



Ministry of Health Sri Lanka

Provisional Clinical Practice Guidelines on COVID-19 suspected and confirmed patients



In collaboration with Ceylon College of Physicians

Coordinated by Epidemiology Unit

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GUIDELINES DEVELOPMENT AND EDITORIAL COMMITTEE

Dr. Ananda Wijewickrama	Consultant Physician, National Institute of Infectious Diseases and President, Ceylon College of Physicians
Dr. Damayanthi Idampitiya	Consultant Physician, National Institute of Infectious Diseases, IDH
Dr. Eranga Narangoda	Consultant Physician, National Institute of Infectious Diseases, IDH
Dr. Amitha Fernando	Consultant Respiratory Physician, National Hospital of Sri Lanka
Dr. Chandimani Udugodage	Consultant Respiratory Physician, Faculty of Medical Sciences,
Dr. Jayantha Weeraman	Consultant Paediatrician, Epidemiology Unit, Colombo
Dr. Neranjan Dissanayake	Consultant Respiratory Physician, Teaching Hospital, Ratnapura
Dr. Manoj Edirisooriya	Consultant in Intensive Medicine, National Hospital of Sri Lanka
Dr. Upul Dissanayake	Consultant Physician, National Hospital of Sri Lanka
Dr. Priyankara Jayawardana	Consultant Physician, De Soysa Maternity Hospital, Colombo
Dr. Rohitha Mutugala	Consultant Virologist, National Hospital-Kandy
Dr. Channa Perera	Consultant Judicial Medical Officer, Colombo
Dr. Indika De Lanerole	Consultant Emergency Physician, National Hospital of Sri Lanka
Dr. Hasitha Tissera	Consultant Epidemiologist, Epidemiology Unit
Prof. Chandanie Wanigathunga	Professor of Pharmacology, University of Sri Jayewardenepura
Prof. Senaka Rajapaksha	Senior Professor in Medicine, Faculty of Medicine, University of Colombo and Director, Postgraduate Institute of Medicine
Prof. Asita de Silva	Professor of Pharmacology, University of Kelaniya and Chairman, National Medicines Regulatory Authority
Prof. Vasanthi Pinto	Professor of Anesthesiology and Critical Care, Faculty of Medicine, University of Peradeniya
Prof. Neelika Malavige	Director for Dengue Research, University of Sri Jayewardenepura
Dr. Malika Karunarathne	Consultant Microbiologist, National Institute of Infectious Diseases
Dr. Rajiva de Silva	Consultant Immunologist, Medical Research Institute, Colombo
Dr. Krishantha Jayasekara	Consultant Physician, Teaching Hospital- Karapitiya
Dr. Harsha Sathischandra	Consultant Physician, National Hospital of Sri Lanka
Dr. Nalayini Rajaratnam	Consultant Physician, Teaching Hospital- Jaffna
Dr. Suranga Manilgama	Consultant Physician, National Hospital-Kandy
Dr. Rasika Gunapala	Consultant Paediatrician, Lady Ridgeway Hospital

Editorial Assistance

Dr. Azhar Ghouse	Senior Registrar in Community Medicine, Family Health Bureau
Dr. Asela Abeydeera	Medical Officer, COVID-19 Clinical Management Cell, Epidemiology Unit
Dr. Chaturika Herath	Medical Officer, COVID-19 Clinical Management Cell, Epidemiology Unit
Dr. Sammani Ratnayake	Research Assistant, Epidemiology Unit

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1. INTRODUCTION

The Corona virus disease 2019 (COVID-19) epidemic can affect us in one way or another, and the recent severe outbreaks in several countries and the unpredictability of this epidemic will essentially require advance preparedness for optimum care in the health sector. With this in view, it became necessary to develop a clinical practice guideline (CPG) on clinical management of COVID -19 patients. However, this CPG will be reviewed and revised based on further evidence as the disease situation progresses.

Experience from Wuhan the capital city of Hubei province in central China, the epicenter of this epidemic where the majority of patients and deaths reported was the basis of this guideline. Preliminary evidence from COVID-19 cases suggest that transmission during the early phase of illness also seems to contribute to overall transmission dynamics; therefore, isolation of more severely ill patients at the time of presentation to healthcare facilities alone will not be adequate. As the epidemic unfolds, it has become apparent that mild cases are common in COVID-19 epidemic. Patients with mild disease manifestations will be missed unless a more sensitive surveillance system is put in place, and these patients might spread the disease silently, similar to influenza. However, more critical and life-threatening disease has been observed among old age groups especially with co-morbidities. Therefore, early case detection, prompt isolation of ill people, appropriate and timely management of patients, comprehensive contact tracing and immediate quarantine of all possible contacts will minimize widespread community transmission and will help to mitigate any major outbreak situation and associated mortality.

This provisional CPG will be useful in early detection and management of suspected and confirmed cases of COVID- 19, and to develop the capacity of the health sector to be prepared for any eventuality with suspected and confirmed COVID-19 outbreaks.

1.1 CLINICAL CASE DEFINITIONS OF COVID-19

The present recommendation is to isolate and test all clinically/epidemiologically suspected cases of COVID-19 infected patients.

All patients with medical/surgical, obstetrics/gynecological or paediatric conditions should receive the usual standards of care in keeping with clinical status, in a designated area. Management of these patients should NOT be delayed under any circumstances pending COVID-19 test result.

All confirmed cases **once stable**, should be transferred to a designated COVID-19 Treatment Centre.

Clinically Suspected Case:

A. A person with ACUTE RESPIRATORY ILLNESS (with Cough, SOB, Sore throat; one or more of these) with a history of FEVER (at any point of time during this illness), returning to Sri Lanka from ANY COUNTRY within the last 14 days.

OR

B. A person with acute respiratory illness (with Cough, SOB, Sore throat; one or more of these) AND having been in **close-contact*** with a confirmed or suspected COVID-19 case during the last 14 days prior to onset of symptoms;

**Close-contact: A person staying in an enclosed environment for >15 minutes (e.g. same household/workplace/social gatherings/travelling in same vehicle) OR who had direct physical contact.*

OR

C. A person with ACUTE RESPIRATORY ILLNESS (with Cough, SOB, Sore throat; one or more of these) with a history of FEVER (at any point of time during this illness), with a **history of travel to or residence in a location designated as an area of high transmission of COVID-19** disease as defined by the Epidemiology Unit, MoH, during the 14 days prior to symptom onset.

OR

D. A patient with **acute pneumonia** (not explainable by any other aetiology) regardless of travel or contact history as decided by the treating Consultant.

- Management of such patients should NOT be delayed under any circumstances.
- Patients should receive the standards of care in keeping with the known underlying cause in a designated area (ETU/ isolation unit/ designated respiratory unit/ designated ward-HDU/ ICU).
- A sample for the PCR test obtained and sent (**not the patient**) to a designated laboratory.
- Once the result is available, if positive, the patient (once stable) can be transferred to a designated COVID-19 treatment center.

OR

E. A patient with fever and in respiratory distress as evident by RR>30 per minute, SpO₂ <90% on room air, regardless of travel or contact history and without a definable cause, as decided by the treating Consultant.

- Management of such patients should NOT be delayed under any circumstances.
- Patients should receive the standards of care in keeping with the clinical condition in a designated area (ETU/ isolation unit/ designated respiratory unit/ designated ward-HDU/ ICU).
- A sample for the PCR test obtained and sent (**not the patient**) to a designated laboratory.
- Once the result is available, if positive, the patient (once stable) can be transferred to a designated COVID-19 treatment center.

F. Any person **irrespective of the presence of symptoms**, with an epidemiological link to a confirmed COVID-19 case who needs testing, as decided by the Regional Epidemiologist or the Central Epidemiology Unit.

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

Sampling Procedure:

- If the patient is producing sputum, sputum should be collected as the sample. When the sample is taken, a sputum cup should be given to the patient who should be in a place separated from other patients. Health care worker should move out of the room where the sample is collected.
- If the patient is not producing sputum, nasopharyngeal swab should be taken as the sample. During this procedure, health care worker should wear the standard PPE.

1.2 DISPOSITION OF CASES

1.2.1 Disposition of suspected cases

- All patients fitting to the above suspected case definitions (**A, B, C**) should be admitted and transferred by ambulance to the closest designated hospital (refer updates on the list of designated hospitals) for confirmatory testing and management. **This should be done only after stabilizing the patient and in prior consultation with the respective designated hospital**, adhering to necessary infection prevention and control (IPC) precautions.
- In case of **D and E**, patient should be managed in the same hospital in a designated area (ETU/ isolation unit/ designated respiratory unit/ designated ICU). A sample for the PCR test obtained and sent (not the patient) to the designated laboratories. Once the result is available, if positive, the patient (once stable) can be transferred to a designated COVID-19 treatment center.
- In case of **F**, all COVID-19 positive individuals will be admitted to a designated treatment facility.

1.2.2 Disposition of a confirmed case

All confirmed cases should be transferred to a COVID-19 Treatment Centre.

**THESE INSTRUCTIONS ARE TO BE APPLIED IN ALL HOSPITALS
/SETTINGS, INCLUDING THOSE IN THE PRIVATE SECTOR**

1.3 Assess severity, resuscitate if necessary and patient disposition by first contact doctor

A suspected COVID-19 patient can present in one of several ways to a health care facility or a general practice. A person presenting for screening purposes with or without mild symptoms, a person with early respiratory symptoms and a person with pneumonia with acute respiratory distress, where all three groups having had a travel or contact history. Ideally, treatment centers should have clear sign posting so that a suspected COVID-19 patient will go straight to a predetermined room (isolation room) for further evaluation and treatment. Suspected patients should be provided with a medical mask. There should be a designated medical officer who will assess the patient by taking history of symptoms, travel and contact and screen whether such patients fit into the clinical case definition. Those who fit into the suspected case definition and who may need hospital admission will be referred to the nearest designated health care institution for confirmatory testing and management (list of hospitals and designated laboratories annexed). Screening doctors should take necessary precautions by wearing standard personal protective equipment (PPE) i.e. standard medical mask, disposable gloves and apron. This system is especially applicable in a situation when there is established community level disease transmission or significant number of patients are screened routinely.

Of those who are screened and found to have no symptoms including family contacts should be advised on self-isolation by staying indoors for 14 days (incubation period) in a well-ventilated room separate from the rest of the household. Such individuals should be advised to use separate toilet, or clean shared toilet regularly and use separate towels and not to entertain visitors. They should seek advice regularly on further management from the designated sentinel hospital and area public health staff if they develop clinical symptoms.

Initial data from COVID-19 transmission areas suggest that the patients display approximately three proportions of severity – 80% having mild symptoms, 15% severe disease, 5% critically unwell. Those with severe disease or critically unwell patients should be given emergency treatment at the initial treatment center and transported to the designated sentinel hospital. Patients fitting the suspected case definition should be tested for COVID-19 at the designated laboratory assigned for each sentinel hospital. A critically ill patient seen at a hospital ETU who might be resuscitated but subsequently fitting to COVID-19 suspected definition based on the

history should be isolated in a separate area in ETU until transfer facilities are made available. Hospital ambulance or 'Suwasariya' service should provide transfer facilities to the designated sentinel hospital and the vehicle used for transporting such patients should be disinfected at the receiving end.

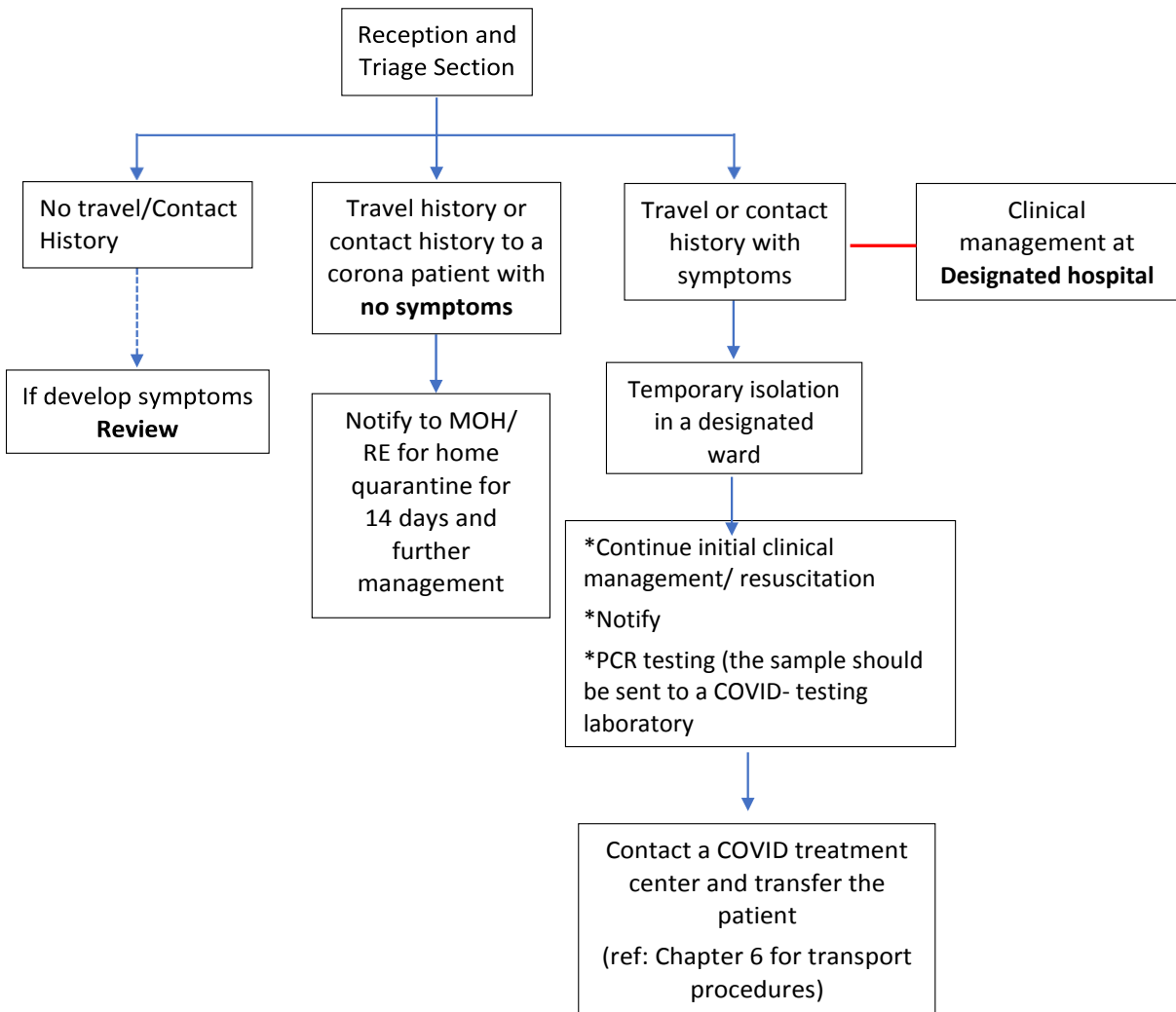


Figure 1: Primary care assessment of suspected Covid-19 patient

2 PREPARING DOCTORS FOR ASSESSMENT OF PATIENTS

Current corona virus (COVID-2019) infection may present with mild, moderate, or severe illness. Severe illness includes severe pneumonia, ARDS, sepsis and septic shock. Early recognition of suspected patients allows for timely initiation of infection prevention and control (IPC) measures.

Key action points:

- **A designated area in the hospital should be identified away from the main OPD to screen patients.**
- **This should be at the entrance to the facility, away from patient waiting areas.**
- Clear signposts should direct the patient to this area.
- A medical mask should be provided to the patient immediately at the designated area.
- The medical officer at the screening area should obtain a brief history (including contact and travel history) and conduct a brief examination (pulse, respiratory rate, oxygen saturation).
- Any patient who fits in to the definition of COVID-19 suspect should be admitted to a pre-designated isolation area (room or ward).
- The patient should be clinically assessed and categorized according to the **table below**.

This tool is intended to be used at the screening centre to decide on the level of care.

Parameter	Level of severity (one or more)		
	Mild	Moderate	Severe (Critical)
1. Resp. Rate (RR/min)	12 – 20	20 – 30	> 30
2. Heart Rate (HR/min)	< 100	100 – 120	> 120
3. O ₂ Saturation – on room air (% by Pulse Oxymeter)	> 94	90 – 94	< 90
Level of care	Isolation area	Isolation area with resuscitation facilities	Designated isolation area with critical care facilities

- The patient should be stabilized, and necessary investigations done according to severity and clinical indications.
- Once stabilized, the patient should be transferred by ambulance to the closest designated hospital (see Annexure for the list of designated hospitals) for confirmatory testing and management.
- The transfer should be done after informing the respective hospital, adhering necessary IPC precautions.

