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திகதி) 25.05.2021
Date)

Provincial Directors of Health Services

Regional Directors of Health Services

All Heads of Institutions

Revised Clinical Practice Guidelines on Institutional Management of COVID-19 Patients in Sri Lanka

This circular is to be used in all treatment facilities where patients who have positive COVID-19 diagnostic test results are managed. The previous "guidance for treating patients with COVID-19 infection" issued on **02.12.2020** is hereby further revised and updated.

The patient categorisation is based on the severity of illness and are presented in three parts as follows together with related annexures:

Part – 1	:	Initial management for asymptomatic and low-risk patients with **mild disease**
Part – 2	:	Treatment of patients with **moderate disease**
Part – 3	:	Care of patients with **severe (critical) disease** with progressive desaturation
Annexures	:	1. Laboratory testing 2. Quick guide for oxygen therapy 3. Proning during COVID-19 4. Guide for Ventilation 5. Flow chart on respiratory support for easy reference

385, සුවසිරිපාය, සුජාත බද්දේගම විමලවංශ හිමි මාවත, කොළඹ 10. 385, வணக்கத்துக் குரிய பத்தேகம விமலவங்ச தேரோ மாவத்தை, கொழும்பு 10.
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Categorization of COVID-19 positive patients:

Presentation	Disease Category
Positive COVID-19 diagnostic test	Asymptomatic individuals
Has signs and symptoms of COVID-19 but do not have shortness of breath, is not dyspnoiec and no abnormal chest imaging	Symptomatic, mild disease
Has symptoms and signs of **COVID-19 pneumonia** (fever, cough, dyspnoea, respiratory rate up to 30/min, crepitations, etc.), with low SpO_2 < 94% on room air*.**BUT** does not have features of **severe pneumonia** (see below). Chest imaging will show evidence of COVID related changes. **Lower SpO_2 needs to be considered in patients with chronic respiratory diseases.*	Moderate disease
Has features of **severe COVID-19 pneumonia** suggested by; **1)** SpO_2 <90 % with **maximum oxygen supplement** as standalone criteria **OR** **2)** SpO_2 ≤94 % on Oxygen **AND** **Evidence of severity assessed by the following criteria** ❖ Respiratory rate > 30/min , excessive use of accessory muscles, and thoraco-abdominal dis-synchrony ❖ Radiographic infiltrates – > 50% multi-lobar infiltrations ❖ P/F ratio < 300 (Partial pressure of Oxygen/ Fraction of O_2 ❖ S/F ratio < 235 (Saturation/Fraction of O_2) ❖ Haemodynamic instability; ▪ Heart rate > 120/ min ▪ SBP < 90 mmHg ▪ Lactate > 2 mmol/L	Severe disease

Part 1
Asymptomatic and low-risk patients with mild disease

All patients will have positive COVID-19 diagnostic PCR/RAT test results.

Asymptomatic individuals –

- Risk assessment to be done at the point of entry in to healthcare facility
- Symptom screening to be done by a medical officer including observation of vital parameters
- Monitor vital parameters heart rate (HR), respiratory rate (RR), oxygen saturation- SpO_2 (at rest or after brief exertion) and Temperature – preferably three times daily or more depending on the risks identified
- Warning features for immediate medical attention
    - Difficulty in breathing
    - Persistent pain or heaviness in the chest
    - Sudden onset mental confusion or inability to arouse
    - If the SpO_2 measured at rest is below 96% or less than 94% after mild exertion.

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- Continue regular medication for underlying comorbidities /be vigilant of the possibility of undetected comorbidities which may aggravate the current clinical condition (eg Diabetes/HTN)
- Adults on low dose Aspirin to be continued with and in others with high-risk of cardiovascular disease risk Aspirin 75mg daily to be considered

Symptomatic patients with mild disease (low-risk)

Low risk category of patients include;

- Individuals who are <60 years of age
- Non pregnant females of childbearing age
- Those without any comorbidities such as diabetes, hypertension, chronic heart/lung/renal diseases OR if comorbidities are present, must be well-controlled
- Who are not suffering from immune compromised states OR not on long-term immune suppression therapy.

