,
- ii. Disinfectant 1% sodium hypochlorite
- iii. Frequency – 3 times a day.

**5. Minimal touch surfaces:**

- i. Floor, ceilings, walls, curtains & blinds.
- ii. Disinfectant 1% sodium hypochlorite/ Virkon
- iii. Frequency – 2 times a day.
- iv. Damp mopping is preferable to dry mopping.
- v. Walls & blinds should be changed when visibly dirty
- vi. Curtains to be changed at the time of deep cleaning after patient discharge.

**6. Terminal cleaning: Discharge patients:**

- i. Terminal cleaning requires both thorough cleaning and disinfection for environmental decontamination.
- ii. Cleaning should be followed by or combined with a disinfectant process
- iii. Ensure room is prepared prior to cleaning, remove medical equipment and patient used items.
- iv. Wear PPE – surgical mask, protective eyewear, apron and gloves.
- v. Ensure AC & fan is switched off.
- vi. Remove the bio medical waste bins and replace after cleaning & disinfecting.
- vii. Remove soiled linen, bed screens and curtains (including disposable curtains/screens) that are soiled or contaminated
- viii. Damp dust all surfaces, furniture and fittings with 1% sodium hypo chlorite from top to bottom.
- ix. Clean all surfaces of bed and mattress with 1% sodium hypo chlorite /virkon
- x. Wash the floor with R2 followed by disinfection with 1% Sodium hypo chlorite/ virkon



- xi. Replace all the required amenities and block the bed (contact time 4 hrs) as per IC protocol.
- xii. Release the bed after 4hrs after surface areas disinfecting with 1% sodium hypochlorite/ virkon
- xiii. Bed making to be done as per the SOP.
- xiv. New curtains to be fixed.

## **7. Soiled linen collection**

- i. Enter the room with yellow liner & with proper PPE
- ii. Switch off the fan.
- iii. Remove the soiled linen as a precautionary measures soil linen to be collected in double layered (using 2 bags), tag the cover, quantity of linen to be mentioned.
- iv. (COVID-Sticker/identification to be placed).
- v. The soiled covers to be transported to the common soiled collection area in designated closed trolley.
- vi. The trollies to be cleaned & disinfected & remove the PPE and follow hand hygiene protocols.
- vii. Common soil linen collection area: The transported soiled covers to be placed in
- viii. Identified bins and to hand over separately to the vendor and to be washed separately as per the infected linen washing protocols. Fresh to be collected separately.
- ix. Infectious fabrics should be separated from other infectious fabrics (non-COVID-19) and washed in a dedicated washing machine
- x. Wash and disinfect these fabrics with chlorine-containing disinfectant at 90 oC for at least 30 minutes.

Note: Linen stock to be maintained separately.

- i. The trollies used to carry linen shall be disinfected immediately each time after being used for transporting infectious linen.
- ii. The transport trolley should be wiped with chlorine-containing disinfectant. Leave disinfectant for 30 minutes before wiping the trollies clean with clean water.

## **8. Lift cleaning protocols:**

- i. All the lift boys to carry hand rubs and insist patients on hand hygiene.
- ii. Routine cleaning (Top to Bottom): Before starting of each shift lift to be brought to basement for thorough cleaning (With dry wipes & disinfectant with Virex) with proper PPE. (FREQUENCY 3- TIMES A DAY).
- iii. As precautionary measures disinfection of lifts is done very 2- hours.
- iv. Lift buttons/Railings to be disinfected half an/ hour.
- v. End of the day thorough cleaning of floors lifts with R2 & Virex.
- vi. Separate trolley to be identified /carried

**9. Wheel chair & Stretcher:**

- i. After shifting every patient wheel chairs & stretchers will be disinfected with alcohol.
- ii. Designated wheel chair/stretchers labeled with COVID-19 in the areas required.
- iii. End of the day wheel chairs & stretchers will be cleaned thoroughly. The Equipment in the OT could be covered by the transparent drapes too, while operating on all suspect or confirmed cases

## **Annex 5: Total parenteral nutrition administration protocol**

**Parenteral Nutrition** refers to nutrition directly into the systemic circulation by passing the GI tract and the first circulation through the liver

Nutritional components of TPN

### **Macro nutrients**

**a) Carbohydrates;** this is the main source of energy and it is composed of Monohydrous dextrose. It yields 50-65% of Total calories

$$\text{Kcals CHO} = (\text{Total Kcals}) - (\text{Kcals CHNO}) - (\text{Kcals lipid})$$