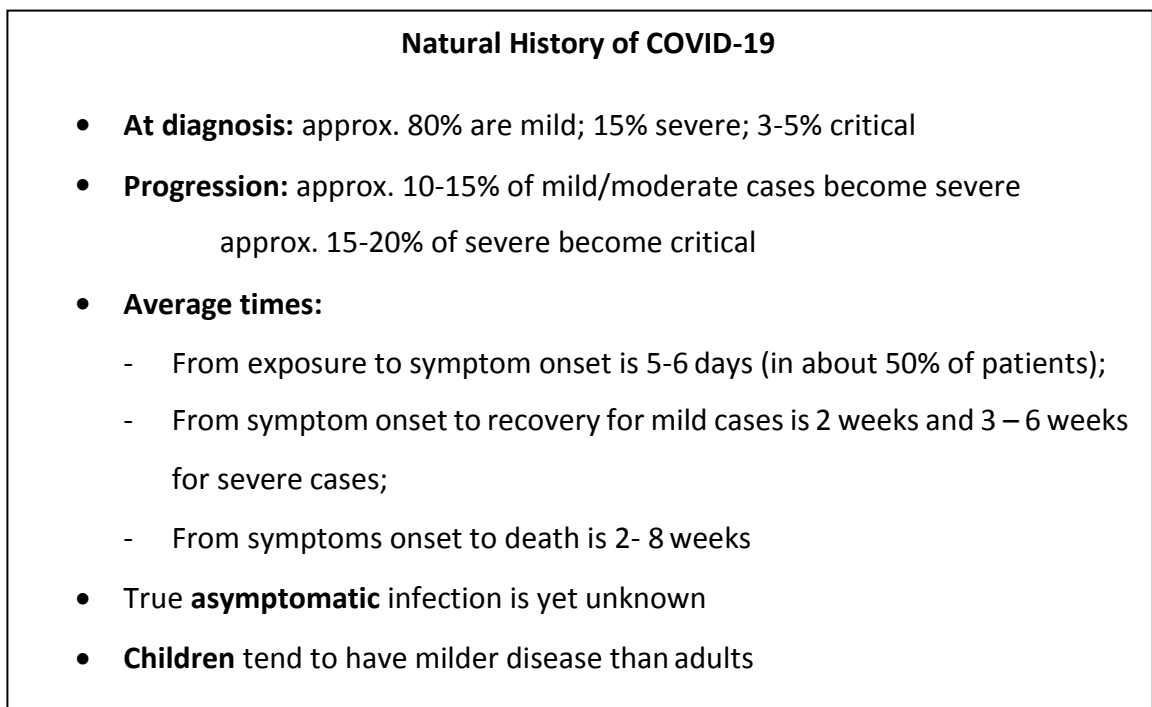


Figure 2: Brief natural history of COVID-19

3 DIAGNOSING COVID-19

3.1 LABORATORY DIAGNOSIS OF COVID-19

Every hospital should set-up a **site team of consultants** (physician, pulmonologist if available, paediatrician, Obstetrician, Surgeon, microbiologist, virologist if available, anaesthetist, intensivist if available, emergency physician if available) in order to be up to date about the latest guidelines and circulars, to keep in touch with central authorities and to solve issues in the hospital. This team should be appointed by the head of the institution.

Indications for testing

Testing for COVID-19 is indicated only for the patients who belong to case definition issued by the Ministry of Health. Please refer the latest guidelines issued by the Ministry of Health. Testing for COVID-19 for screening purpose is not recommended.

Test method

RT-PCR is the currently recommended diagnostic test for COVID-19. It is recommended to ensure a continuous supply of reagents for the PCR performing centers.

Antigen/Antibody tests are currently not recommended for diagnosis.

However, COVID-19 antibody tests (IgG) using ELISA/ immune chemiluminescence methods (standardized and locally validated) may be selectively used as part of discharge criteria for COVID-19 patients (using rapid tests is not recommended).

Sample collection

Type of the samples is depending on the clinical presentation of the patients. Sample Collection procedure is summarized in Figure 3.1.

In patients with mild upper respiratory tract infection, nasopharyngeal and oropharyngeal samples are to be collected using 2 swabs. Samples are to be transported in Viral Transport Medium (VTM).

Use a sterile, leak-proof, screw-cap container with VTM for sputum.

In patients with more severe respiratory disease, endotracheal aspirate or bronchoalveolar lavage collected in VTM.

Tissue from biopsies or autopsy including those from the lungs should be stored in VTM

Figure 3.1 – Procedure of sample collection and storage

	Sample	Container	Media	Transport
1	Sputum (preferred) 2-3 mL	Sterile plastic container	1 mL saline or VTM (if thick sputum)	2-8°C If ≥48 hours, store at -70°C
2	Nasopharyngeal and oropharyngeal swab (both preferred)	sterile tube	2-3 mL VTM	2-8°C If ≥48 hours, store at -70°C
3	Tracheal aspirate (preferred sample if intubated) 2-3 mL	Sterile plastic container	1 mL VTM	2-8°C If ≥48 hours, store at -70°C
4	Broncho alveolar lavage fluid/bronchial wash (If intubated & performed for another reason) 2-3 mL	Sterile plastic container	1 mL VTM	2-8°C If ≥48 hours, store at -70°C

*VTM; viral transport media

- Ensure that Health Care workers (HCWs) who collect specimens should follow the standard and precautions and should use the recommended PPE.
- Perform procedures in an adequately ventilated room and should follow the steps of donning and doffing of PPE.
- Perform hand hygiene before and after contact with the patient and his or her surroundings and after PPE removal.
- Specimen should be labelled properly.

User-friendly **flow charts** on investigation of a suspected COVID-19 patient (Figure 3.2) and investigation of a Confirmed case of COVID-19 (Figure 3.3), specifically for use in ETUs and General Medical wards are given below.

Figure 3.2 - Investigation of a suspected COVID-19 patient

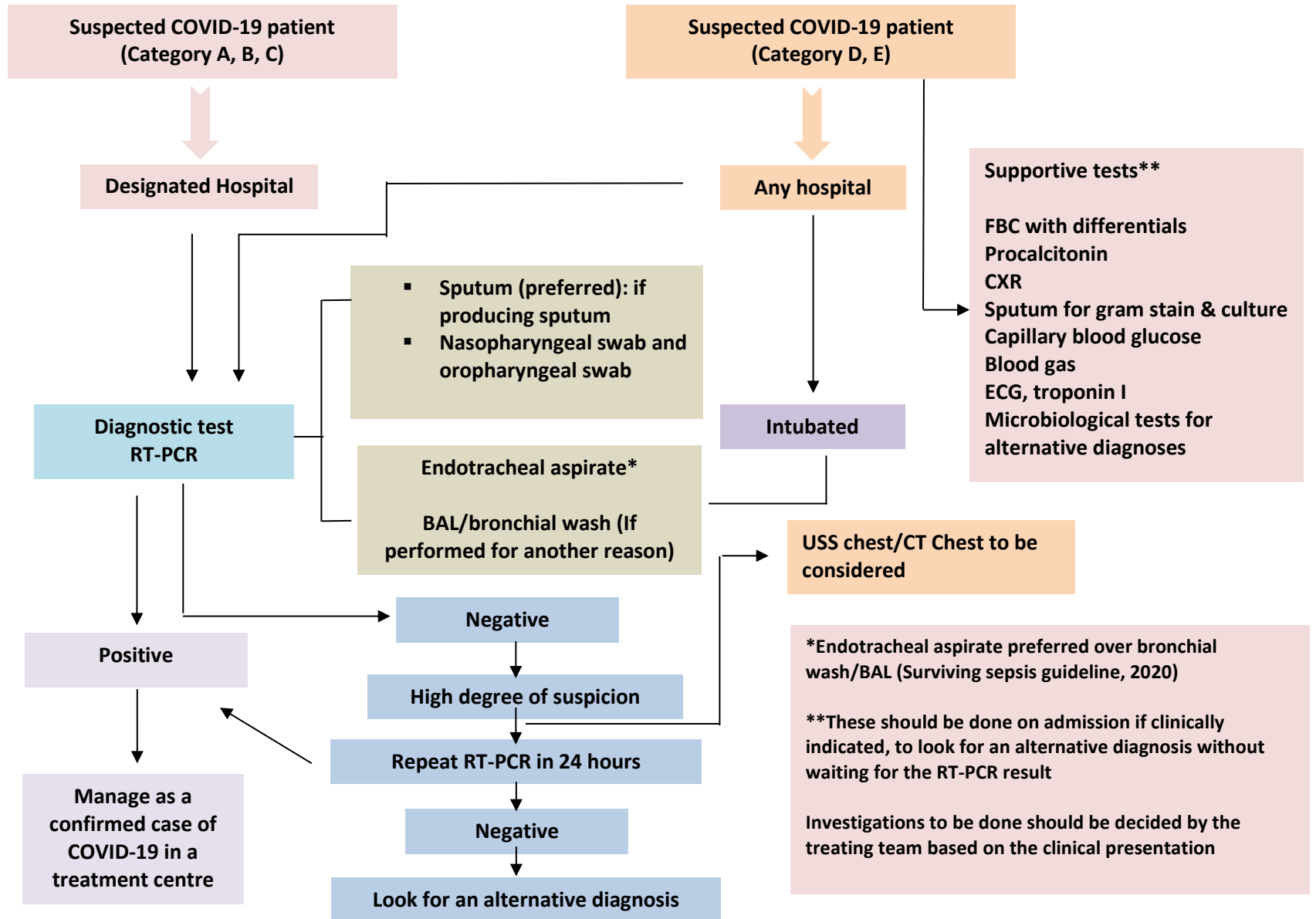
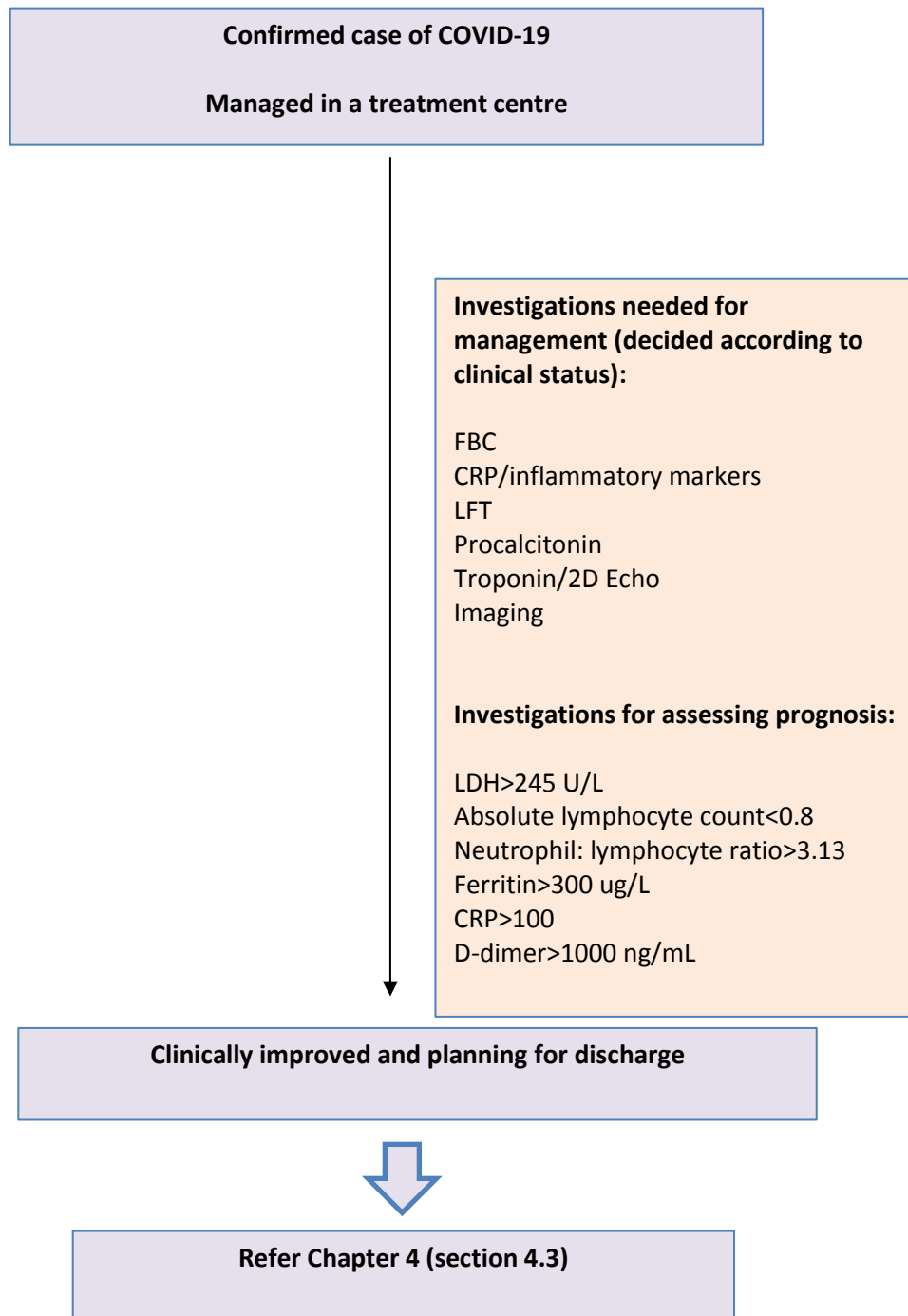


Figure 3.3 - Investigation of a confirmed case of COVID-19



Transport of samples to the laboratory

Sample should be transported to testing laboratory as soon as possible with ice (4°C). If any delay, can be stored at refrigerator (4°C) up to 48 hours. Do not freeze.

Ensure that personnel who transport specimens are trained in safe handling practices and spill decontamination procedures.

Sample should be transported in **triple package** to ensure the requirements in the national or international regulations for the transport of dangerous goods (infectious substances).

State the full name, age, travel history, clinical symptoms and the type of specimen of the suspected case clearly on the accompanying request form.

Notify the laboratory as soon as possible that the specimen is being transported.

PPE is not necessary for people who transport specimens in the triple package.

Description of Triple package

Primary receptacle	Should be a waterproof, leak-proof receptacle containing the specimen and receptacle should be wrapped with absorbent material to absorb all fluid in case of breakage. Preferably plastic container.
Secondary receptacle	Should be a durable, waterproof, leak-proof receptacle to enclose and protect the primary receptacle(s). Preferably Styrofoam container. Ice packs should be placed in between primary and secondary receptacles.
Outer package	Container which the secondary receptacle is placed. Preferably cardboard box.

Other lab tests

- At ETUs and General Medical wards, interim COVID-19 /Respiratory sections/wards, tests to find an alternative cause should be available, for exclusion (eg: procalcitonin).
- At ETUs and General Medical wards, tests to find alternative infections should also be readily available: NS1 antigen, blood/sputum culture facilities, other microbiology tests.

- In hospitals managing COVID patients, further tests should be available: ferritin, procalcitonin, LFT, Renal profile, troponin, d-dimer, INR, FDP, BNP/Pro-BNP, CK, LDH, Blood-Gas analysis.

Imaging

- Emergency radiology services (e.g. chest x-ray) should be readily available.
- Ultrasound scan of chest is recommended for further evaluation of suspected COVID-19 patients to identify lung consolidation, associated pleural effusions or to support an alternative cause (e.g. pulmonary oedema)
- CT chest should be available for patients known or suspected to have COVID-19. This may require use of appropriate PPE and infection control measures
- Trans thoracic Echo-cardiography in selected patients

3.2 INJECTION PREVENTION AND CONTROL (IPC) MEASURES

- Initiate IPC at the point of entry of the patient to health care facility.
- Suspected COVID-19 patients should be given a mask and directed to separate area.
- Keep at least 1 m distance between suspected patients.
- Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow and perform hand hygiene after contact with respiratory secretions.
- Standard precautions should always be applied in all areas of health care facilities. That is hand hygiene, the use of personal protective equipment (PPE) when in indirect and direct contact with patients' blood, body fluids, secretions (including respiratory secretions) and non-intact skin. Prevention of needle-stick or sharps injury; safe waste management; cleaning and disinfection of equipment; and cleaning of the environment.
- Additional precautions (e.g. droplet, contact, or airborne) are required.
- IPC measures should be adhered to at all times.

Healthcare facility management

Managing patient placement

- If possible, place COVID 19 suspected patients in single rooms
- Maintain at least 1-meter distance between all patients
- Avoid putting more than one patient in a single hospital bed

- Have alcohol-based hand rub or soap and water hand-washing stations readily available
- Keep dedicated equipment for the patient e.g. stethoscope, BP apparatus

Managing the environment

- Limit movement of patients within the healthcare facility to reduce spread of infection
- If a patient needs to be moved e.g. for imaging, transfer out of hospital, plan ahead: all staff and visitors who will come into direct contact with the patient should wear PPE
- Perform regular environment cleaning and disinfection
- Maintain good ventilation. If possible open doors and windows

Managing visitors

- Limit the number of visitors per patient
- All visitors should wear PPE

For healthcare workers

- At the point of entry /triage – medical mask
- Collecting respiratory specimens- goggles/face shield, preferably N-95 Mask, gown (long sleeves), gloves.
- Caring for a suspected patient – non-aerosol generating procedures - goggles/face shield, gown, gloves, medical mask/N-95 mask
- Caring for a confirmed patient – non-aerosol generating procedures - goggles/face shield, gown, gloves, N-95 mask
- Caring for a patient (confirmed or suspected) – with aerosol generating procedures - goggles/face shield, gown, gloves, N95 respirator
- Transport of a patient (confirmed or suspected) – goggles/face shield, medical mask, gown, gloves
- Do not touch your eyes, nose or mouth with gloves or bare hands until proper hand hygiene has been performed.
- PPE s should be changed between use and for each patient. Dispose in a waste bin with lid and wash hands thoroughly. Anything single use cannot be re used or sterilized.

- Hand hygiene –Use an alcohol-based hand rub or wash hands with soap and water
 - Before touching a patient
 - Before engaging in clean/aseptic procedures
 - After body fluid exposure risk
 - After touching a patient
 - After touching patient surrounding

Also refer the Epidemiology Unit website for Guidance on the rational use of personal protective equipment (PPE) in hospitals in the context of COVID-19 disease

4 CLINICAL MANAGEMENT

4.1 COVID 19 CONFIRMED CASES OR COVID-19 SUSPECTED PATIENTS

1. Mild/ no pneumonia

- To be managed in an isolation area (COVID-19 confirmed cases can be managed together)
- Monitoring of pulse, respiratory rate and saturation (Minimum of twice a day or as clinically indicated)
- Observe for evidence of deterioration.
- High risk patients may require more frequent monitoring (eg: Age more than 50 yrs/ diabetes/ cardiovascular diseases/ other comorbidities)
- **Therapies** – anti-pyretics for fever, supportive therapy

2. Those with evidence of pneumonia

- To be managed in the designated ward/area for COVID 19 patients/suspects

3. Pneumonia with ARDS, Sepsis/Septic Shock and multi-organ failure.

Mild Disease – no need for supplemental oxygen

Moderate Disease – requires oxygen

Severe Disease – See section on critical care in Chapter 5

Obtain blood for basic haematology, biochemistry, ECG, X-Ray chest (use portable X Ray if facilities are available)

Therapies -

- Oxygen (maintain saturation >94%, via supplemental oxygen.) Use disposable, single use oxygen delivery devices (nasal prongs, simple nasal mask, venturi devices)
- HFNO (High Flow Nasal Oxygen) – In those with respiratory failure, but unable to ventilate. Should be done with the health care personnel in PPE with N95 mask as this is an aerosol generating procedure
- NIV (Non- Invasive Ventilation) - In those with respiratory failure, but unable to ventilate. Should be done with the health care personnel in PPE with N95 mask as this is an aerosol generating procedure
- Identify patients co morbid conditions (IHD, DM, HT) and manage accordingly

➤ IV fluids – use conservatively. Aggressive fluid resuscitation will worsen oxygenation

Dual infection – Infections with another pathogen in addition to COVID 19. E.g. Dengue, Influenza. A positive COVID 19 does not rule out other infections.