Baseline monitoring of symptoms and vital parameters should be uniformly performed in all patients irrespective of underlying risk factors but the frequency may be increased in high risk categories

- Perform Full Blood Count (FBC) and C-reactive protein (CRP) (be vigilant about other fever syndromes eg: Dengue, leptospirosis, influenza)
- Close monitoring for progression – HR, blood pressure (BP), RR, **SpO_2** level three times daily

Symptomatic care:

- Paracetamol for fever or pain control, consider symptomatic control of cough
- Anti-histamines, Oral Rehydration Solution (ORS) when indicated
- Bronchodilators when indicated.
- Adults on low dose Aspirin to be continued with and in others with high-risk of cardiovascular disease risk Aspirin 75mg daily to be considered
- Steroids and NSAIDS (except low dose Aspirin) should not be used (unless indicated due to other co-morbidities e.g. severe acute asthma)

Part 2

Patients with moderately severe disease

- Moderate severity is considered when a patient has symptoms and signs of **COVID-19 pneumonia** (fever, cough, dyspnoea, respiratory rate up to 30/min*, crepitations, etc.), with low $SpO_2 \leq 94\%$ on room air** **BUT**
  - Does not have features of **severe pneumonia** (See below).
  - Chest imaging will show evidence of COVID related changes.

    * *RR can be normal in the early stage*

    ** *Lower SpO_2 needs to be considered in patients with chronic respiratory diseases.*
- Close monitoring for disease progression – HR, RR, SpO_2, at least 4 hourly or continuous (depending on the severity) BP & Temp as indicated.
- Necessary laboratory investigations (Refer **Annexure 1** on Investigations for patients with moderate and severe disease)

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Treatment:

- Oxygen Therapy commence when the $SpO_2 \leq 94\%$ on room air
    - ❖ low flow oxygen devices, face masks, venturi masks or non-rebreathing masks (NRBMs) capable of delivering oxygen flow rates up to 15 L/min targeting to achieve SpO_2 of 92-96% (lower values in COPD 88-92%).
    - ❖ If the requirement is < 5 L/min, can use bedside (mobile) oxygen concentrators if available - to preserve oxygen cylinder supply (Refer **Annexure 2** - Quick guide for oxygen therapy**).**
    - ❖ Self proning (Refer **Annexure 3**).

- Steroids
    - ❖ Dexamethasone 6mg PO or IV daily for 10 days or until hospital discharge (whichever comes first) for patients when they start requiring oxygen supplementation.
    - ❖ If dexamethasone is not available can consider an equivalent dose of oral prednisolone at 40mg daily /Methyl prednisolone 32mg daily/hydrocortisone 50mg 8/H for 10 days or until hospital discharge (whichever comes first)
    - ❖ Need to obtain opinion from the Consultant Obstetrician and Gynecologist for the choice of steroid treatment in pregnancy.

- Venous thromboembolism (VTE) prophylaxis should be prescribed to all patients under this category unless there are contraindications
    - ❖ Choice of agent/dose: enoxaparin 40mg daily s/c for all patients irrespective of the weight of the patient
    - ❖ Exceptions:
        - eCrCL<30 mL/min : Enoxaparin 20 mg daily s/c OR Heparin 5000 units BD
        - ESRD (eCrCL<10 mL/min or on dialysis) : Heparin 5000 units BD
        - History of heparin-induced thrombocytopenia: Fondaparinux 2.5mg daily
- Anticoagulation after hospital discharge should be selectively considered
- Antibiotic cover to be commenced cautiously only if a secondary bacterial infection is suspected (preferably guided by biomarkers) – can start Cefotaxime 1g/iv/8H or Ceftriaxone 2g/Daily (after taking cultures)
    - ❖ Discuss with the Microbiologists early.
    - ❖ For further information follow national guidelines on antibiotic use

Part 3

Severe disease (critical) with progressive desaturation

All patients who progress to severe disease should receive standard care and be managed in the original health facility until escalation to HDU/ICU facilities is made available.