And the recommended amount is 2– 5 mg/kg/min

**b) Amino acids;** this is composed of crystalline amino acids which can be standard or specialty. It yields 15-20% of total calories

The recommended amount is 0.8 - 2.0 g/kg/day

1. Maintenance 0.8-1.0 g/kg
2. Catabolic pts 1.2-2.0 g/kg
3. Trauma/severe burn: up to 2.5 g/kg

**c) Lipids;** these are made from Safflower /soybean oil/Fish oil

The recommended intake is 0.5 – 1.5 g/kg/day

Lipids produce 25% - 35% of total kcals and they prevent essential fatty acid deficiency

### **Micronutrients;**

These are vitamins, electrolytes and trace elements

Parenteral Nutrition contains lower vitamins and trace elements as it by pass digestion and absorption process

### **Macronutrients adverse effects**

- i. **Amino Acids:**
  - Increased renal solute load
  - Azotemia (Increase in Blood Urea Nitrogen)
- ii. **Carbohydrates:**
  - Increased minute ventilation

- Increased CO<sub>2</sub> production and O<sub>2</sub> consumption
- Increased respiratory quotient (RQ)
- Lipogenesis and liver problems
- Hyperglycemia

iii. **Lipids:**

- Egg allergy, Hyper-triglyceridemia
- Decreased cell-mediated immunity
  - limit to <1 g/kg/day in critically ill immuno-suppressed patients
- Abnormal LFT

**Routes of Administration of Parenteral Nutrition**

**Central route** this is for long-term infusions or in unstable critically ill pts and the lines which are normally used are; Femoral lines, Internal jugular lines, Subclavian veins catheters

This route is for solutions with osmolality above 800-900 mOsm/l

**Peripheral route** this is for infusions over 10-14 days

Parenteral nutrition is administered through a peripheral vein, Short catheters (cannulas) and mid-way catheters

This route is for solutions with osmolality below 600-900 mOsm/l

It is used where energy and protein needs are moderate and for patients with mild or moderate malnutrition

**Nutrients requirements for TPN**

There is no standard prescription for TPN and the requirements are based on;

- Pt physiological condition (trauma, fluids restrictions etc.)
- The high risk of refeeding syndrome

**Refeeding syndrome**

These are metabolic disturbance occurs after re-initiation of feeding to pts who have been starved, severely malnourished, metabolically stressed after post major surgery

**TPN administration**

<b>DAY</b>	<b>CALORIE INTAKE</b>	<b>SUPPLEMENTS AND ELECTROLYTES</b>	<b>MONITORING</b>
<b>1</b>	10 kcal/kg/day or 5 kcal/kg/day in patients with BMI<14 or no food>15days CHO: 50 – 60% Fat: 30 – 40% Protein: 15 – 20%	Vitamin B complex 30 minutes prior to feeding	<ul style="list-style-type: none"> <li>• Do baseline biochemistry (urea, creatinine, Na+, K+, Cl-, Ca2+, Mg2+ and PO42-,</li> <li>• LFTs if not done recently</li> <li>• Ensure fluid balance</li> <li>• Correction of electrolytes</li> <li>• Monitor biochemistry daily</li> <li>• Monitor RBG 4 hourly</li> </ul>
<b>2-4</b>	Increase by 5 kcal/kg/day or continue minimal feeding if patient has low tolerance, thus do not increase if biochemical shifts occurred. Supplement and repeat	Correct biochemistry abnormalities	Check biochemistry daily and correct any abnormalities  •Maintain zero fluid balance
<b>5-7</b>	20 – 30 kcal/kg/day	Correct biochemistry abnormalities. Supplementation, oral or IV until day 10	Daily and correct any abnormalities  •Maintain zero fluid balance
<b>8-10</b>	30 kcal/kg/day or increase to full requirements	Continue Thiamine 100mg and B complex supplementation until day 10	Check biochemistry twice a week

**Example of calculation in administering TPN**

For example, the patient with GI fistula weighs 70kg, with electrolytes well balanced

$$10\text{kcal} \times 70\text{kg} = 700 \text{ kcal/bwt}$$

The available TPN bag has 1440mls which yields 1000 kcal

The pt will get 1008ml/24hrs; the flow rate of PN will be 42mls/hr

**Special considerations for energy requirements; Pediatrics**

Parental Nutrition administration for pediatrics depends on individual circumstances, age and size of infant or child