There is no place for systemic corticosteroids, unless the patient has an asthma/ COPD exacerbation.

Limited evidence suggests to avoid non-steroidal anti-inflammatory drugs (NSAIDs) such as Ibuprofen in patients with COVID-19.

4.2 USE OF US SCAN (USS) OF THE CHEST IN PATIENTS WITH COVID-19 INFECTION

- **High resolution CT scans are still the gold standard imaging modality**
- Ultrasonography is increasingly being used as an important tool in the management of patients with COVID-19.
- It is described that pathological changes in COVID-19 appears in peripheral and basal regions of the lungs making it amenable to be viewed by USS.
- The signs that are detected are not exclusive to COVID 19 but will help in early identification of interstitial and alveolar changes as well as some features of resolution.
- It will help to identify deterioration and monitoring of disease progression.

Comparison of High-resolution CT vs Ultrasound Findings in Covid-19

Lung CT	Lung Ultrasound
Pleural thickening	Pleural thickening
Ground glass appearance	B-lines
Pulmonary infiltrating shadowing	Confluent B-lines
Subpleural consolidations	Small consolidations
Multi-lobar involvement	Multi-lobar involvement
Negative or atypical lung CT in early or mild disease	Focal B-lines in early or mild disease

Diffusely scattered ground glass opacities and consolidations with progression of disease	Alveolar interstitial syndrome (multiple diffuse B-lines) in critically ill patients and pleural thickening in patients with pulmonary fibrosis
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Procedure of performing a USS

USS Probe

1. Type - Curvilinear probe (3–5 MHz)
2. Position of probe
 - initially keep the probe marker pointing towards the cephalic direction (idea- to scan multiple intercostal spaces at a given time)
 - when an abnormality is detected, turn the probe parallel to ribs where the abnormality is detected (idea- to scan the suspicious area without ribs obstructing the view)

Refer annexure 03 for guidance on USS technique and Ultrasonography patterns in patients with Covid-19 Infection

Protocol to be used during USS:

The Modified BLUE protocol should be used during USS as given in Annexure 04

Use of Ultrasonography in patients with COVID- 19 infection:

- 1) To detect complications:
 - a. **Emergence of viral pneumonitis:**
can be bilateral or unilateral, multiple thick B lines, irregular pleural lines, sub-pleural consolidations
 - b. **Adult Respiratory Distress Syndrome (ARDS):**
bi basal consolidations, dependent distribution, air bronchograms, dynamic consolidations, abnormal pleura
 - c. **Fluid overload** –(e.g.- Covid- 19 complicated by acute kidney injury)
multiple symmetrical B line with normal pleura
 - d. **Myocarditis**
abnormal myocardial contractility

2) To predict the recovery of patient:

Reappearance of bilateral A-lines

Note- In some countries lung US is used as a triaging tool in Emergency Departments to identify patients who are Covid- 19 positive and can be discharged.

Steps to follow when performing USS in a patient suspected/ confirmed with Covid-19

Infection:

Note - every step should be taken to minimize the chances of cross infections

1. Before performing the procedure

- only machine with probe to be taken to the patient- any other non-essential stuff to be removed from the machine
- Gel bottle – not to be re used, ideally single use gel packets
- Probe cover needed

2. During the procedure

- use personal protective equipment (PPE) depending on the clinical scenario
- minimize contact with the patients

3. Post – US scan – procedure to follow

- Disinfect the US scan machine – including wire, probes, screen
- Appropriate doffing of PPE

4.3 DISCHARGE CRITERIA

Discharge criteria for asymptomatic/mildly symptomatic, moderate to severe and critically ill patients are described below.

A. Discharge criteria for asymptomatic/ mildly symptomatic patients

- Discharge criteria for **asymptomatic/mildly symptomatic patients** (all of the following should be present):
 - i. At least a period of **10 days** from onset of illness/point of positive PCR test
 - ii. Afebrile and clinically well with improvement of symptoms for at least **3 days**

iii. If the patient has **2 consecutive negative PCR tests (done 24 hours apart)**

OR

If PCR is positive, but the patient has a PCR **Ct >32** (SARS-COV-2), can be discharged if the COVID-19 antibody test (IgG) is positive using ELISA / immune chemiluminescence tests standardized and locally validated for Sri Lanka (and **not rapid tests**).

- **Strict home quarantine** to be followed for **another 2 weeks** after being discharged from hospital.
- **Flowchart for discharge of asymptomatic/ mildly symptomatic COVID-19 patients based on PCR tests (done on day 10 and beyond) is given in figure 4.1.**

B. Discharge criteria for patients with moderate/severe illness and critically ill patients

- Patients with **moderate/severe/critical illness** will have to be considered for discharge on a case by case basis (e.g.: with room air saturation >94% for 48hrs).
- For discharge apply points (ii) and (iii) as given above for asymptomatic/mild patients

If a patient is discharged on positive COVID-19 IgG antibody report, it is important to be mentioned in the diagnosis card given to such patient.

When a patient is discharged from hospital based on 2 negative PCR reports or positive IgG antibody report (as mentioned above) such patients requires no further PCR testing even if they are hospitalized subsequently.

Flowchart for discharge of asymptomatic/ mildly symptomatic COVID-19 patients

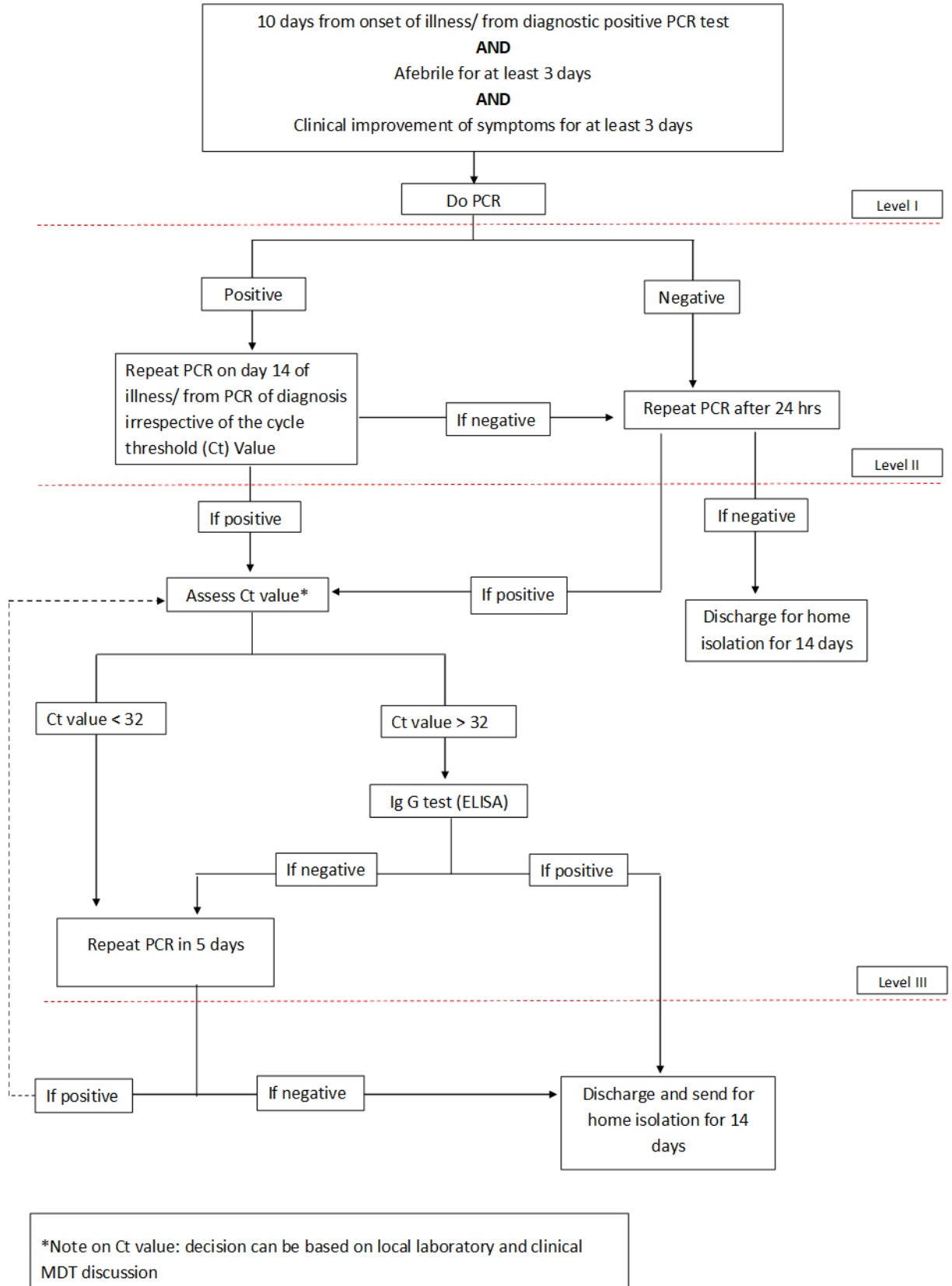


Figure 4.1 Flowchart for discharge if asymptomatic/mildly symptomatic COVID-19 patients

5 MANAGEMENT OF CRITICALLY ILL PATIENTS WITH COVID-19

At the onset of the pandemic of COVID-19, the pathophysiology and the outcomes were almost unknown. However, recent literature has shed light on the pathophysiology of the organs involved, the clinical course and the outcomes of the illness.

5.1 PRICIPLES IN THE MANAGEMENT OF CRITICALLY ILL COVID-19 PATIENTS DURING A PANDEMIC

1. Measures to reduce morbidity and mortality and to ensure improved outcomes during a period of high influx of patients to the intensive care units (ICU)
2. Increase the ICU surge capacity
3. Safety and wellbeing of the health care staff
4. Fair allocation of resources avoiding compromise of care towards non- COVID patients
5. Control the burden on the health care system by adopting measures to contain the disease

5.2 GUIDANCE FOR ADMISSION TO A CRITICAL CARE UNIT

1. COVID -19 status of all patients should be confirmed prior to admission. Patients may be referred from a COVID ward or transferred from another hospital following confirmation of the diagnosis.
2. Any physician or an experienced member of the treating team may refer critically ill COVID-19 patients to a designated HDU/ICU for admission before they deteriorate.
3. Consultant in-charge of the ICU or an experienced member of the ICU team should carefully assess patient's trajectory and agree with the referring team to admit those who will be potentially salvageable/ benefited from ICU care.
4. Until transfer to the designated COVID HDU/ICU patient should be managed in an isolated area with the following facilities
 - 4.1 Continuous monitoring of vital parameters
 - 4.2 Escalation of ventilatory support from NIV/HFNC to invasive ventilation.
 - 4.3 Appropriate organ support to maintain haemodynamic stability.
5. All health care providers involved with transferring & receiving patients should don

appropriate PPE's. If the patient is intubated or is planned to undergo an aerosol generating procedure (AGP), staff involved in patient care should don tight fitting N95 respirators.

6. On arrival to the ICU initial assessment should follow the ABCDE approach. Detailed examinations with imaging, establishment of appropriate monitoring, lines & drains, collection of biological samples etc. should be planned appropriately and performed simultaneously to minimize repeated exposure of the staff involved in patient care.

Management strategies for more severe form of the disease should be based on evolving evidence and from further understanding of the pathophysiology of the disease.

5.3 PATHOPHYSIOLOGY

Approximately 20% of patients infected with SARS-CoV-2 develop pneumonia with hypoxaemia requiring critical care. Current and most recent evidence describes COVID-19 pneumonia requiring respiratory support, as a spectrum of a disease entity with two phenotypes, Type 1 (L) and Type 2 (H) with distinguishable pathophysiological characteristics confined to each group.

Evolution of COVID- 19 pneumonia

I. Type 1 phenotype

- Represent patients at one end of the clinical spectrum with near normal breathing and low saturation (normally breathing termed as “silent hypoxaemia”). The most characteristic observation made at this stage is dissociation of the severity of hypoxaemia with the maintenance of relatively good respiratory mechanics, with a compliance of >50ml/cmH₂O within the respiratory system
- The patient will compensate by an increase in respiratory drive with a resultant increase in tidal volume (V_t) more than the respiratory rate (RR). Despite additional work of breathing (WOB) patients will not appear dyspnoeic as the respiratory demands are met with a minor increase in trans-pulmonary negative pressure to achieve the desired V_t.
- Unhindered progression of this process of combinations of raised trans-pulmonary negative pressure and inflammatory mediator- induced “cytokine storm” increases

capillary permeability causing a patient induced “self-inflicted lung injury” (P-SILI) within 5-8 days.

- Hypothesized reasons for hypoxaemia in Type 1 (L) phenotype are:
 - a) Loss of hypoxic pulmonary vasoconstriction and impaired regulation of pulmonary blood flow (vasoplegia) leading to V/Q mismatch with R to L shunt.
 - b) Micro-thrombi due to a hypercoagulable state in the pulmonary capillaries contributing to V/Q mismatch with R to L shunt.

II. Type 2 Phenotype

- Represent the other extreme of this disease spectrum which is characterized by severe hypoxaemia with increased lung weight & decrease lung compliance (< 40ml/cmH₂O).
- This occurs as a result of the progression of P-SILI. Inflammatory mediators induced lung permeability will cause increased interstitial edema and increased lung weight leading to dependent atelectasis. Once atelectasis reaches a certain magnitude, lung compliance will be reduced markedly and the tidal volume generated for a given inspiratory pressure will be reduced. Thus, the clinical picture will be similar to ARDS.
- Transition from Type 1 to type 2 phenotype will occur at this point as a result of evolution of COVID -19 pneumonia.
- Hyper-coagulable state with various multi organ effects, cardiomyopathy, secondary bacterial lung infections have also been noted in association with COVID-19

Classification of disease spectrum

Type 1 (L)	Type 2 (H)
Low elastance	High elastance
Low V/Q (high R→ L shunt – due to vasoplegia)	High shunt
Low lung weight	High lung weight
*Low recruit- ability (high compliance/ high gas volume)	*High recruit- ability (low compliance/ low gas volume)
CT chest: Ground glass densities primarily located; sub-pleurally along lung fissures	CT chest: Extensive bilateral pulmonary infiltrates

5.4 INDICATIONS TO REFER TO DESIGNATED COVID – 19 HDU/ICU

As COVID – 19 pneumonia progresses through the disease spectrum with worsening hypoxaemia, early admission to HDU/ ICU is indicated to institute respiratory and other organ supportive measures under close monitoring.

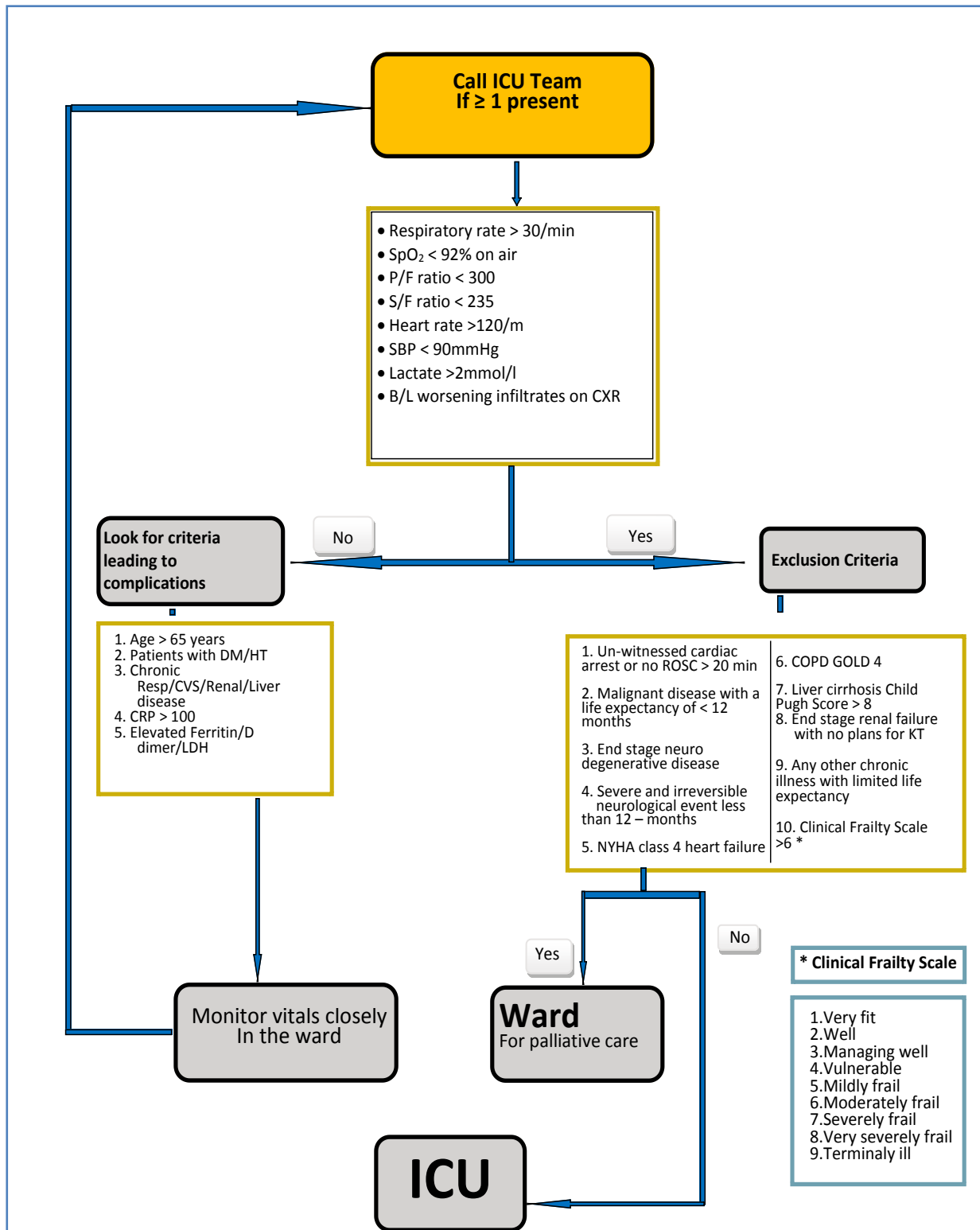
Any physician or an experienced member of the treating team may refer patients to designated COVID- 19 ICU (either confirmed or suspected), before further deterioration of the clinical condition.