If the following criteria are met, such patients need to be upgraded to the HDU/ICU and escalate the management;

1) SpO_2 <90 % with maximum oxygen supplement as standalone criteria **OR**
2) SpO_2 <94 % on Oxygen **AND**

Evidence of deterioration assessed by the following criteria

- ❖ Respiratory rate > 30/min , excessive use of accessory muscles, and thoraco-abdominal dis-synchrony

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- ❖ Radiographic infiltrates – >50% multi-lobar infiltrations
- ❖ P/F ratio < 300 (Partial pressure of Oxygen/ Fraction of O_2
- ❖ S/F ratio < 235 (Saturation/Fraction of O_2)
- ❖ Haemodynamic instability;
    - Heart rate > 120/ min
    - SBP < 90 mmHg
    - Lactate > 2 mmol/L

* Irrespective of the saturation, the rapidly progressing x-ray changes per se can be considered as severe disease

HDU/ICU Management:

1. Respiratory support: The following modalities should be considered depending on the clinical requirement and the availability.

I. High flow nasal oxygen (HFNO) therapy in HDU:
- ❖ Commencing with the flow rate 15-30 L/min, escalated gradually up to 40-60 L/min
- ❖ Consider using intermittently (not continuously), depending on the patient's requirement
- ❖ Should check with hospital capacity of oxygen supply if planning to continue on HFNO or multiple units of HFNO being used simultaneously.
- ❖ Targeting to achieve SpO_2 of 92-96% (lower values in COPD 88-92%).

II. Continuous Positive Airway Pressure (CPAP):
- ❖ CPAP of 7 – 10 cmH2O
- ❖ For CPAP machines with a single circuit, use viral filters with non-vented masks (with an exhalation port)
- ❖ The viral filter should be placed between the mask and the exhalation port.
- ❖ Dual circuit can be used with non- vented mask and viral filters
- ❖ Targeting to achieve SpO_2 of 92-96% (lower values in COPD 88-92%).

III. Non-invasive ventilation (NIV) (BiLevel):
- ❖ NIV delivered with a non-vented mask and a dual limb breathing circuit.
- ❖ If NIV delivered with a single tube, use a viral filter between the mask and the exhalation port.
- ❖ Choose the NIV settings according to the patient's clinical condition and the selected mode. (either as pressure support or EPAP and IPAP)
- ❖ Short term use is recommended under close monitoring for patients with acute heart failure, COPD, or is immune-compromised.

IV. Awake prone positioning
- ❖ May improve V/Q mismatch, oxygenation and work of breathing.
- ❖ May be combined with HFNO, CPAP or NIV.
- ❖ Refer Proning during COVID-19 (non-intubated) (**Annexure 3**).

V. Invasive ventilation
- ❖ If patient is not responding to non-invasive ventilatory strategies move to invasive ventilation **early** (eg: If evidence of deterioration and the SpO_2 cannot be maintained > 92 % on the FiO_2 of 0.7) (**Annexure – 4**)

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- ❖ Aim of ventilation is to reduce / prevent self-inflicted lung injury.
- ❖ For the procedure for safe intubation, please refer the existing guidelines.
- ❖ Depending on the type of the lung pathology (identified by lung ultrasound, ventilator graphics), if indicated, Prone early. This should be done at least for 14 -16 hours daily to recruit non-ventilated alveoli- (**Annexure - 3**)

  Please note;
  - Staff should be with optimal PPE
  - This is a spectrum of disease process and the management should be a personalized therapy and should not be driven strictly by the protocol.
  - If the patient deteriorates, need to consider possible complications and obtain expert opinion (Anaesthetist/ Intensivists/ Respiratory physicians/Physicians)

VI. Patient should be physically attended frequently by the health caregivers

VII. Veno Venous - ECMO if available, need to be considered early to correct Hypoxaemia, following an MDT

2. Therapeutic anticoagulation is indicated in;
   - Confirmed VTE with CTPA/Doppler Scan
   - High degree of clinical suspicion of VTE (with/without D-dimer >1500 ng/ml)
   - o Therapeutic Choice of agent: Enoxaparin 1mg/kg bd or 1.5mg/kg once daily
   - o If Cr Cl<30 – Enoxaparin 1mg/kg once daily

   ❖ Alternatives:
   unfractionated heparin infusion (goal of APTT: 60-100/sec)

For patients who are already on anticoagulants (e.g. stroke prophylaxis in atrial fibrillation);
Option 1: Continue with the same dosing regimen of the anticoagulant being used
Option 2: Change to a shorter acting anticoagulant - e.g. low molecular weight heparin (LMWH)

3. Tocilizumab (Interleukin-6 Inhibitor)

Benefit of Tocilizumab will depend, only if the patient is selected on **stringent criteria** decided by a **multidisciplinary team (MDT)** (including treating physician/respiratory physician/ Intensivist/ Anaesthetist), preferably in consultation with a member of the national expert committee on clinical management. Please note that Tocilizumab must be **ordered on named patient basis** and a brief treatment summary should be maintained for all such patients.