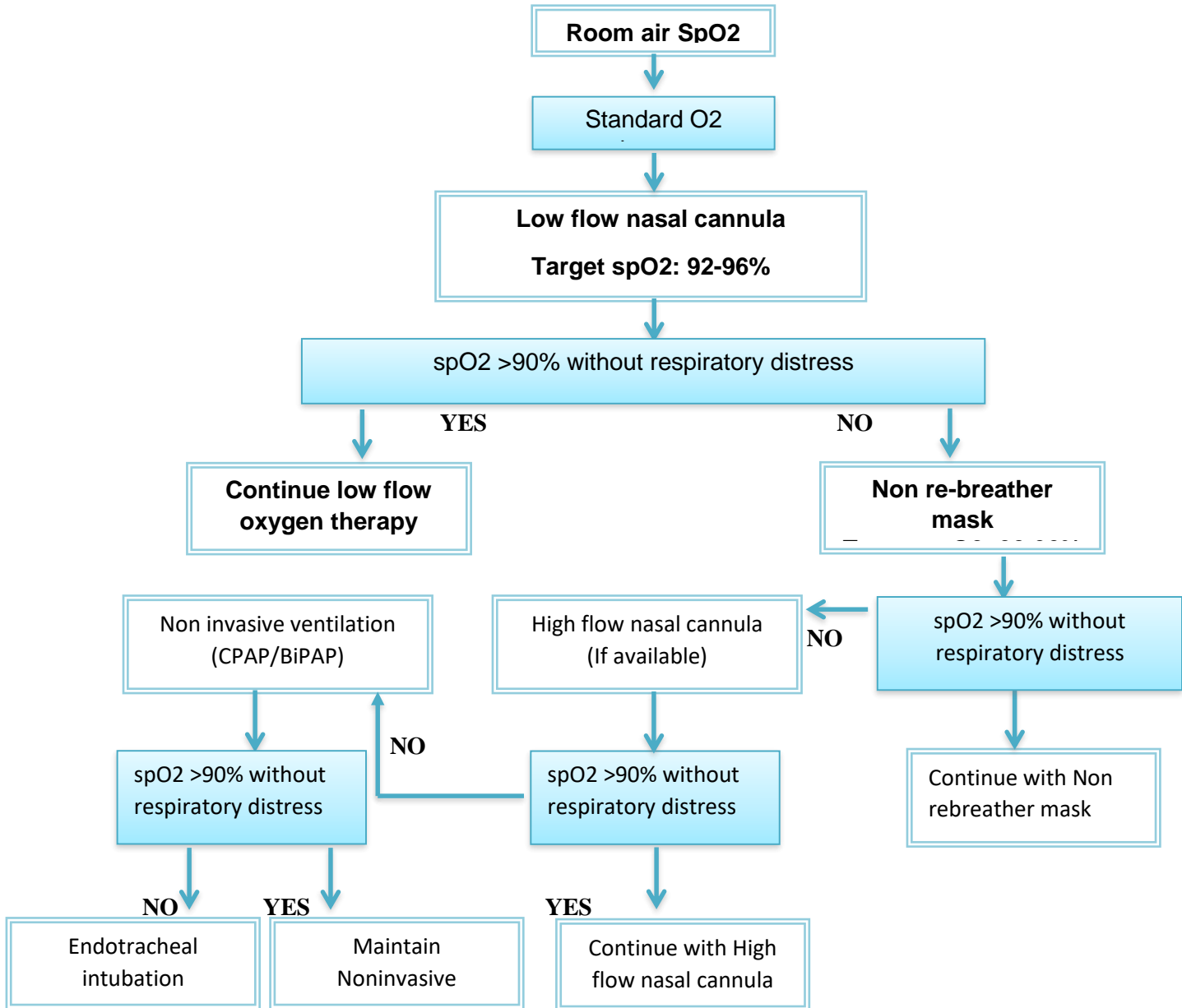
<b>Age</b>	<b>Kcals/Kg/day</b>
<b>Preterm</b>	110-120
<b>0-1</b>	90-100
<b>1-7</b>	75-90
<b>7-12</b>	60-75
<b>12-18</b>	30-60

### **Complications of Parenteral Nutrition**

There are two categories;

- a) Metabolic complications
  - Gastrointestinal complications
  - Abnormal liver function caused by underlying diseases, i.e. sepsis
- b) Macronutrient and micronutrients complications; Hyperglycaemia, hypoglycaemia, Azotaemia, Electrolyte imbalance and too much infusion which may cause hyperlipidaemia

## Annex 6: Respiratory support algorithm



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