Consultant in-charge of the ICU or an experienced member of the ICU team should carefully assess the patient’s trajectory on an urgent basis and agree with the referring team to admit only patients who will be potentially salvageable or benefited by ICU care, in the absence of exclusion criteria for ICU admission .

Presence of one or more of the following features requires the attention of the ICU team:

- Respiratory rate > 30/min
- Saturation of < 92%, on air
- B/L worsening infiltrates on CXR
- P/F ratio < 300
- S/F ratio < 235
- Heart rate > 120/ min
- SBP < 90 mmHg
- Lactate > 2 mmol/L

CRITERIA FOR HDU/ICU REFERRAL FOR A COVID- 19 PATIENT



Source: College of Anaesthesiologists and Intensivists of Sri Lanka

5.5 Criteria for admission to designated COVID 19 ICU

1. Confirmed patients with COVID 19

AND

2. With acute and potentially reversible organ dysfunction poorly responding to initial resuscitation as stated below;

- i. Severe hypoxaemia ($\text{SpO}_2 < 92\%$ on air or $\text{SpO}_2 / \text{FiO}_2$ ratio < 235) with or without evidence of increased WOB/ respiratory drive/ inspiratory effort indicated by the use of accessory muscles (RR may be normal)
- ii. Refractory circulatory shock (SBP < 90 mmHg, Lactate > 2 mmol/L)
- iii. More than single organ failure

AND

3. With adequate physiological reserves to survive the critical illness without significant chronic co-morbidities

AND

4. Decided for full escalation of organ support or, limited escalation for 48 hours

5.6 Respiratory therapy for COVID – 19 pneumonia in the ICU

Aims of Respiratory Therapy

- i. To correct hypoxaemia with the most suitable respiratory intervention to avoid/ minimize the risk of self-inflicted lung injury and progression from Type 1 to Type 2 disease.
- ii. Careful selection of ventilatory parameters to avoid/ minimize ventilator-induced lung injury while ensuring haemodynamic stability.

Key aspect of care in the ICU should be to assess the respiratory drive, inspiratory efforts and work of breathing (WOB). Assessment of this can be done clinically looking for the excessive use of accessory muscles, high swings in the CVP trace and thoraco-abdominal dyssynchrony. This can ideally be measured by oesophageal pressure swings. RR can be normal in the early stages. If in obvious respiratory distress, non-invasive or invasive ventilation should be considered early to avoid/ limit the transition from type 1 to type 2 phenotype by patients self-inflicted lung injury (P- SILI).

Respiratory therapy offered in the ICU vary, based on the conceptual models of COVID – 19 pneumonia guided by the likely phase of the disease spectrum (Type 1 or Type 2) This can be evaluated by the following clinical parameters at the time of admission to the ICU:

- SpO₂ value on air
- Work of breathing (WOB) /respiratory drive/ inspiratory efforts assessed by excessive use of accessory muscles, high swings on the CVP trace and thoraco-abdominal dis-synchrony
- RR can be normal in the early stage

Patients with hypoxaemia (SpO₂ < 92% on air) only with no evidence of increased WOB/ respiratory drive/ inspiratory efforts should be managed initially using 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 SpO₂ of 92-96%. Majority of Type 1 patients without breathlessness may respond well to the above interventions.

Patients with hypoxaemia (SpO₂ < 92% on air) with evidence of increased WOB/ respiratory drive/ inspiratory efforts at the time of admission or those who fail to achieve a SpO₂ of 92-96% on low flow oxygen devices should be changed over to high flow oxygen devices using CPAP, HFNC or NIV. Each patient should be re-assessed within 1-2 hours to check for improvement in SpO₂ > 92% on a maximum of FiO₂ 0.6 along with reduced WOB

High flow nasal oxygen (HFNO) therapy in HDU/ ICU:

- HFNO is a high flow oxygen device
- Offered in HDU/ ICU setting, preferably in a negative pressure room
- Patients to wear a surgical mask
- Staff should be with optimal PPE (with N95 mask)
- Commencing flow rate 15-30 L/min, escalated gradually up to 40-60 L/min along with FiO₂ up to 0.6%

***Should check with hospital capacity to supply oxygen, if planning to continue on HFNO*

Continuous Positive Airway Pressure (CPAP):

- A high flow oxygen device
- CPAP is offered in HDU/ ICU setting, preferably in a negative pressure room
- Staff should be with optimal PPE (with N95 mask)
- For CPAP machines with 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
- CPAP of 7 – 10 cmH₂O

Non-invasive ventilation (NIV):

- NIV is a high flow oxygen device
- Offered in HDU/ ICU setting, preferably in a negative pressure room
- Staff should be with optimal PPE
- 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)

**NIV is not strongly recommended for those who fail on HFNO/ CPAP*

**Short term use is recommended under close monitoring for patients with acute heart failure, COPD, or is immune-compromised.*

**Self- proning is advisable with these strategies to improve oxygenation.*

Patients achieving targeted endpoints should be continued on high flow oxygen therapy with regular re-assessments every one to two hourly.

Patients who fail to achieve the targeted $SpO_2 > 92\%$ on a maximum FiO_2 0.6 along with reduced WOB/ respiratory drive/ inspiratory efforts after 1-2-hour high flow trial, should be considered for invasive ventilation. Aim of ventilation is to reduce high trans pulmonary pressure to minimize/ prevent patient self-inflicted lung injury (P SILI).

**For intubation, please refer annexure 08 and the guideline on intubation published by the College of Anaesthesiologists and Intensivists of Sri Lanka.*

Ventilatory strategies will be decided by the following respiratory mechanics monitored after commencing invasive ventilation.

Initial ventilator strategy can be either on volume or pressure -controlled mode with tidal volumes of 8 ml/kg of PBW and PEEP of 8 cmH₂O.

The static compliance and the driving pressure need to be assessed and imaging studies with CXR, HRCT or lung ultrasound need to be performed to determine the type of the disease.

- Static compliance > 40 ml/cmH₂O
- Driving pressure < 15 cmH₂O
- P. plat < 30 cmH₂O

Patients with static compliance of > 40 ml/cmH₂O, driving pressure of < 15 cmH₂O and P. plat < 30 cmH₂O are consistent with COVID – 19 pneumonia of Type 1 with near normal compliance and non-ARDS picture. Therefore, the following ventilator strategy is recommended:

TYPE 1

- **Volume or Pressure Controlled mode**
 - VT: 7-9 ml/Kg (guided by PaCO₂)
 - RR: < 20 bpm
 - PEEP: 8-10 cmH₂O
 - FiO₂: target $SpO_2 \geq 92\%$
 - Prone: ONLY as a rescue measure
- *Keep driving P. < 15 cmH₂O and Plat P. < 28 cmH₂O*

In type 1 patients, use of more liberal tidal volume (7–9 ml/kg) often attenuates dyspnea and may avoid hypoventilation with possible reabsorption atelectasis and hypercapnia. PEEP levels should be limited to 8–10 cmH₂O as higher levels will decrease pulmonary compliance and can affect right heart function. The EtCO₂/PaCO₂ relationship is a useful tool to quantify efficiency of pulmonary exchange. A ratio < 1 suggests elevated shunt and dead space. Prone positioning should be considered more a rescue maneuver in type 1 disease to facilitate the redistribution of pulmonary blood flow. Long-term prone positioning/ supine cycles is of very little benefit and it leads to high levels of stress and fatigue among medical staff.

In patients with COVID –19 pneumonia and an ARDS like picture (Type 2) have a low static compliance (< 40 ml/cmH₂O), higher driving pressures and higher plateau pressures. Therefore, the following ventilator strategy is recommended:

TYPE 2

- **Volume controlled mode**
- VT: 4 - 6 ml/Kg (slight hypercapnia acceptable)
- RR: up to 40 bpm
- PEEP: 10 – 20 cmH₂O
- FiO₂: target SpO₂ ≥ 92%
- Prone: early, daily for 16 hours to recruit non-ventilated alveoli

**Keep driving P. < 15 cmH₂O and Plat P. < 28 cmH₂O*

In type 2 patients, lower tidal volumes are preferred in view of low compliance and pulmonary oedema. Gradual increase of PEEP to 14 -15 cmH₂O along with prone position will be beneficial in recruiting the collapsed and atelectatic alveoli. Cardiac ultrasonography can be used to monitor RV function when higher levels of PEEP are applied.

Summary to determine phenotypes of COVID-19 pneumonia

Features	Type 1 (L)	Type 2 (H)
Static compliance of the lung (ml/cmH ₂ O)	>50	<40
Tachypnoea	Usually not	Present
Dyspnoea	+/-	++
Radiological evidence (CXR, HRCT)	Normal or ground glass densities	Evidence of consolidation [#]
Applying PEEP > 10 cmH ₂ O	No improvement in SpO ₂	Improvement in SpO ₂
	*High PEEP and prone position may not be beneficial	*High PEEP and prone position will be beneficial

[#]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 Type 1 to Type 2 with a mixed picture.

Sedation and muscle relaxation

Use adequate sedation and neuromuscular blockade. Infusions as opposed to boluses are advisable to prevent excessive ventilatory drive.

Monitoring during invasive mechanical ventilation

- i. Continuous monitoring of SpO₂, ECG & EtCO₂ (preferably mainstream)
- ii. PaO₂, PaCO₂ and serum lactate intermittently
- iii. Plateau pressure, static compliance, flow- time graph and pressure volume loop.
- iv. Haemodynamic – invasive blood pressure monitoring is preferred. (BP may be affected with high ventilatory pressures) consider CVP monitoring
- v. Echocardiogram to monitor the effect on pulmonary vasculature (RV size and function) and cardiomyopathy (LV size and function)

- vi. Radiological imaging (Chest X Ray, Lung ultrasound or HRCT chest) to monitor progression of the disease.
- vii. Fluid status and UOP
- viii. CRP, FBC, D-dimers, ferritin, procalcitonin, Troponin, BNP
- ix. Monitor for any leaks in the ventilator tubing and prevent disconnections.

Weaning

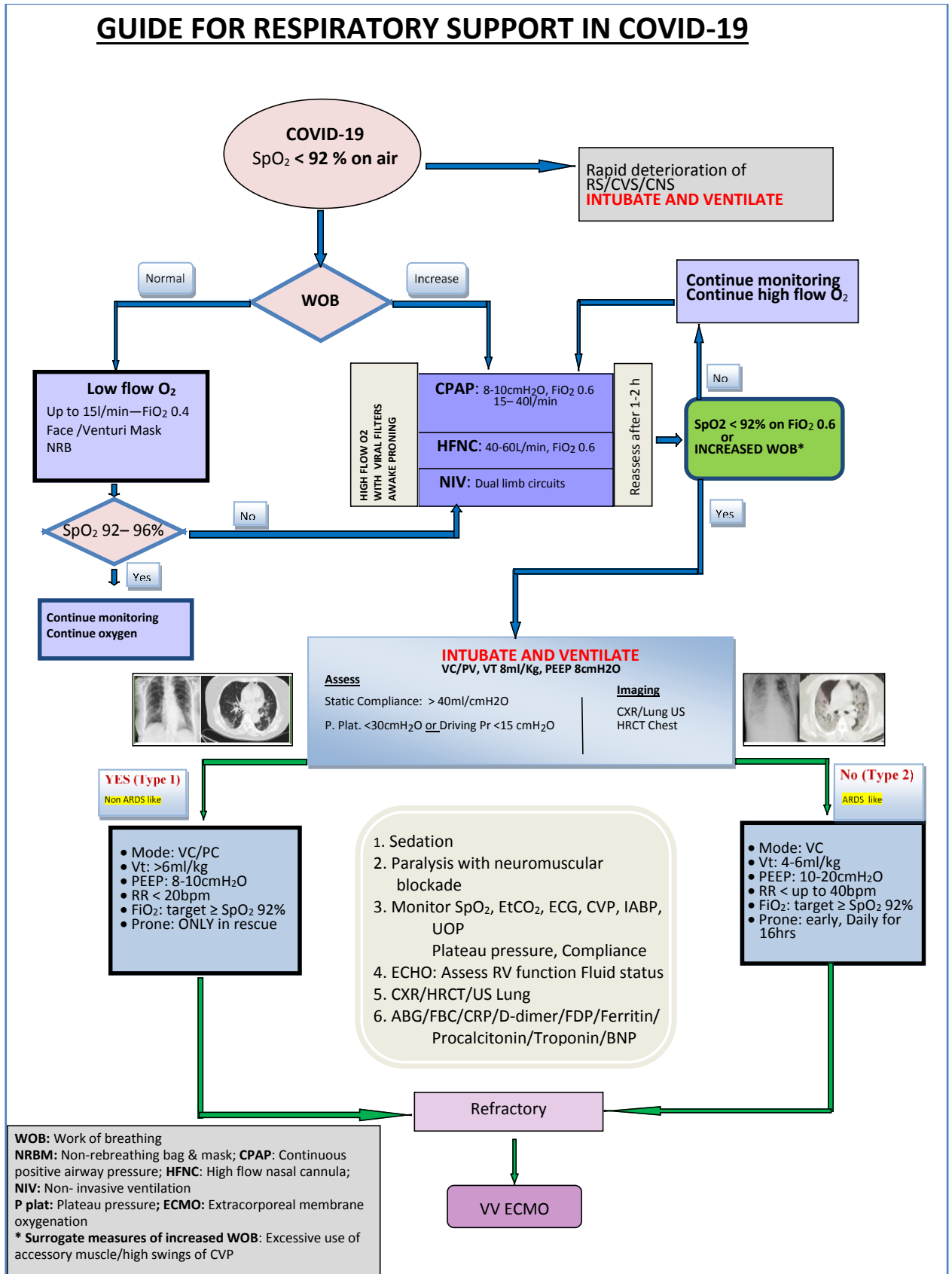
- i. Weaning should be started when the high respiratory drive settles and hypoxaemia resolves.
- ii. Minimize continuous or intermittent sedation, targeting specific titration endpoints (light sedation unless contraindicated) or with daily sedation holds
- iii. If the inflammatory markers are found to be high, do not attempt extubation even if all other indicators are deemed satisfactory as the course of the disease may last for 2 – 3 weeks.

VenoVenous - ECMO if available, need to be considered

Important factors to consider are time and means of intervention, risk of bleeding with anticoagulation and coordination with mechanical ventilation.

Refer Annexures 5 and 6 for endotracheal intubation in critical care and generic measures of ICU care respectively.

GUIDE FOR RESPIRATORY SUPPORT IN COVID-19



Source: College of Anaesthesiologists and Intensivists of Sri Lanka

5.7 GUIDE FOR FLUID THERAPY IN COVID-19

Regular assessment of fluid status and cautious fluid therapy are of paramount importance in improving outcomes of patients admitted to the ICU. The clinical findings will have to be interpreted with attention to the phase of disease spectrum and its underlying pathophysiology (as described earlier).

Goals of fluid therapy

- To optimize fluid status to maintain adequate organ perfusion until recovery from acute illness.
- To avoid complications due to fluid deficits or overload.

Assessment of fluid status

- **Clinical:** HR, BP, capillary refill time, colour and cold/warm peripheries, response to passive leg raising (PLR), hourly urine output
- **Blood:** lactate and base deficit (ABG)
- **Static measurement:** trends in central venous pressure
- **Dynamic measurements:** swings in PPV or SVV
- **US based:** swings in IVC diameter
RV function (dilatation and contractility)
LV contractility

Principles of fluid therapy

Throughout HDU/ ICU stay, judicious fluid therapy targeting euvolaemia is recommended to ensure optimal end organ perfusion and preclude end organ failure. Cautious fluid therapy is recommended to avoid hypovolaemia or hypervolaemia.

Maintenance fluids should be continued, orally or parenterally or both and any additional fluid losses should be replaced under close monitoring. Regular reassessment of fluid status should be continued to detect fluid deficits and overload at the earliest.

Targeted end points 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
- Lactates < 2 mmol/L
- Base deficit within normal range
- Normal response to Passive Leg Raising (PLR)
- Trends in central venous pressure (CVP)
- <13% swings in pulse pressure variation (PPV), stroke volume variation (SVV)
- IVC diameter: compressibility or expandability <18%
- RV function: normal size and function
- LV contractility: compatible with normal function

Management of Fluid deficits

Fluid deficits in patients with significant intrapulmonary shunts (Type 1 phenotype) may worsen the underlying hypoxaemia. Additionally, the global impairment in perfusion along with hypoxaemia may predispose patients to organ dysfunction.

- Patients on **non-invasive respiratory support**: Will be improved haemodynamically in response to fluid challenges (250ml of crystalloids given over 30min).
- Patients on **invasive ventilation**: It is useful to know the phenotype of the disease phase in guiding fluid therapy. Cardiac ultrasound can be used to assess the RV diameter and the function which is reflective of pulmonary vascular resistance and can be used as a guide to fluid therapy. Additional information about fluid status can be gathered by monitoring CVP values and the trends and assessing the variability of IVC diameter using ultrasound.
 - In patients with Type 1 or non-ARDS disease, fluid resuscitation should be done under close monitoring of the above parameters to optimize haemodynamic stability. It is important to prevent organ hypoperfusion and organ dysfunction in these patients.
 - In patients with Type 2 disease with an ARDS picture, fluids may have to be restricted to prevent / minimise fluid leakage into the lungs which can lead to worsening of

pulmonary oedema and hypoxaemia. In patients who are unresponsive to fluids, haemodynamic stability can be achieved with vasopressors (norepinephrine, vasopressin) and with inotropes such as dobutamine

- Myocardial involvement (hyperdynamic heart, acute stress induced cardiomyopathy and diffuse myocardial inhibition) can be assessed using troponin and beta- natriuretic peptide (BNP) measurements and echocardiography.