Inclusion criteria: The following must be fulfilled mandatorily;

1. Hypoxemia requiring high-flow nasal oxygenation (HFNO) with fraction of inspired oxygen (FiO2) > 0.4 /30L/min or non-invasive ventilation (NIV) or mechanical ventilation (MV) with rapidly increasing supplementary oxygen demand and worsening radiological changes not explained by fluid overload or bacterial sepsis.

2. Should have either completed or currently on steroids.
3. CRP >75mg/dl or doubling of CRP within 24 hours (this should not be taken in isolation and correlated with the above clinical context).

   It is recommended to safely exclude bacterial or viral (other than SARS-CoV-2) infection that might be worsened by Tocilizumab. (Dose: 8mg/kg up to a maximum of 800mg)

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A second dose can be given 12 hours later under exceptional circumstances following an MDT consensus in consultation with a member of the national expert committee if the patient's condition has not improved.

In Pregnancy, advice should be obtained from the attending obstetric team.

Contraindications for the use of Tocilizumab:

- Active TB
- Herpes Zoster
- Sepsis
- GI perforation
- Multiple Sclerosis
- Allergy to Tocilizumab
- ALT>5 times
- Platelets < 50,000 per mcL or 50 x 10^9/L
- Severe Neutropenia (<500/mm^3)

4. Other supportive management:
   a) Fluid Management
      - ❖ Conservative fluid management strategies are beneficial (but avoid hypovolaemia)
      - ❖ Targeted endpoints in fluid therapy
        - HR /BP: within normal range (age, sex matched)
        - CRFT: < 2 sec
        - Well perfused warm peripheries
        - UOP: >0.5 ml/kg BW/ hour
        - Lactate < 2 mmol/L
        - Arterial Blood Gas - Base deficit within normal range
        - Normal response to Passive Leg Raising (PLR)
        - Trends in central venous pressure (CVP) if available
        - <13% swings in pulse pressure variation (PPV), stroke volume variation (SVV)
        - IVC diameter: compressibility or expandability <18%
        - Echocardiography
          - RV function: normal size and function
          - LV contractility: compatible with normal function

   b) Secondary or co-infection
      - ❖ Secondary or co-infection with bacterial and/or fungal infection may also be possible.
      - ❖ Perform regular microbiological surveillance
      - ❖ Perform fungal biomarkers if available
      - ❖ Procalcitonin (PCT) may be useful in helping to guide antimicrobials.

   c) **Bacterial pneumonia** (Co-infection with COVID-19):
      - ❖ Consider when signs, symptoms and other investigations are suggestive of secondary bacterial infection (e.g., purulent sputum or excessive endo-tracheal secretions, leucocytosis, raised CRP, Neurtophil toxic granules in the blood picture etc.)
      - ❖ Blood culture, sputum culture/tracheal secretion culture should be taken before starting or changing antibiotics and MRSA screening
      - ❖ Antibiotic decision making should be taken with the consensus of the microbiology team as a part of the MDT
      - ❖ Empiric treatment for bacterial pneumonia

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Moderately severe bacterial pneumonia

Ceftriaxone 2 g daily (IV)

+/- Azithromycin 500 mg Stat, then 250 mg daily x 4d OR

Clarithromycin 500 mg/bd (IV or PO)

Severe bacterial pneumonia (obtain MDT consensus)

Meropenem 1g tds (IV) OR

Piperacillin-Tazobactam 4.5g tds (IV) OR

Ticarcillin Clavulanate 3.2g (IV) tds OR

Cefepime 1g bd (IV)

+/- Vancomycin 1g bd over 1 hr infusion (dose adjustment is necessary for renal impairment)

Add Metronidazole if aspiration is suspected

In the ICU set up the locally endemic bacterial organisms and their sensitivity patterns also need to be considered when deciding on empiric therapy

If severe (life-threatening) beta-lactam allergy and no record of subsequently tolerating other beta-lactams, microbiology opinion is indicated.

Consider antibiotic nebulisation for LRTI with multi resistant organisms.
Empiric antibiotic therapy should be reviewed with culture and ABST results.

Add antifungals/ anti-viral treatment if there is evidence for such infections with microbiology opinion.

d) Viral co-infections
   - ❖ Look for evidence of viral co-infection (influenza) even if SARS-CoV-2 is detected.
   - ❖ Patients who have been given steroid therapy may be more prone to reactivation of pathogens such as cytomegalovirus (CMV), herpes simplex virus (HSV) and varicella zoster virus (VZV).

e) Evidence of Sepsis or Septic Shock - manage according to the sepsis guidelines

f) Acute kidney injury
   - ❖ Consider Nephrology consultation for possible intervention
   - ❖ Continuous renal replacement therapy (CRRT) is the preferred modality.
   - ❖ In the difficulty of providing CRRT consider alternative modalities including prolonged intermittent RRT, acute peritoneal dialysis or intermittent haemodialysis
   - ❖ Some degree of fluid restriction might be needed to improve the pulmonary manifestations of the disease, but should be careful not to compromise the renal perfusion (Guided by diagnostic ultra sound evidence and dynamic parameters).

g) Myocarditis / Cardiomyopathy / Arrhythmias / Pericarditis
   - ❖ Monitor electrolytes: Keep Mg^{2+}>2 mmol/L, K^{+}>4 mmol/L
   - ❖ Baseline ECG and monitor closely for QTc Prolongation
   - ❖ Troponin I > 2 times or up trending , ECG abnormalities and/or hemodynamic instability, consider LV function assessment and cardiology consult

h) Liver involvement
   - ❖ COVID-19 patients may have raised ALT/AST/GGT/Bilirubin levels but no specific intervention is advocated

i) Seizures may occur in about 0.5% of hospitalised patients.
   - ❖ Stroke largely due to large vessel thrombotic/embolic occlusion

   - ❖ Delirium is a common occurrence
   - ❖ Less common occurrences are: Meningoencephalitis. Motor neuropathy of the Guillain-Barré type, Transverse myelitis

j) Glycaemic control
   - ❖ Insulin resistance is a common occurrence
   - ❖ Keep the RBS 120-180 mg/dl

k) Nutrition and Adjunctive therapy as necessary (add vitamins and minerals)

If there is no significant improvement, despite the above management strategies, the patient may need further investigations including radio-imaging and expert opinion to evaluate for complications.

Special patient groups

1. Pregnancy
   - ❖ Management guided by Obstetric, Neonatology and infectious disease teams

2. Immunocompromised/ organ transplant
   - ❖ Reactivation of viruses such as hepatitis B virus (HBV) or herpesviruses (HSV, CMV, VZV), and M. tuberculosis may occur in patients receiving steroids or immunomodulation.

Other therapeutic option

Because there is inadequate evidence, the following agents are not recommended for treatment of COVID-19. However, there is also no evidence that these agents are harmful when prescribed for the treatment of other conditions in patients with COVID-19.

- Hydroxychloroquine (HCQ)
- Azithromycin
- Favipiravir
- Remdesivir
- Ivermectin
- Indomethacin or other NSAIDs
- Vitamin C, Vitamin D, Zinc

Discharging from ICU to ward/ home with venous thromboembolism (VTE) prophylaxis

- Discharging from ICU to ward
  - ❖ In patients who were NOT started on therapeutic anticoagulation in the ICU, continue VTE prophylaxis until discharge
  - ❖ In patients who were started on therapeutic anticoagulation in the ICU will need oral anticoagulants on discharge and follow up at the anticoagulation clinics

- Discharge home
  - ❖ VTE prophylaxis should be discontinued upon discharge home; continuation after discharge can be considered in patients expected to have a period of prolonged immobility, provided they are not at high bleeding risk.

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For discharge of each category of patients, refer 'Discharge criteria for COVID-19 patients' circular no. DGHS/LS/CV-GL/2020 dated 30th October 2020. Once discharged, patients **should not be subjected to further PCR testing** even when hospitalized for any condition subsequently (even during the first 2 weeks after discharge). This recommendation is applicable for a period of 3 months after initial diagnosis.

All Heads of healthcare institutions island-wide should take immediate measures to update the knowledge of relevant categories of clinical staff on management of COVID-19 in consultation with COVID-19 Cell and specialist clinicians serving in respective institutions.