Management of fluid overload

Fluid overload should be avoided as it may lead to pulmonary oedema and decrease in SaO₂. Diuretics can be used cautiously in patients with evidence of hypervolemia to return to an euvolaemic state. Conservative fluid strategy is recommended with continuous monitoring of fluid status.

See Annexure 06: Flow chart on Fluid Therapy in COVID 19

- Micro thrombosis and associated ischemic events are explained to be very common in COVID-19. Good lung compliance with severe hypoxia suggests the possibility of pulmonary microvascular and/or macrovascular disease. The development of a hypercoagulable state in COVID-19 probably may be the likely cause.
 - Frequent checking of D- dimer levels and FDP should be carried out when indicated and raised levels should be treated with anticoagulants. Regular monitoring of D- dimer levels will also predict the severity and prognosis of the illness. TEG is also helpful but checking for D dimer levels will be more justifiable.
 - Use of Anticoagulation.
Unless contraindicated anticoagulation with subcutaneous enoxaparin, 1mg/kg 12hourly (dose adjust with Cr Cl < 30mls/min) is recommended. This can be continued until the patients D-dimer level returns to normal.
- The possibility of pulmonary thromboembolism should be considered in patients with sudden deterioration of oxygenation, respiratory distress and hypotension as this may lead to sudden death
- The increased risk of venous thromboembolism (VTE) should be assessed and pharmacological thromboprophylaxis should be given to all high-risk patients. This may

need to be withheld if there is active bleeding, platelets < 30,000/mm³ or in the presence of any other contraindication.

- **For Cr Cl > 30:** Low molecular weight heparins (LMWH) enoxaparin 1mg/kg s/c 12 hourly
- **For Cr Cl < 30 or AKI:** Unfractionated heparin 5000 units s/c bd/ tds or dose-adjusted LMWH

5.8 Other management strategies of severe COVID - 19 patients in a specified HDU/ICU

Follow a holistic approach when managing patients with COVID- 19

- A. Infection prevention strategies (Annexure 6)
 - Employ strategies to prevent ventilator associated pneumonia (VAP)
 - Rational use of antibiotics for co-infections
- B. Nutrition
 - Enteral nutrition; should be started early. (Annexure 6)
- C. Other generic strategies on management of ventilated COVID patients
 - Measures to reduce incidence of pressure ulcers (Annexure 6)
 - Measures to reduce incidence of ICU-related myopathy. (Annexure 6)
 - Careful attention should be paid to adverse drug reactions and drug interactions
 - Tracheostomy: To be considered in clinical decision making.
 - Suctioning: Use closed inline suction catheters. Any disconnection of the patient from the ventilator should be avoided to prevent lung de - recruitment and aerosolization.
 - Nebulization: Void the use of nebulizers. Metered dose inhalers are preferred where possible.
 - Bronchoscopy: Diagnostic bronchoscopy is not recommended due to the risk of aerosolization. Tracheal aspirate samples are sufficient for diagnosis of COVID-19
- D. Closely monitor for signs of clinical deterioration, such as progression to sepsis, acute kidney injury or any other organ failures and respond immediately with appropriate interventions.

5.9 CIRCULATORY FAILURE IN COVID 19

Circulatory failure in COVID 19 may be due to a multitude of causes including cardiogenic shock. Severely and critically ill patients with COVID-19 can develop myocardial injury with significantly elevated cardiac biomarkers due to nonischemic causes (such as myocarditis) or ischemic causes (both type 1 MI or type 2 MI) in the setting of hypoxia from acute respiratory distress syndrome and potential micro-thrombi.

1. A high degree of suspicion is paramount to pick the COVID -19 patients presenting with cardiovascular manifestations such as acute coronary syndrome and arrhythmias.
2. Thrombolytic therapy may be considered in stable patients with COVID-19 who has STEMI and on suspicion of MI.

Refer the following annexures for further details on specific care protocols

- **Annexure 08 - Management of Acute Kidney Injury and Renal Replacement Therapy**
- **Annexure 09 – Management of Sepsis and Septic Shock in COVID-19**

SPECIFIC MEDICATIONS

Discuss with the respiratory physician and adhere to the unit protocol

Refer Annexures 10 & 11 for the list of equipment and drugs needed for management of critically ill patients with COVID-19 and specifications of High Dependency areas

5.10 ESCALATION PLAN FOR COVID- 19 PATIENTS

Understand the patient’s co-morbid condition(s) in the management of critical illness and appreciate the prognosis. Communicate with patient and their families prognostic information early and provide support throughout their HDU/ICU stay. Understand the patient’s values and preferences regarding life-sustaining interventions.

Communication: do not use personal mobile phones during duty hours. Availability of a dedicated smart phone and intercom facilities in cohort ICU is important to prevent frequent staff movements.

5.11 DISCHARGING PATIENTS FROM ICU

- Step down: discharge from the ICU to a HDU or ward has to be done carefully and may have to be rapidly planned as the demand for beds may rise exponentially.
- Every patient should be assessed daily using the ABCDE approach in order to de-escalate as they recover. Plan of de-escalation should be reviewed at least twice a day in-order to liberate patients from life sustaining measures early.
- Patients stepped down from ICU/ HDU should be sent back to a separate cubicle in the cohort area for COVID- 19 confirmed cases as some of them may still shed the virus at the time of discharge from ICU.
- Those who are with multiple co-morbidities and poor physiological reserves or unable to show expected progress during a pre-determined ICU trial (eg; for 48 hours) should be either stepped down or a decision has to be made as “not for further escalation” in case of further deterioration.
- Deceased patients with COVID -19: Refer to the chapter on disposal of deceased

5.12 STAFF SAFETY AND WELL-BEING

Staff allocation: doctors, nurses and ICU staff should be on a roster ensuring that the minimal number of personnel are present at a given time to avoid unnecessary exposure to all concerned.

Health care staff will be subjected to both physical and psychological stress when involved in patient care during a pandemic of such magnitude. Therefore, early measures to address burnout would ensure better service provision during this difficult period and ensure safety of health care providers. The following factors should be considered to ensure staff safety and well-being.

1. Train staff on donning, doffing, prone ventilation and methods of communication regularly by means of simulation.
2. Limit and minimize extended duty hours for not more than 24 hours.
3. Make sure staff gets adequate rest, meals, sleep and ensure adequate toilet facilities for which dedicated areas should be identified.
4. Screen staff regularly for symptoms of COVID- 19 or other illnesses.
5. Arrange various methods of communication whereby they could contact their family members and friends on a regular basis.
6. Prepare an additional list of names and contact details of doctors, nurses and support staff in the event of crisis escalation
7. Stress relieving sessions to be organized for the staff on a regular basis (leisure activities/ exercises on relaxation)
8. Arrange for regular visits by psychological counsellors to provide support to all staff concerned

Examples of some high-risk aerosol generating procedures (AGPs) where full PPE is required include:

- Bronchoscopy
- Tracheostomy
- Upper gastrointestinal endoscopy
- Trans-oesophageal Echocardiogram
- Intubation, extubation, LMA and related procedures (procedures where bag-mask ventilation and/ or open suctioning are required)

5.13 INCREASING ICU SURGE CAPACITY IN THE HOSPITAL

Create cohort ICUs (areas separated from the rest of the ICU beds to minimize the risk of in-hospital transmission) for COVID-19 patients

Every hospital should organize a triage area, where patients could receive ICU care up to mechanical ventilation if necessary, to support critically ill patients with suspected COVID-19 infection, pending the final result of diagnostic tests

Take immediate measures to activate non-functioning ICU beds for usage.

6 GUIDELINE ON INTER-HOSPITAL SAFE TRANSPORT OF A SUSPECTED / DIAGNOSED PATIENT WITH COVID- 19

During the transfer of a patient diagnosed or suspected with COVID- 19, every measure should be taken to prevent a breach in infection control, mitigate the viral spread whilst not compromising the safety of the patient and health care workers (HCW).

We recommend to transfer deteriorating patients early than late.

Keep a designated ambulance for transfer of COVID-19 confirmed/suspected patients

This document should be used as a guide to safely transport a patient with COVID-19. We suggest adhering to the steps stated below.

STEP 1: Communication before the transfer

- The decision to transfer a patient to another hospital must be agreed upon by the responsible senior clinicians in **both** the referring and receiving hospitals.
- The receiving hospital must be contacted **before** the transfer regarding the exact location to where the patient should be transferred in the Hospital as this may not be the usual area within the hospital.
- Notify the receiving unit that they are conveying a suspected / diagnosed COVID- 19 patient and the expected time of arrival.
- Communicate to the receiving team just before departure and state the estimated time of arrival

STEP 2: Stabilization of the Patient

- Stabilization of the patient is mandatory before transport.
- If the patient is un-intubated, the patient should be provided with a surgical mask to wear during transfer
- If oxygen is required, place nasal prongs under the surgical face mask. Maintain the lowest possible gas flow to achieve the desired oxygenation level.
- If indicated, electively intubate the patient and stabilize before transfer in order to minimize aerosol generating procedures (AGPs) during transfer.

- If intubated:
 - Ensure the endotracheal tube is well secured and note the length and depth of tube before transfer.
 - Ensure there is no cuff leak
 - Avoid circuit disconnections during transfer
 - Connect to a portable ventilator. Avoid / minimize Ambu ventilation
 - Do not forget **the Bacterial and Viral filter between the patient and the circuit and between the expiratory limb and the ventilator.**
 - If the same person involved in intubation is also involved in the transfer, change personal protective equipment (PPE) accordingly before joining the transfer team.
 - Avoid the use of high flow nasal oxygen and open breathing circuits during transfer

STEP 3: Ambulance

- Remove all unnecessary equipment or move them into a closed compartment within the ambulance before loading the patient.
- Always use ambulances with two compartments (driver's compartment should be separated from the patient).
- Ensure the partitions within the ambulance are closed and sealed throughout the journey.
- Ambulance windows need to be wind down. Air- conditioning inside the vehicle must be adjusted, to extract and not to recirculate air within the vehicle
- By-standers (family members) should not be allowed to travel within the patient compartment
- Non-COVID patients should NOT be transferred in the same vehicle as a suspected or confirmed patient with COVID-19

STEP 4: Staff and safety

- All members of the ambulance crew should be aware that they are handling a suspected / diagnosed COVID- 19 patient.
- Involve minimum number of staff (one doctor +/- one nurse, driver+/- one supporting staff). This has to be decided by the clinical condition of the patient and **by the clinical authority** available at that moment.

- One responsible staff member should travel in the same compartment (two if the condition is critical) with the patient
- During transfer, the responsibility for support and supervision to the transfer team is provided by the referring senior clinician.
- All staff should be donned in appropriate PPE s

STEP 5: Recommended PPE

All health care workers on transfer require PPEs. But the recommended degree of PPE is determined by the distance of patient contact in reference to 1 meter and level of involvement with the patient for aerosol generation procedures.

PPE requirement	Close contact <1m and Involve in AGPs*	Close contact <1m, but NO AGPs*	Distant contact >1m
1. Hand sanitizer	Yes	Yes	Yes
2.Fluid resistant Gown / coverall	Yes	Not mandatory	No
3.Plastic apron to cover the body	No	Yes	No
4.Surgical Mask	No	Yes	Yes
5.N95 Mask	Yes	Yes (if high risk)	No
6.Eye protection (goggles or /and visor)	Yes	Yes	No
7.Gloves	Double 1 st - tight fitting 2 nd glove	Single (If the risk is too high double)	No
Eg of the HCW	<ul style="list-style-type: none"> Transporting suspected COVID-19 patients in the same compartment of the ambulance 	<ul style="list-style-type: none"> Assisting with loading or unloading patient with suspected COVID-19 disease eg Stretcher 	<ul style="list-style-type: none"> Driver, if involved only in driving the suspected COVID19 and the driver

	<ul style="list-style-type: none"> • HCW involved in intubation, suction, CPR 	<p>handlers, supporting staff, Doctors, Nurses, ODP</p> <ul style="list-style-type: none"> • Driver of ambulance with no separate compartment for the driver 	<p>compartment is separated from the patient</p>
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Ref: Rational use of PPE and Infection Prevention and Control of COVID-19 Health care settings in Sri Lanka, Sri Lanka College of Microbiologists, Epidemiology Unit, Ministry of Health and Indigenous Medical Services World Health Organization, Sri Lanka. 2nd April 2020

- Please consider the above as the minimum standard.
- Always make sure one person is with a complete PPE (with eye protection, N95 mask and coverall) within the ambulance in case of an emergency AGPs (accidental extubation, CPR)
- Always make sure one set of Additional PPE is available

STEP 6: Equipment and Drugs

- Prepare transport equipment and drugs in anticipation of medical emergencies, such as sudden cardiovascular collapse or hypotension (Annexure 12)

(Also refer to the “Transport of Adult Critical Care Patient” guidelines by the College of Anaesthesiologists and Intensivists Sri Lanka)

STEP 7: Monitoring

- Minimum standards of monitoring - continuous ECG, non- invasive blood pressure, oxygen saturation, end tidal CO₂ if ventilated

STEP 8: Rescue and contingency plans during transport

- In case of unanticipated hypoxemia in a non-intubated patient, gentle bag-mask ventilation should be done with the lowest possible flow rates to achieve oxygenation. The Mapleson C circuit or self- inflating BVM should be fitted with an HME incorporating a bacterial and viral filter.

- If intubation is required during transfer it should be done in accordance with all precautions when intubating a patient with COVID- 19 (refer to the interim guidelines on intubation by the College of Anaesthesiologists & Intensivists of Sri Lanka)

STEP 9: Documentation

- The clinical record should document the patient's clinical status before, during and after transport, relevant medical conditions, environmental factors, therapy given, adverse logistic events, and procedures undertaken and hand over to the receiving team.

STEP 10: On Arrival

- On arrival, the medical officer/ in - charge of the team should inform the receiving unit before off-loading the patient to the designated area.
- Transfer within the Hospital:
 - Inform the destination unit
 - Have a designated route
 - The receiving unit should make arrangements to clear the route of transport within the hospital. (Make an announcement through the public addressing system)

STEP 11: Post Transportation

- All clinical waste should be disposed of as infectious clinical waste, as per local policy, at the receiving unit
- All linen should be disposed of as infectious linen, as per unit protocol, at the receiving unit
- Clean all the equipment immediately following the hand over. (see step 12)
- Vehicle should be left to ventilate with windows open
This should be done by the conveying staff (carrying staff) before doffing of PPE
- The crew should remove PPE in the designated area identified within the receiving unit
- All PPE must be disposed of as clinical waste, as per local policy, at the receiving unit

STEP 12: Post transport Decontamination

- Conveying staff are expected to **clean any equipment** used for transfer this should be completed before the removal of PPE.
- Use disposable equipment as much as possible.

- Cleaning should be done by a dedicated team of housekeeping personnel at the receiving center **before** embarking on the return journey
- Cleaning personnel should wear surgical mask, fluid resistant gown, heavy duty gloves, eye protection, boots or closed shoes.
- Decontaminate all equipment used, exposed surfaces and contact areas. e.g. stretches, wall, cupboards etc.

Cleaning of the ambulance

- Leave windows open
- Vehicle interior surfaces
 - Start from the ceiling and work from top to bottom
 - Spray and wipe with 0.1% hypochlorite solution and leave for a minimum of 10min. Wash later with water.
- Floor of the Vehicle:
 - Spray and mop with 0.1 % hypochlorite solution and leave for a minimum of 10minutes. Wash later with water.
- Any reusable item (ventilator tubing) need to be cleaned and decontaminated at the receiving end. Do not take it back to the referring center if it cannot be decontaminated
- Leave the windows of the ambulance open before doffing of the cleaning personnel.
- All used linen should be disposed of as infectious linen, as per local policy, at the receiving unit
- All waste should be disposed of as clinical waste, as per local policy, at the receiving unit

STEP 13: Doffing (removing PPE)

- Doffing has to be done in the correct order to prevent cross contamination at the end of cleaning and decontamination
- To be done at the receiving end.
- Should practice hand decontamination with alcohol hand rub between removing of each item of PPE
- PPE s should be disposed as clinical waste
- Any reusable item (eye protections) needs to be cleaned and decontaminated as per local protocol.

- The ambulance personnel should take a bath and change into a clean attire before commencing the return journey.
- A checklist of procedures to be carried out during a transfer is provided in Annexure 13.

We strongly recommend the clinical authority to educate ambulance staff and train them so as to ensure safety of all members involved during a transfer and to prevent contamination of the surroundings.

The responsibility of the safe transfer remains on the administrative authorities of both the conveying and receiving hospitals.

BVM – bag-valve mask, PPE- personal protective equipment, AGP- aerosol generating procedure

7 MANAGING HIGH-RISK PATIENTS

7.1 COVID-19 IN PREGNANCY

Pregnant women do not appear to be more susceptible to the consequences of corona virus than the general population. There is no evidence that the virus can pass to the baby during pregnancy.

As a precautionary approach, pregnant women with suspected or confirmed COVID-19, when they go into labour are being advised to attend an obstetric unit with specialist cover with isolation facilities. At the moment there is no evidence that the virus can be carried in the breast milk. Therefore, benefits of breastfeeding outweigh any potential risk of transmission of corona virus through breast milk.

Pregnant women with suspected, probable, or confirmed COVID-19, including women who may need to spend time in isolation, should have access to obstetric, foetal medicine and neonatal care, as well as mental health and psychosocial support, with facilities to care for any maternal and/or neonatal complications.

Mode of birth should be based on obstetric indications.