Please bring the contents of this circular to the notice of all officers concerned in your Province/District/Institution/Unit/Ward. Also, provide a copy of this circular to relevant individual consultants in your administrative jurisdiction/institution.

Dr. Asela Gunawardana
Director General of Health Services

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Director General of Health Services
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Cc:

1. Secretary of Health
2. Additional Secretary (MS & PHS)
3. DDG (MS)
4. DDG (LS)
5. DDG (PHS) I & II
6. DDG (ET&R)
7. Chief Epidemiologist
8. Director - FHB
9. Director - MRI
10. D/MSD
11. D/HPB
12. All Other Technical DDGs & Directors
13. Medical Directors of Tri Forces and Police Hospital

Annexure 1

Investigation of a confirmed case of COVID-19

DAILY

FBC
Complete metabolic panel
Liver function tests (ALT/AST/ Bilirubin)

Radiology

CXR at admission, In ambulatory patients CXR PA/Lat
Lung Ultrasound (when indicated)

Baseline ECG (If starting drugs which prolong QT c, risk of ischaemia)

Reassess QT c if at risk (may need frequently)

To use for risk stratification (Can repeat with clinical deterioration):

Troponin (if >2 times normal, repeat in 24 hrs)
Haemodynamic compromise or up trending levels – echocardiography
If clinically indicated - Blood cultures
Procalcitonin if indicated
Ferritin
D –Dimer
LDH
CPK
Blood grouping
For AKI- Serum creatinine
Urinalysis
BNP

Consider pregnancy test if indicated

Viral serology (seek microbiology advice)

Annexure 2

Quick guide to oxygen therapy in COVID 19

Target: Maintain SpO_2> 94%

Lower values in COPD 88-92%

Disease severity	Oxygen Therapy			
	Delivery device	**Oxygen usage**		
Mild i. SpO_2>94% on air ii. NO evidence of deterioration	**Close monitoring for disease progression** • HR, BP, RR, SpO_2 3 times / day			
Moderately severe i. SpO_2< 94% on room air Without evidence of dyspnoea & increased inspiratory effort	Low flow oxygen devices, Oxygen face masks, Venturi masks, Non-rebreathing masks (NRBMs) capable of delivering oxygen flow rates up to 15 L/min*	**Per patient**	**Per hour**	**Per day**
		5 L/min	300 L/hr	7,200 L/day 06 ward cylinders#/day
		15 L/min	900 L/hr	21,600 L/day 03 jumbo cylinders##/day
Severe (Critical) i. SpO_2< 90% with maximum O_2 supplements OR ii. SpO_2< 94% with O_2 Supplement **AND** evidence of deterioration seen as - RR>30/min - CXR>50% multi lobar infiltration - P/F ratio < 300 - S/F ratio < 235 - Haemodynamic instability	**High flow nasal oxygen (HFNO)**** • Commencing flow rate 15-30L/min • Escalate gradually to 40-60 L/min	10 L/min (eg: paediatrics)	600 L/hr	14,400 L/day 12 ward cylinders#/day
		15 L/min	900 L/hr	21,600 L/day 03 jumbo cylinders##/day
		60 L/min	3,600 L/hr	86,400 L/day 12 jumbo cylinders##/day
	CPAP/NIV • Commencing flow rate 8L/min • Maximum flow rate 25 L/min • CPAP 7-10cm H_2O	8 L/min	480 L/hr	11,500 L/day
		25 L/min	1,500 L/hr	36,000 L/day
	Invasive ventilation Body weight 50Kg TV 6ml/Kg FiO2 1.0 RR 20/min	**Per patient**	**Per hour**	**Per day**
		06 L/min	360 L/hr	8,640 L/day

* If the requirement is ≤ 5 L/min: Use bed side oxygen concentrators if available (to preserve O_2 cylinder supply)

** Need not use continuously, consider using intermittent HFNO depending on the patient's O_2requirement

\# A ward cylinder has 680L of Oxygen

A jumbo cylinder has 7000L of Oxygen

- **When indicated prone early to improve the V/Q mismatch under senior supervision**
- **If there is evidence of deterioration and unable to maintain SpO_2> 92%, please escalate O_2 therapy appropriately**
- **Intense monitoring of the patient is warranted with escalation of O_2 therapy**