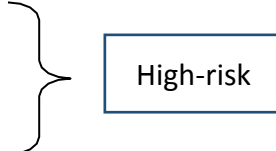
Please note that this information is subjected to further evidence based with more experience.

7.2 CARE FOR OLDER PATIENTS WITH COVID-19

Overall mortality reported as approx. 1-2% of infected persons while the case fatality among hospitalized patients is reportedly around 15%.

Table: Who is at risk of dying from COVID-19

Age (yrs)	No. of Deaths	%
0 – 9 years	0	0
10-19	1 in 500	0.2
20-29	1 in 500	0.2
30-39	1 in 500	0.2
40-49	1 in 250	0.4
50-59	1 in 76	1.3
60-69	1 in 27	3.6
70-79	1 in 12	8.0
80+ years	1 in 6	15



Older adults (above 50 years of age) with serious medical conditions e.g. heart disease, diabetes, lung disease are at higher risk to become very sick from the COVID -19 infections.

Suspected/Probable (awaiting diagnosis) cases of COVID -19 (who are probably in self-isolation), if faced with a medical/ surgical or obstetrics emergency should be first assessed for COVID 19 infection and concurrently transferred/ referred to the relevant specialty clinic/ unit immediately for appropriate care. Necessary arrangements should be made in the clinic/ ward to attend to them immediately/ as a priority basis to limit their waiting time.

8 AUTOPSY PRACTICE AND DISPOSAL OF DEAD BODY

COVID-19 related deaths could be categorized arbitrarily into 4 groups:

Category I

Death following **confirmed** Corona Viral Infection (COVID-19)

- Method of disposal
 - An inquest is not required.
 - Minimum handling.
 - Viewing of the body only by close relative/s is allowed in a pre-designated area in hospital.
 - No embalming/No autopsy (medico-legal or pathological). The body cannot be taken home.
 - Place the body in a body bag and seal.
 - Body should not be viewed after sealing.
 - Funeral undertaker should place sealed body bag in a coffin for transportation (coffin should be preferably sealed)
 - **The body should be cremated within 24 hours (preferably within 12 hours).**

In case of death occurring in the ward /ICU /ETU:

- Only use designated body bags or a suitable alternative.
- The dead body should be handled by the attending staff and put in the body bag and kept in a pre-designated place.
- If the death occurred in ICU, the body should be removed from the machines and placed in a pre-designated area.

Supervision of disposal should be done by MOH/ PHI along with area police.

Category II

Death following suspected Corona Viral Infection (awaiting laboratory confirmation)

- Method of disposal
 - An inquest may be required.
 - Minimum handling.
 - External examination only.
 - Nasal swab, throat swabs, tracheal aspirate and femoral blood sample (centrifuged) to be collected to be sent for analysis.

- Viewing of the body only by close relative/s is allowed in a pre-designated area in hospital.
- Place the body in a body bag and seal after external examination.
- Body should not be viewed after sealing.
- No embalming. The body cannot be taken home.
- Funeral undertaker should place sealed body bag in a coffin for transportation (coffin should be preferably sealed).
- The body should be cremated within 24 hours.
- Clinicians and JMO should try to trace the report as early as possible:
 - If COVID-19 become positive: **should be cremated as in category- I**
 - If COVID- 19 is excluded: to handle as category IV
 - If the report is not available within 24 hours: cremation.

In case of death occurring in the ward /ICU /ETU:

- Only use designated body bags or a suitable alternative.
- The dead body should be handled by the attending staff and put in the body bag and kept in a pre-designated place.
- If the death occurred in ICU, the body should be removed from the machines and placed in a pre-designated area.

Supervision of disposal of the body should be done by MOH/ PHI along with area police.

Category III

Death following possible Corona Viral Infection with suggestive history and clinical findings

- Method of disposal
 - An inquest may be required.
 - Minimum handling.
 - External examination only.
 - Nasal swab, throat swabs, tracheal aspirate and femoral blood sample (centrifuged) to be collected to be sent for analysis.
 - Viewing of the body only by close relative/s is allowed in a pre-designated area in hospital.
 - Place the body in a body bag and seal after external examination.
 - Body should not be viewed after sealing.

- No embalming. The body cannot be taken home.
- Funeral undertaker should place sealed body bag in a coffin for transportation (coffin should be preferably sealed).
- The body should be cremated within 24 hours.
- JMO should try to trace the report as early as possible:
 - If COVID-19 become positive: **should be handled as category I**
 - If COVID- 19 is excluded: to handle as category IV
 - If the report is not available within 24 hours: cremation

In case of death occurring in the ward /ICU /ETU:

- Only use designated body bags or a suitable alternative.
- The dead body should be handled by the attending staff and put in the body bag and kept in a pre-designated place.
- If the death occurred in ICU, the body should be removed from the machines and placed in a pre-designated area.

Supervision of disposal of the body should be done by MOH/ PHI along with area police.

Category IV

Death due to pneumonia unlikely to be due to corona viral infection

- Method of disposal.
 - An inquest may be required. Better not to open all body cavities.
 - Nasal swab, throat swabs, tracheal aspirate and femoral blood sample (centrifuge) to be collected to be sent for analysis.
 - If necessary, perform a true cut lung biopsy.

Routine disposal can be recommended (this has to be dealt on case by case basis by JMO).

DEATH OF FOREIGN NATIONALS following diagnosed Corona Viral Infection

- Disposal is same as category- I.
- The hospital authority should inform the Ministry of Health officials to contact the relevant embassy for the cremation in Sri Lanka.

DEATH OF FOREIGN NATIONALS due to other unnatural causes (e.g. RTA) with possible exposure to COVID-19

- Disposal same as category II/category III However, an inquest is required. (An external examination or a limited autopsy may be performed).
- Hospital authority should inform the Ministry of Health officials to contact the relevant embassy for the cremation in Sri Lanka.

In case of any **suspected criminality** of COVID-19 infected patient under category I, II or III – An inquest is required. A partial or full autopsy may have to be performed with necessary IPC on a case by case basis by Consultant JMO.

Sample dispatch to designated laboratory - Please refer Chapter 3

Supervision of disposal should be done by MOH/ PHI along with area police.

The postmortem handling should be done by the senior-most JMO with the senior morgue attendants in category I, II or III.

In category I, II and III

- The body should never be washed under any circumstance.
- The body has to be placed in a sealed body bag and a coffin.
- Exclusive cremation.
- The disposal of bodies must be monitored by police, MOH and PHI.

Note – this chapter has been issued as a Ministry of Health circular (EPID/400/2019 n-Cov).

9 HOSPITAL PREPAREDNESS FOR COVID-19 GLOBAL PANDEMIC

There are increasing number of COVID-19 outbreaks in many parts of the world. Accordingly, there may be a possible increase of COVID -19 patients in Sri Lanka also. Therefore, strengthening the hospital emergency preparedness and response plan by all institutions is a vital component in the current strategy of combating the global COVID-19 pandemic.

Currently there is a three-tier approach by the Ministry of Health to address the needs;

- Designated COVID-19 treatment facilities (at NIID/IDH, Colombo East Base Hospital, BH Welikanda)
- COVID-19 Isolation hospitals (see the list in Annexure 14)
- Identified centers with ICU / HDU facilities

COVID-19 isolation hospitals and all other secondary/tertiary care hospitals are instructed to make arrangements to immediately scale up their preparedness as and when informed. These facilities will have to be expanded depending on the status of COVID-19 crisis.

All healthcare institutions must ensure that patients are not deprived of their usual standard of care irrespective of their COVID-19 status.

Hospital preparedness plan should include the following key elements*:

- 1) Establishment of COVID-19 Operational Cell
- 2) Outpatient and emergency department care
- 3) Establishing designated interim COVID-19 suspected section/ward
- 4) Provision of critical care for Non-COVID and COVID-suspected patients
- 5) Safe transferring of patients to a COVID-19 designated/isolation hospital
- 6) Ensuring safety of health care staff
- 7) Managing COVID-19 cured patients

9.1 ESTABLISHMENT OF "COVID-19 OPERATIONAL CELL"

In order to facilitate collective decision-making process at institutional level as well as effective implementation of patient care measures and patient / staff safety measures all hospitals are instructed to establish a 'COVID-19 Operational Cell' in their hospital. Implementation of these decisions should be done considering the available facilities and needs.

The Head of the Institution should function as the chairperson and decide on the composition and members of COVID-19 Operation Cell. Such a cell should be composed of Consultant Physicians, Consultant Respiratory Physician, Anesthetist/Intensivist, Emergency Physician, Consultant Microbiologist/Virologist, Special Grade Nursing Officer, Chief Pharmacist, Chief MLT and a Medical Officer who should function as the secretary. Other relevant specialist consultants in the hospital together with those in-charge of other staff may be co-opted as required. Members of Operational Cell should positively assist the Head of Institution to manage hospital service.

The key functions of this cell are to operationalize the main elements given below:

- Assisting and guiding implementation of circular instructions given by Ministry of Health through institutional policies / circulars
- Clarifying unclear areas of instructions given by the center
- Assisting and guiding rotations, safety and welfare of staff
- Maintaining optimum patient care including emergency care
- Advising and guiding in issues related to quarantining of staff
- Assisting and guiding in any other relevant matters

Relevant specialists will provide technical guidance and monitoring on OPD and emergency department setup, admission to relevant sections or wards, emergency and critical care needs, arrangement of necessary investigation, PPE facilities and safe transferring of patients.

The Operational Cell could use the guidelines on a 'Hospital Preparedness for COVID-19 - Practical Manual' developed and available on Epidemiology Unit Website: www.epid.gov.lk on Ministry Website and through following link: <http://covid-19.health.gov.lk> .

9.2 OUTPATIENT AND EMERGENCY DEPARTMENT CARE

All patients who require admission should be screened using proposed screening tool by a doctor or a nurse (Annexure 9). There should be a separate triage/area clearly sign posted at the entrance of all hospitals.

All OPDs/ Emergency Departments should have separate areas to manage;

- Patient suspected to have Covid-19 infection
- Patients presenting with respiratory illness
- Patients presenting with other illnesses and with suspicious contact history and
- Other categories of patients

Once resuscitated and stabilized at the emergency department all patients should be accommodated in to designated unit without any delay (Ward/HDU/ICU or interim COVID-19 suspected section/ward).

9.3 ESTABLISHMENT OF DESIGNATED INTERIM COVID-19 SUSPECTED SECTION/WARD

A designated section or ward should be established as an interim measure to manage COVID-19 suspected patients. In the current context, it is preferable not to consider existing medical units to establish this section/ward. However, hospital COVID-19 Operational Cell should collectively decide which section to be used for this purpose. All patients managed in this section/ward should receive standard medical care.

All Patients Under Investigation (PUI) for COVID-19 should be admitted to this interim COVID-19 suspected section/ward. A consultant Physician will be in-charge of this with a dedicated, trained team of doctors, nurses etc. All patients managed in this section/ward should receive standard medical care. Non-medical conditions in these patients should be attended by specialist in the relevant field, when referred, without a delay. Necessary facilities to manage patients as well as PPE for the staff should be available (refer guidelines on rational use of appropriate PPE for both patients and staff). Distancing of patients and hand hygiene practices should be strictly adhered in this unit.

Designated respiratory ward/section

In addition to the COVID-19 suspected ward/section, hospital COVID-19 Operational cell may decide on establishing a separate interim respiratory ward/section with necessary facilities depending on the need and the availability of the space, staff, facilities and other logistics.

9.4 PROVISION OF CRITICAL CARE FOR Non-COVID AND COVID-SUSPECTED PATIENTS

Necessary arrangements should be made to attend immediately to critical care needs of all patients irrespective of their COVID-19 status (with necessary safety measures and equipment). As such, separate HDU/ICU area should be designated for the needs of COVID-19 suspected patients. This arrangement should not compromise the provision of critical care for non-COVID-19 patients.

9.5 SAFE TRANSFERRING OF PATIENTS

Any patient suspected or confirmed of COVID-19 should be transferred to the nearest designated hospital in accordance with the clinical practice guidelines issued by the Ministry of Health. Decision to transfer a patient should be mutually agreed upon by the responsible senior clinicians in both the receiving and referring hospitals. All patients should be adequately resuscitated, and their clinical status optimized before the transfer.

9.6 ENSURING THE SAFETY OF HEALTHCARE STAFF

There may be undue fears and concerns regarding corona virus infection (COVID-19) among health care staff. A mechanism should be developed by all institutions to address this issue early and arrange awareness training programmes for group of staff with assistance of Medical Officer – Focal Point and Infection Control Nursing Officer. The necessary materials are available in www.epid.gov.lk and *Ministry Website* and in the following link - <http://covid-19.health.gov.lk>.

Every step should be taken to ensure the safety and wellbeing of the health care staff who are dealing with Covid-19 pandemic. Some of the essential steps are;

- Supply of PPE
- Provision of required infrastructure facilities
- Continuous education programs
- Provision of psychological support

- Ensuring surge capacity - adequate number of staff by recruiting additional personal from other areas of the hospital if needed.

Quarantine of staff should be done according to the circulars and collective decision with COVID-19 Operational Cell.

9.7 MANAGING PATIENTS CURED OF COVID-19

Patients who are cured of COVID-19 once discharged should be followed up by relevant Medical Officer of Health and public health team for another two weeks.

If a person cured of COVID-19 requires medical care for any other condition/co-morbidity such person should not be discriminated due to his/her history of COVID-19 status.

10 SCREENING AND MANAGEMENT OF HEALTHCARE WORKERS FOLLOWING EXPOSURE TO A CONFIRMED/ SUSPECTED CASE OF COVID-19

With possible increase in the number of COVID-19 cases, frontline healthcare workers (HCW) are at higher risk of exposure.

This chapter provides a standard screening tool and disposition for healthcare workers who have been exposed to a confirmed/suspected case of COVID-19. It will provide appropriate quarantine and testing to ensure the safety of HCW and build confidence in continuing to work.

Disposition of the HCW following exposure to confirmed/ suspected case of COVID-19 will depend on their level risk of exposure and development of symptoms in the HCW. This will be described in three parts:

1. Assessment of the level of risk associated with the exposure
2. Protocol for Asymptomatic HCW/ member of staff according to the level of risk
3. Protocol for Symptomatic HCW/ member of staff according to the level of risk

10.1 Assessment of the level of risk associated with the exposure of a HCW/Member of staff exposed to a confirmed^{*}/ probable[#] COVID 19 patient

^{*}confirmed COVID 19 patient - *A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.*

[#]probable COVID 19 patient - *A suspect case for whom testing for the COVID-19 virus is inconclusive. ('Inconclusive' herein refers to an inconclusive result of the test reported by the laboratory or a suspect case for whom testing could not be performed for any reason)*

For a HCW to be considered as having been exposed, the exposure should have taken place within a period of 48 hours before the onset of the symptoms and up to 14 days after the onset of symptoms in the patient.

In the event of an exposure to an asymptomatic case, the period of contact is measured as the 48 hours before the date on which the sample which led to confirmation was taken and up to 14 days after the date of which the sample was taken.

Assessment of the level of risk associated with the exposure

Should be done by a committee appointed by the hospital

This committee should comprise of the head of the institution, consultant physician/ respiratory physician, intensivist/anaesthetist, consultant microbiologist/virologist and infection control nursing officer of the hospital

To assess the risk of exposure the following 5 questions should be asked:

1. Did you have face-to-face contact (within 1 metre) with a confirmed or probable COVID-19 patient for more than 15 minutes, without you and/or the patient wearing surgical face masks?
2. Did you have a direct physical contact when providing care to a confirmed or probable COVID-19 patient without wearing appropriate PPE?
3. Were you present when any aerosol-generating procedures were performed on a confirmed or probable COVID 19 patient, without wearing appropriate PPE?
4. Was there a splashing of secretions on to the mucus membrane when providing care for a confirmed or probable COVID 19 patient?
5. Did you have any health care interactions with a confirmed or probable COVID 19 patient without appropriate personal protective equipment (PPE)?