Annexure 3

Awake-Prone positioning to improve oxygenation

❖ **Consider prone position only if patient can:**

- Adjust position independently
- Communicate and cooperate
- No anticipated airway concerns

❖ **Absolute contraindications**

- Respiratory distress
- Haemodynamic instability
- Altered mental status
- Unstable spine
- Recent abdominal surgery
- Thoracic injury

❖ **Relative contraindications**

- Morbid obesity
- Advanced Pregnancy
- Facial injury
- Neurological concerns

❖ **Procedure of Awake Proning**

- Explain the procedure and the benefit to the patient
- Ensure and secure the oxygen therapy (e.g. adequate length of tubing)
- The patient should be change positions as follows.
    * 30 Minutes to 2 hours lying on the right side (bed flat)
    * 30 Minutes to 2 hours sitting up (30-60 degrees) by adjusting the head of the bed
    * 30 minutes to 2 hours lying on the left side (bed flat)
    * 30 minutes to 2 hours lying fully prone if possible (take expert opinion in patients with obesity, pregnancy and difficult cases)
    * Continue to repeat the cycles
- Monitor oxygen saturation after every change (should maintain SpO_2 92-96% with no signs of respiratory distress)
- If deteriorate oxygen saturation
    * Increase inspired oxygen
    * Consider return to supine position
- Discontinue if
    * RR > 35, tired, using accessory muscles
    * No improvement
    * Patient is unable to tolerate the position

Annexure 4

Invasive Ventilation

- If patient is not responding to non-invasive ventilatory strategies move to invasive ventilation
- The patient may present on a spectrum of a disease process

Features	Type 1 /Non ARDS Type (L)	Type 2 / ARDS Type (H)
Static compliance of the lung (ml/cmH2O)	>50	<40
Tachypnoea	Usually not	Present
Dyspnoea	+/-	++
Radiological evidence (CXR, HRCT)	Normal or ground glass densities primarily located; sub-pluerally along lung fissures	Evidence of consolidation* Extensive bilateral pulmonary infiltrates
Applying PEEP > 10 cmH_2O	No improvement in SpO_2	Improvement in SpO_2

- Lung US - evidence of multi zone involvement of consolidation (C profile), >2 B lines (B profile) or CT evidence of consolidations in the lung bases.
- There may be patients who are in the intermediate state transitioning from one phenotype to another or with a mixed picture.

Ventilatory Strategy

TYPE 1 (non ARDS Type/L)	TYPE 2 – (ARDS Type/H)
Volume or Pressure Controlled mode	Volume controlled mode
VT: 7-9 ml/Kg (guided by PaCO2)	VT: 4 - 6 ml/Kg (slight hypercapnia acceptable)
RR: < 20 bpm	RR: > 20 Guided by the CO2
PEEP: 8-10 cmH2O	PEEP: 10 – 20 cmH2O
FiO2: target $SpO_2 \geq 92\%$	FiO2: target $SpO_2 \geq 92\%$
Prone: as a rescue measure	
*Keep driving P. < 15 cmH2O and Plat P. < 30 cmH2O	*Keep driving P. < 15 cmH2O and Plat P. < 30 cmH2O

- When compliance is normal, PEEP ≤10 cmH2O is often sufficient, and a high PEEP strategy and higher lung volumes may be harmful.
- As compliance deteriorates, higher PEEP levels may be appropriate. And aim for tidal volumes of 6 mL/kg and driving pressure <15 cmH2O (driving pressure = plateau pressure – PEEP).
- Prone ventilation: introduce early at least for 16 hrs a day to recruit non-ventilated alveoli.
- Please refer to flow chart below

Sedation/ muscle paralysis

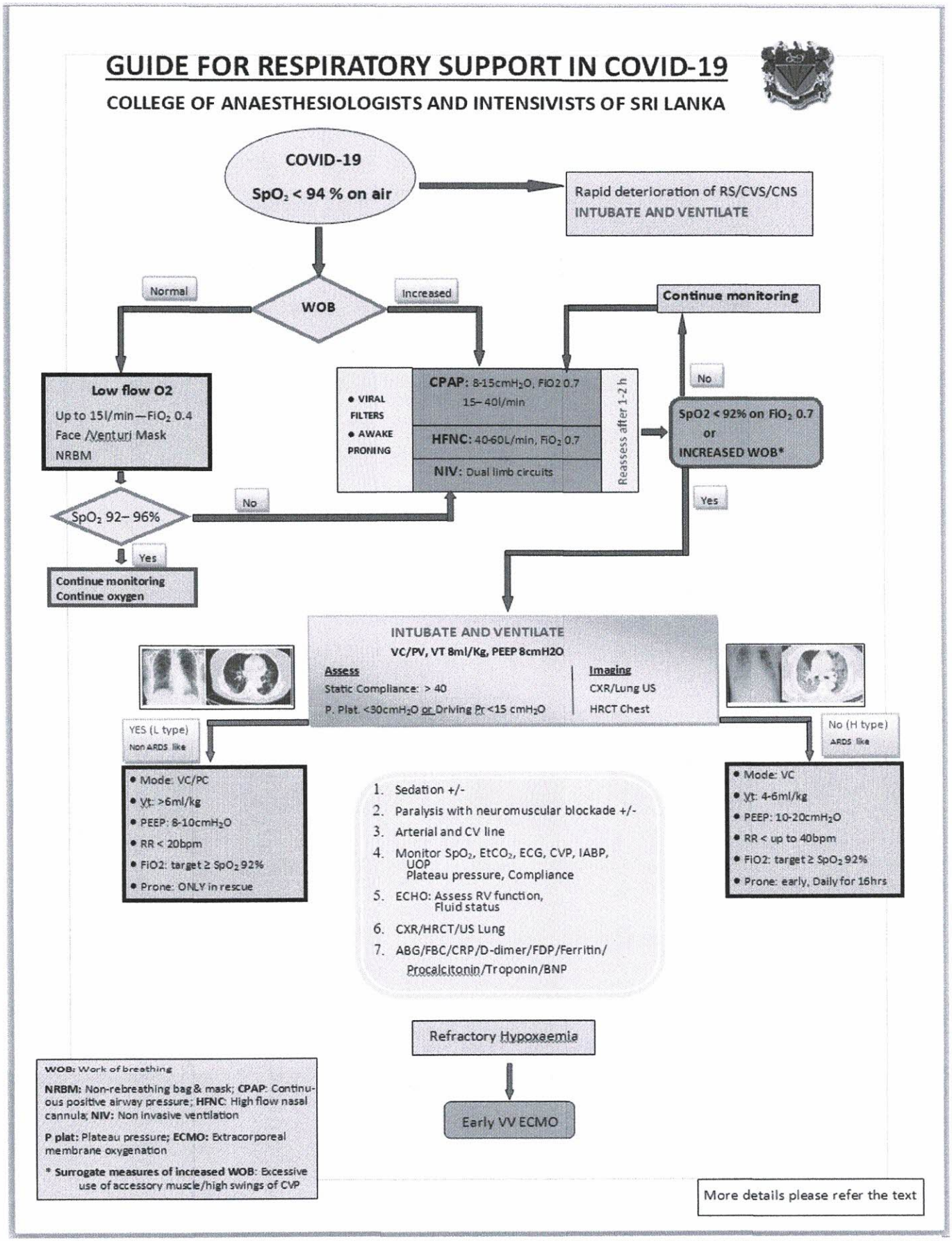
- Use adequate sedation and neuromuscular blockade to avoid further lung injury (if there is ventilator desynchrony or a high spontaneous minute ventilation).
- Moderate sedation to prevent self- extubation
- Infusions as opposed to boluses are advisable

Extubation

- Do not extubate early
- Extubation should be delayed until there is a consistently improving course in the following:
    - breathing pattern, respiratory and cough strength
    - ability to self-clear secretions
    - chest radiology
    - markers of inflammation and thrombosis
    - oxygenation and mean airway pressure and PEEP.
- Use of a spontaneous breathing trial with monitoring of RSBI (Rapid Shallow Breathing Index <105) may be useful in assessing adequacy of ventilation
- Leak tests (Caution: aerosol generation risk).
- Dexamethasone may be used to reduce airway oedema.
- May need reintubation if evidence of airway swelling, tenacious secretions, weakness and delirium.

Annexure 5

Flow Chart for Easy Reference



This circular was prepared by the Clinical Guidelines Development Technical Committee Appointed by the Ministry of Health in collaboration with the Colleges of Internal Medicine, Anaesthesiologists & Intensivists, and Pulmonologists.