The level of risk is determined as follows:

High risk	If the answer is YES to ANY of the above questions for a confirmed COVID 19 patient
Moderate risk	If the answer is YES to ANY of the above questions for a probable COVID 19 patient
Low risk (protected exposure)	If the answer is NO to ALL of the above questions for a probable or confirmed COVID 19 patient And Other situations as indicated by local risk assessments

Further management of the HCW is as follows:

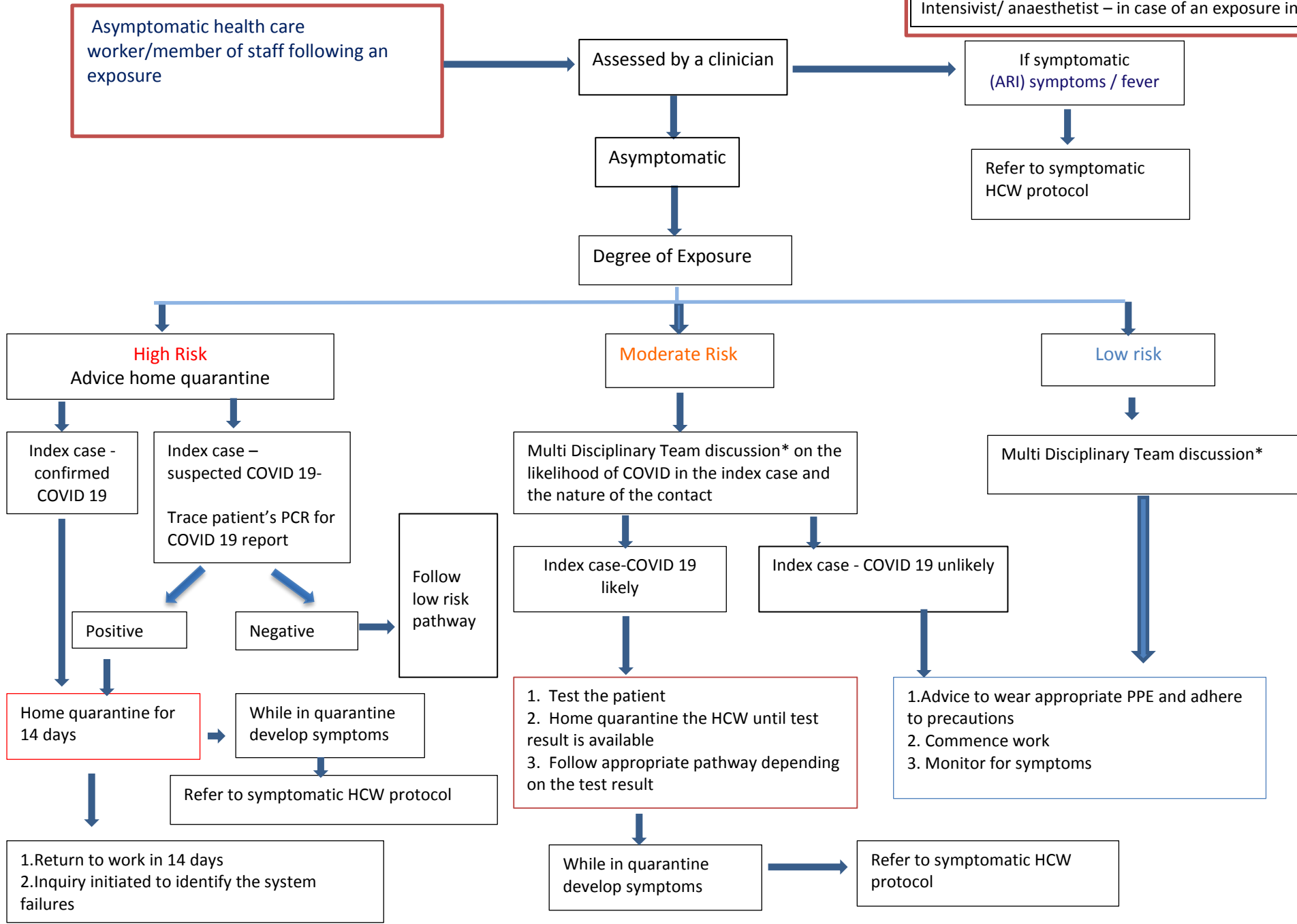
If Asymptomatic → Asymptomatic HCW flow chart (page 64)

If Symptomatic → Symptomatic HCW protocol (page 65)

Exposures of healthcare workers should be directly notified immediately to the Epidemiology Unit using the notification form given in Figure 10.1.

10.2 Asymptomatic HCW protocol:

*MDT team – Head of institution/Respiratory Physician/
Second physician
Microbiologist/virologist
Intensivist/ anaesthetist – in case of an exposure in the ICU



10.3 SYMPTOMATIC HEALTHCARE WORKER/ MEMBER OF STAFF PROTOCOL

HCW - Unwell with Acute Respiratory Infection (ARI) symptoms / fever with an exposure to a confirmed/ suspected COVID 19 patient

Should be assessed by a committee appointed by the hospital

This committee should comprise of the head of the institution, consultant physician/ respiratory physician, intensivist/anesthetist, consultant microbiologist/virologist and infection control-nursing officer of the hospital

10.3.1 Management of the symptomatic HCW

In case of a “High risk” exposure – test the HCW

- The health care worker should be assessed and investigated in an isolation area
- Swabs for PCR for COVID 19 and other appropriate investigations should be sent and traced as early as possible.
- Until the result is known the HCW be kept in the isolation area.

- If the PCR for COVID 19 is positive – All confirmed cases should be transferred to a COVID-19 Treatment Centre.

- If the PCR for COVID 19 is negative,
 - Investigate and continue appropriate management
 - Look for another cause of symptoms
 - Assess fitness for discharge from hospital
 - If not fit for discharge, manage in an isolation area until the status of the index case is determined
 - If fit for discharge - should be home quarantined for 14 days and follow-up the status of the index case

In case of “Moderate risk” exposure – test the HCW

- The health care worker should be assessed and investigated for COVID 19 and other possible causes in an isolation area
- Swabs for PCR for COVID 19 should be sent and traced as early as possible.
- Until the result is known the HCW be kept in the isolation area and managed appropriately

- If the PCR for COVID 19 is positive – All confirmed cases should be transferred to a COVID-19 Treatment Centre.

- If the PCR for COVID 19 is negative,
 - test the index case (probable COVID suspect)
 - assess for another cause
 - assess fitness for discharge from hospital
 - If not fit for discharge, manage in an isolation area until the COVID status of the index case is determined
 - if the index case is COVID positive or the status of the index case cannot be determined – quarantine the HCW for 14 days
 - If the index case is negative for COVID 19, and the HCW is fit to work, report to work. (Quarantine is not necessary)

In case of a “Low risk” exposure – Do not test the HCW

- Investigate and treat the underlying cause
- Quarantine is not necessary
- Continue working if fit to work

10.3.2 Document in the Incident register

All healthcare centers should have an incident register.

Any health care worker presenting with symptoms suggestive of an acute respiratory infection +/- fever with an exposure to confirmed/suspected COVID 19 patient should be registered in the incident register.

The names and contact details of the HCW (in both symptomatic and asymptomatic categories) for whom quarantine is recommended should be sent to the epidemiology unit.

Exposures of Healthcare workers should be immediately notified to the Epidemiology Unit by the attending clinician/head of institution by phone.

Note: refer Ministry of Health circular (EPID/400/2019 n-Cov) for details on documentation in the Incident register and the procedure for granting leave for quarantined/diagnosed HCW.

11 Management of Accidental Discovery of Suspected COVID 19 Patient in the Hospital

There will be instances in various health care settings where patients with or without respiratory symptoms are subsequently suspected to have COVID 19. This is to be expected in the event of a surge in the number of patients in the community with COVID 19. This will also be due to the onset of new symptoms suggestive of COVID 19 whilst in the health care setting, or by the discovery of a contact history/exposure history/geographic location of a high-risk area.

These patients might subsequently become either COVID confirmed or COVID negative.

The anxiety and fear of HCWs, which may occur as a result of a sudden detection of a “COVID suspect” should not affect the provision standard medical care to that patient or any other patient in that health care setting.

However, there is a possibility that this patient, if subsequently confirmed as having COVID 19 can transmit the disease to other patients as well as health care workers. This can be avoided by adhering to the following recommendations

- Administer a checklist (annexure 01) to all patients on admission to the ward (This can be included in the BHT)
- Patients admitting on the same day should be cohorted, as much as possible, in one area for easy identification.

In the event of a sudden discovery of a patient suspected of having COVID 19, the following are recommended to aid the subsequent decision-making:

1. Care for the COVID suspect (index case)
2. Other patients in the ward
3. Health care workers
4. Immediate environment of the index patient

11.1 CARE FOR THE INDEX CASE

The subsequent clinical decisions will depend on the patient's clinical state.

- If the patient is stable and is manageable in a COVID 19 suspect ward he/she will be transferred to that ward for testing after discussing with the relevant Consultant. If the index case is negative for COVID he/she should be taken over by the original unit.
- If the patient is unstable or if the patient needs treatment which cannot be provided in the COVID suspect ward, he/she has to be kept in the same unit or if necessary transferred to an appropriate unit where standard of care for the clinical condition can be provided while maintaining patient safety. The COVID PCR test should not delay transferring the patient to the appropriate care setting. The COVID PCR test should be arranged by the unit where the patient should receive necessary care. The specialized unit due to receive the patient should not delay accepting the patient until COVID status is known.
- If the patient continues to be managed in the same unit or in another unit other than COVID 19 suspect ward, he or she should be kept in a separate cubicle or a 2 m distance from other patients. The patient should wear a medical mask. HCWs should practice appropriate infection control methods (e.g. medical mask, gloves and gown-long sleeves) when looking after the patient.
- If the patient needs aerosol-generating procedures it has to be done adhering to recommended precautions.

The detection of a patient suspected of having COVID 19 is not a reason to close down a ward/ differ admissions/ transferring out other patients or quarantining of staff.

11.2 CARE OF OTHER PATIENTS IN THE WARD

- Determine the risk using the screening tool used for risk assessment (refer Chapter 9, page 63)
- If the exposure is considered,
 - Low risk –COVID follow up not necessary. Continue necessary care
 - Moderate risk - cohort such patients together in the same cubical. Continue

necessary care.

- High risk - not applicable until COVID status of the index case is known.
- Do not transfer outpatients until the index patient's result is available.
- Once the result is available, if positive, those patients who fall into the category of high risk should be isolated and tested for COVID 19. (The day at which the COVID PCR should be done for high risk patients should be determined by the treating physician, taking in to consideration the time of the exposure, symptoms at the time of exposure, the original illness and the symptoms that the patient had when coming to hospital.)
- The standard care for all patients should continue irrespective of their exposure status

11.3 CARE OF EXPOSED HEALTHCARE WORKERS

- The panel of experts appointed to guide the subsequent management (Physician, Microbiologist, Respiratory Physician) should determine the exposure level and subsequent action based on HCW exposure guidelines described in Chapter 9.
- If the exposure is considered low risk the health care workers who have originally managed the index case should continue to look after the patient using appropriate PPE and adhering to recommended precautions. Those falling to the category of moderate risk should be quarantined until COVID 19 status of the patient is available.
- Those who have not been exposed should care for other patients including new admissions to the ward.

11.4 CARE OF THE IMMEDIATE ENVIRONMENT AROUND THE INDEX PATIENT

The immediate environment includes floor, furniture, and the equipment within 2m distance from the index patient. Cleaning the immediate environment is sufficient to prevent infection transmission.

This method of cleaning applies to HDU s and ICUs as well.

Disinfection procedures are described under the following categories:

1. Environmental cleaning after accidental discovery of COVID 19 suspect patient
2. Environment and equipment disinfection after a COVID 19 suspect becomes a confirmed case

11.4.1 Environmental cleaning after accidental discovery of COVID 19 suspect patient:

The patient zone of the **COVID 19 suspect patient** (area within two-meter diameter) and the areas where he has been should be cleaned at least twice a day.

- First wear PPE – N95 respirator, protective eyewear, gloves and fluid resistant gown
- Clean and disinfect frequently touched surfaces, bed rails, bedside equipment etc. using a clean cloth soaked with freshly prepared 0.1% hypochlorite (1000ppm).
- All metal surfaces should be wiped with 60-70% alcohol.
- Floor should be moped with freshly prepared 0.1% hypochlorite (1000ppm)
- If there is a spillage, spill cleaning must be done with freshly prepared Hypochlorite at 1% (10,000ppm) and contact time should be at least 10 minutes

Spill cleaning

- Wear PPE
 - Cover the spillage with wadding from periphery to the center
 - Put 1% hypochlorite
 - Leave for 10 minutes
 - Scoop it out and put in a yellow bag (avoid touching it)
 - Then followed by 0.1% hypochlorite cleaning from periphery to the center
- Remove PPE and perform hand hygiene
- **Equipment-** If possible, use dedicated medical equipment (stethoscope, BP apparatus, thermometer) and disinfect with 60- 70% alcohol after each use.
 - **Dedicated washroom** should be cleaned with freshly prepared 0.5% hypochlorite.

11.4.2 Environment and equipment disinfection after a COVID 19 suspect becomes a confirmed case:

I. Terminal environmental cleaning-

Ensure that environmental cleaning and disinfection procedures are followed consistently and correctly.

- Wear PPE
- Remove all linen, into yellow bags and remove them.
- Remove bed screens and curtains (including disposable curtains/screens) into yellow bags and remove them
- Remove all medical equipment and disinfect as below.

- All metal surfaces should be wiped with 60-70% alcohol.
- If the patient was in an isolation room, after closing the doors spray all surfaces and floors except metal surfaces including mattresses covered with polythene covers, with freshly prepared 0.1% (1000ppm) hypochlorite and apply it all over using a sponge on a stick. Mop floor. Wait for 10 minutes and wash thoroughly with water using a detergent.
- If mattresses and pillows do not have polythene covers, remove them before spraying and dispose them.
- Remove PPE and perform hand hygiene
- If the patient was in a ward, clean and disinfect the area within two-meter diameter and the areas where he has been.
- Frequently touched surfaces, bed rails, bedside equipment, furniture, windows, sills and frames, mattresses covered with polythene covers etc. should be cleaned and disinfected by wet mopping with freshly prepared 0.1% hypochlorite (1000ppm).
- All metal surfaces should be wiped with 60-70% alcohol.
- Floor should be moped with freshly prepared 0.1% hypochlorite (1000ppm).
- Wait for 10 minutes and wash thoroughly with water using a detergent.
- Remove PPE and perform hand hygiene
- **If there is a spillage spill cleaning must be done before any terminal cleaning-**Use freshly prepared Hypochlorite at 1%(10,000ppm), contact time at least 10 min

II. Equipment-

- Medical equipment (stethoscope, BP apparatus, thermometer) should be disinfected with 60- 70% alcohol.

III. Linen

- Soiled linen should be placed in clearly labelled, leak-proof bags or containers before removal from the ward.
- Linen can be cleaned in either of the following ways:

Soaked in freshly prepared 0.05% hypochlorite for 30 minutes and wash under running tap water and then wash with a laundry detergent and dry fully under direct sunlight.

OR

Washed in a washing machine with hot water cycles (60- 90°C) using a laundry detergent and dry in a dryer.

(If there is any solid excrement on the linen, such as feces or vomit, scrape it off carefully with a flat, firm object and put it in the commode or designated toilet before putting linen in the designated container. If the latrine is not in the same room as the patient, place soiled excrement in covered bucket to dispose of in the toilet)

IV. Waste Management

All yellow bags should be closed and tighten the mouths properly and labelled as COVID waste before disposal.

Recommended methods of disposal-

- Incineration
- MetaMizer
- Handover to Sisilli Hanaro private company

V. Handling of reusable items

- Used goggles wipe with 70% Ethyl alcohol and wash with a detergent. Wipe these with 70% Ethyl alcohol again before use.
- Boots should be soaked in freshly prepared 0.5 % hypochlorite and dry under direct sunlight.
- Soaked mops in freshly prepared 0.5 % hypochlorite and allow to dry under direct sunlight. Mop handle must be disinfected by wiping with 0.1% hypochlorite.

VI. Toilets-

Use Hypochlorite at 0.5% for sink, walls, floor and the commodes

Bedpans

- Disinfect with freshly prepared Hypochlorite at 0.5% after disposing of excreta and clean with a neutral detergent and water.

(Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and, possibly, this may introduce risks associated with splashing.)

Contact time at least 10min

- Use washer disinfector if available

- **Ambulance Cleaning** Wear PPE
- Spray freshly prepared 0.1 Hypochlorite.
- Keep for 10 minutes
- Remove the stretcher
- Wash the stretcher
- Wash the ambulance
- Keep minimum items in the ambulance
- Remove PPE and perform hand hygiene

refer chapter 6 for further details

12 ANNEXURES

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ANNEXURE 1 - Quick risk assessment check list for first contact level

PART A - COVID-19 Screening Checklist for All Hospital Admissions (Version 3 dated 08.03.2020)

To be filled by the relevant medical officers at the OPD/ Admission Room/ETU and at initial ward clerking of all patients.

1. General Information of the patient

Name	
Age	
Occupation	
Place of work	
Current Residential Address	

2. Symptoms presented by the patient

Symptoms	Yes ✓ / No ✗	Duration (days)	Further details
Cough			
SOB			
Sore throat			
Fever			
Body aches			
Headache			
Diarrhoea			

3. Travel history of the patient

Type of travel / visits	Yes ✓ / No ✗	If yes, details
Returning to Sri Lanka from ANY COUNTRY within the last 14 days		
History of travel or residence in a location identified as an area of high-risk/ lockdown areas within the last 14 days		
Recent visits to government/ private hospital within the last 14 days		
Attended any Social gathering (shopping, religious, funerals, etc.) within the last 14 days		

4. Evidence of exposure / close contact (within 14 days)*

Details of patient	Yes ✓ No ✗	If yes, details
Close contact with confirmed or probable COVID19 patient		
Suspected person with COVID-19 symptoms		
Home quarantined patient		
Person who had been in a quarantine center		
Household member with acute respiratory symptoms (hospitalized or not)		
Anybody with acute respiratory symptoms		
Anybody travelled in the high-risk/ locked down areas		
Anyone who had close contact with a foreigner or a Sri Lankan		

returnee		
First line worker involved with COVID-19 patient/s		
Other (specify):		

*Close contact: A person with direct contact in an enclosed environment (e.g. Household member, traveling in an enclosed vehicle, working in an enclosed workplace)

Name and Signature of Doctor:

Date and Time:

Place: OPD/ ETU/ Ward/ ICU

Note to all first contact level doctors:

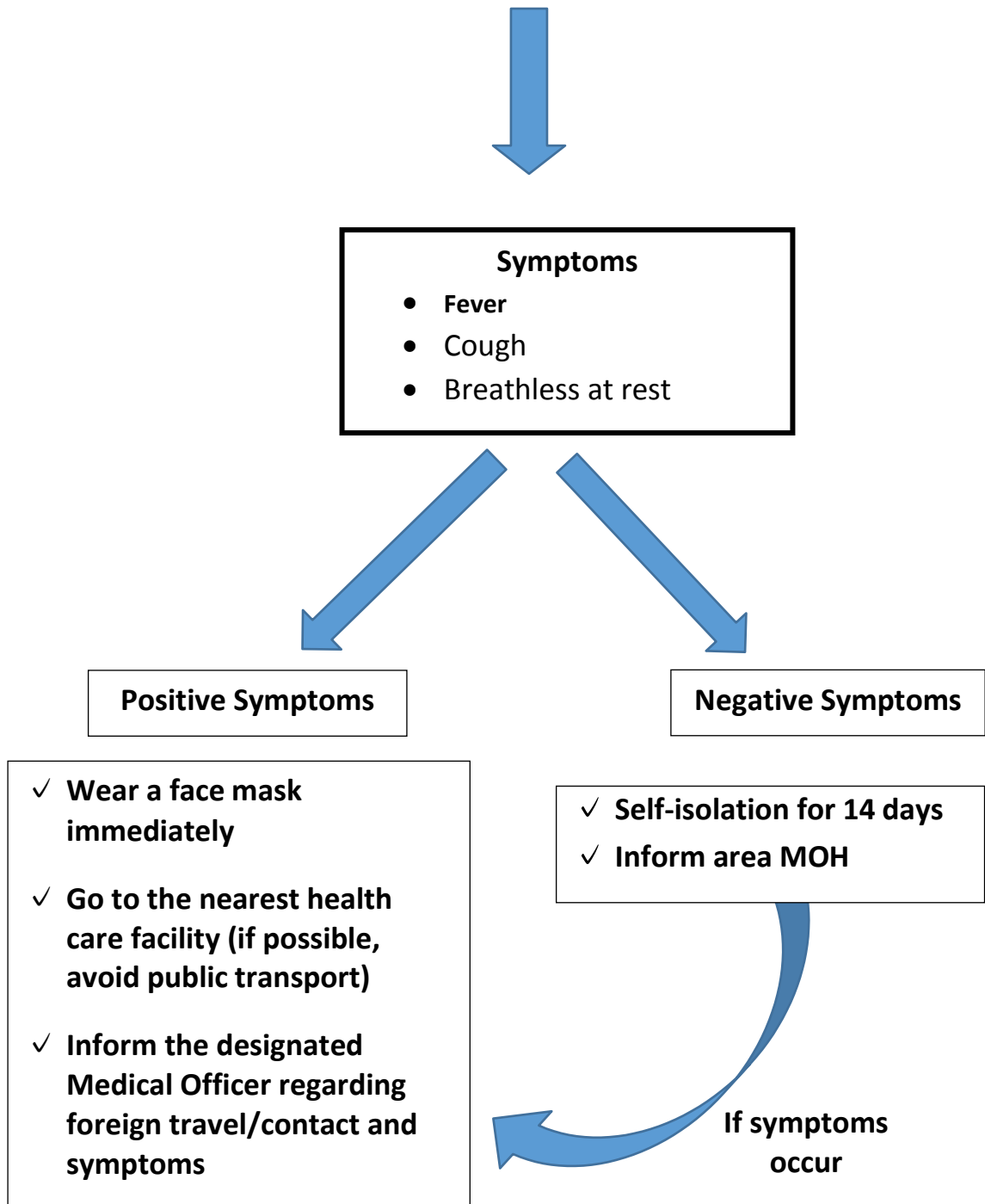
- **Immediately inform your senior officer if you find significant travel or exposure/contact history to patients with acute respiratory symptoms.**
- **In patients presenting with significant travel or exposure/contact history the decision on further management and disposition will be made by a Consultant or by the hospital Operational Cell (multidisciplinary team).**

PART B – COVID-19 PATIENT RISK ASSESSMENT CHECKLIST

Age:					
<input type="checkbox"/> < 50 years <input type="checkbox"/> 50 – 70 years <input type="checkbox"/> > 70 years					
Comorbidities (please tick):					
<input type="checkbox"/> COPD <input type="checkbox"/> Hypertension <input type="checkbox"/> IHD <input type="checkbox"/> DM <input type="checkbox"/> Chronic renal failure <input type="checkbox"/> Chronic Liver Diseases <input type="checkbox"/> Pregnancy <input type="checkbox"/> Other _____					
Clinical Assessment					
	Mild		Moderate		Severe
• Pulse rate	<100		100-120		>120
• Resp. rate	12-20		20-30		>30
• O2 saturation	>94		90-94		<90

ANNEXURE 2 - Public instruction flow chart for hospitals receiving suspected COVID-19 patients

- A person with a recent foreign travel (ANY COUNTRY) history ≤ 14 days
- A person who has been in **close contact** with a confirmed or suspected COVID 19 infected patient (Close contact- a person staying in an enclosed environment e.g.: same household/workplace/social gatherings/travelling in same vehicle)



ANNEXURE 3 – Guidance on USS Technique

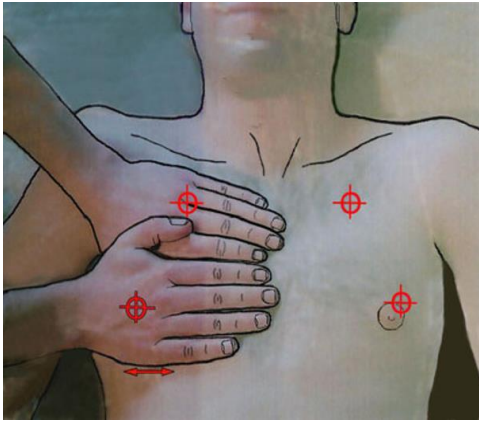


Fig. 1 The upper hand is applied with the little finger touching the lower border of the clavicle. The finger tips touch the midline. The lower hand is applied below the first one. The thumbs do not count. The upper BLUE-point is at the middle of the hand (root of the middle and ring fingers). The lower BLUE-point is in the middle of the palm of the lower hand. This definition allows avoiding the heart. The lower edge of the lower hand indicates the phrenic line, i.e., the end of the lung. The continuation of the phrenic line and its intersection with the middle axillary line define the phrenic point (of interest for assessing the diaphragm laterally). The geometry of the two joined hands from the oblique clavicle results in a horizontal phrenic line (from *Whole Body Ultrasonography in the Critically Ill*, Springer)

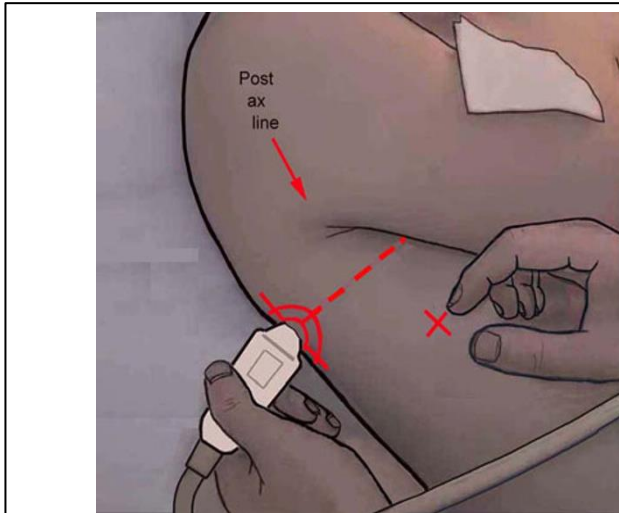


Fig. 2 The probe indicates the PLAPS-point, in the horizontal continuation with the lower BLUE-point (*dotted line*), as posterior as possible to the posterior axillary line with the patient remaining supine. The PLAPS-point is therefore located slightly above the diaphragm. The right index finger roughly indicates the phrenic point (target). PLAPS: posterolateral alveolar and/or pleural syndrome, a basic term used in the BLUE-protocol. Note important features regarding this probe: microconvex shape, 1 × 2 cm footprint, 8 cm length, good resolution from 1 to 17 cm depth, allowing both posterior analysis and fine resolution (from *Whole Body Ultrasonography in the Critically Ill*, Springer)

The upper BLUE-point: is at the middle of the hand (root of the middle and ring fingers).

The lower BLUE-point: is in the middle of the palm of the lower hand.

The phrenic line: (the end of the lung.) The lower edge of the lower hand.

Phrenic point: continuation of the phrenic line and its intersection with the middle axillary line. (of interest for assessing the diaphragm laterally)

PLAPS-point: the horizontal continuation with the lower BLUE-point (*dotted line*), as posterior as possible to the posterior axillary line with the patient remaining supine. (Figure 2)

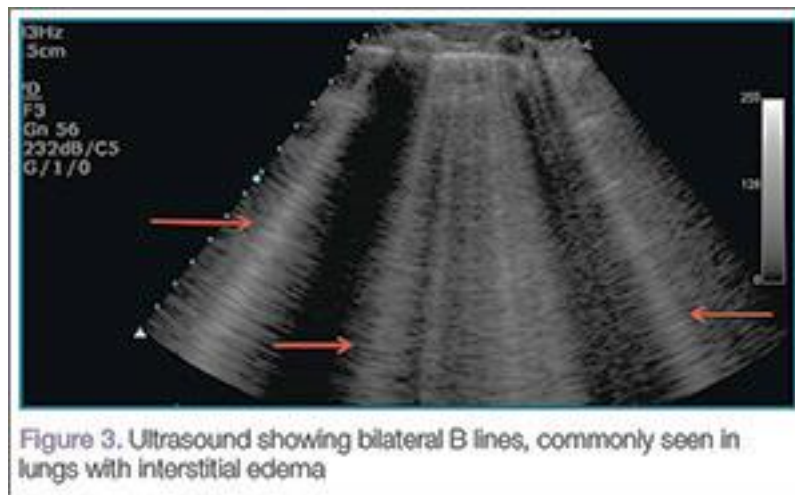
Posterior Lung windows: In a patient who can sit The PLAPS point can be extended posteriorly up to intrascapular level (P1). The phrenic line can be extended inferior to P1 (P2)

Ultrasonography patterns in patients with Covid-19 Infection:

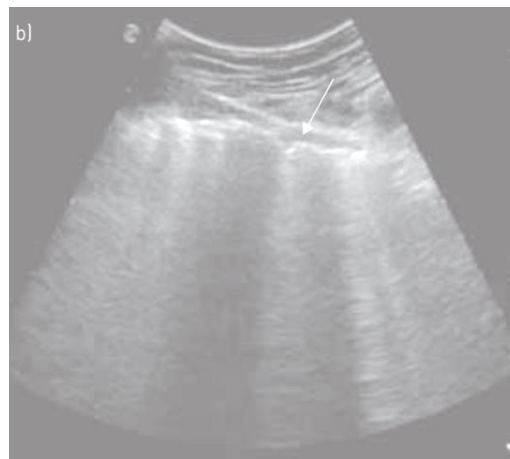
Following patterns have been observed with a tendency for bilateral and postero-basal predominance:

2. Multiple B-lines* - ranging from focal to diffuse with spared areas (representative of thickened subpleural interlobular septa)

“discrete laser-like vertical hyperechoic reverberation artefacts that arise from the pleural line, extend to the bottom of the screen without fading, and move synchronously with lung sliding”

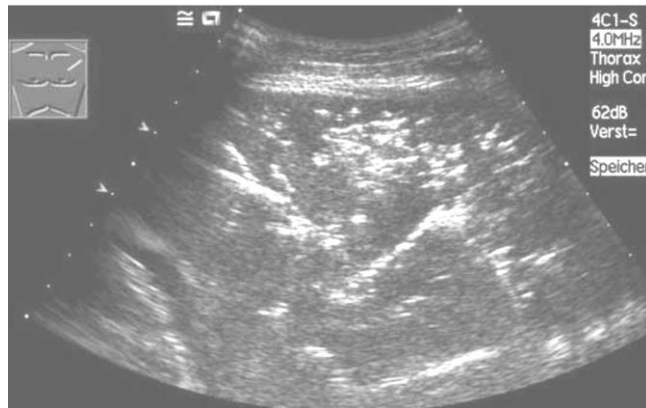


3. Irregular, thickened pleural line with scattered discontinuities:



4. Subpleural consolidations:
 - can be associated with a discrete, localized pleural effusion
 - relatively avascular with color flow Doppler interrogation
 - pneumonic consolidation typically associated with preservation of flow or hyperemia
 -

5. Alveolar consolidation:



- tissue-like appearance with dynamic and static air bronchograms
 - associated with severe, progressive disease
6. Restitution of aeration during recovery
- reappearance of bilateral A-lines
7. **Absence** of pleural effusions support the diagnosis of COVID-19 infection

Annexure 4 – The Bedside Lung USS in Emergencies: BLUE Protocol

Approach to Respiratory Failure

(The Bedside Lung Ultrasound in Emergency: BLUE protocol)

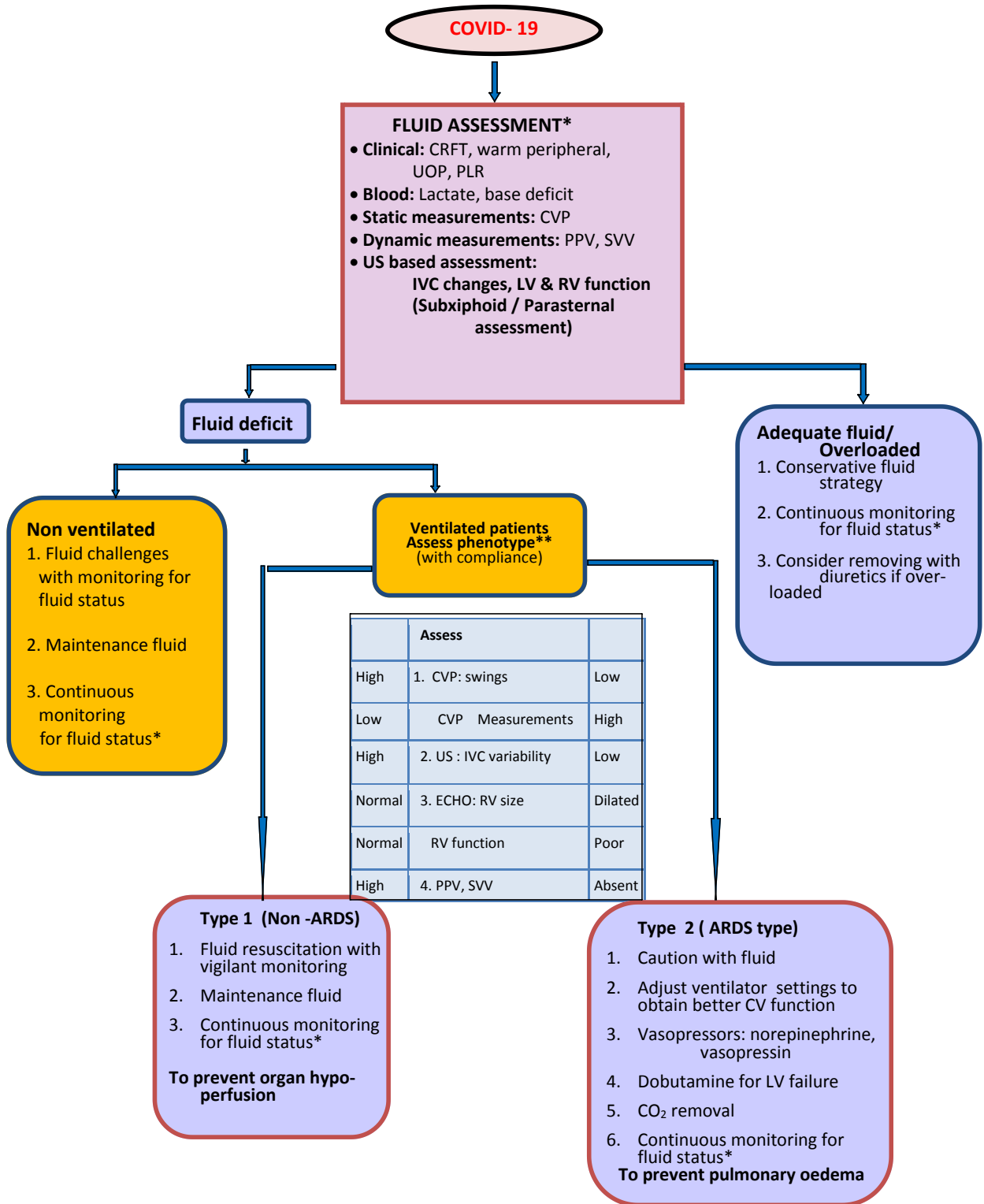
In a breathless patient the ultrasound probe must be placed on upper anterior, lower anterior and posterior lateral points. If we see (on the screen) depending on the scenario then it is:

Breathless	+	Lung sliding present	+	A lines	=	A profile	→	Normal lung profile (no PLAPS)
							→	COPD /Asthma (no PLASPS)
							→	Pulmonary embolism (assess for thrombi)
Breathless	+	Lung sliding absent	+	Exclusive A lines / Barcode sign on M mode	=	A ¹ profile	→	Lung point present (pneumothorax)
							→	Lung point absent (consider further evaluation)
Breathless	+	Lung sliding present	+	B lines/ lung rockets/ comet tails with or without PLAPS	=	B profile	→	Interstitial edema/ pulmonary edema
Breathless	+	Lung sliding absent	+	B lines/ lung rockets / comet tails	=	B ¹ profile	→	Pneumonia
Breathless	+	Lung sliding present or absent	+	Anterior predominant B lines in one lung and predominant anterior A lines in the other lung	=	AB profile	→	Pneumonia
Breathless	+	Lung sliding present	+	Anterior consolidation	=	C profile	→	Pneumonia (anteriorly located)
Breathless	+	Lung sliding present	+	Posterior and/or lateral alveolar consolidation and/or pleural effusion	=	PLAPS profile	→	Pneumonia or pleural effusion or pulmonary edema

ANNEXURE 5- Endotracheal Intubation in critical care

- Endotracheal intubation should be performed by a trained and experienced provider using all precautions against airborne spread; wear full PPE
- Communicate clearly: simple instructions, closed loop communication. Minimize the number of personnel in the intubating room during the procedure
- Pre-oxygenate with 100% FiO₂ for 5 minutes, via a tight fitting face mask with Mapleson C circuit or ambu bag with a reservoir. Always use a HME filter (with bacterial and viral filter) and catheter mount.
- Perform a rapid sequence induction
- Avoid face mask ventilation (bagging) to reduce aerosolization
- To avoid cardiovascular collapse use ketamine 1–2 mg/kg, rocuronium 1.2 mg/kg or suxamethonium 2 mg/kg provided that there are no contraindications
- Ensure full neuromuscular blockade before attempting tracheal intubation. (coughing and bucking increases aerosol release.)
- Use of video laryngoscopy may avoid placing the operator's face close to the patient.
- Tracheal tubes with a subglottic suction port are preferred.
- Inflate the tracheal tube cuff to seal the airway before starting ventilation. Note and record the depth of the ETT. Do not bend and listen for any cuff leak.
- Attach a viral filter to the bag-valve mask before the procedure. This should reduce the spread of viral particles out of the endotracheal tube following intubation (or during bag-mask ventilation if that is required).
- Attach to the ventilator immediately post intubation and do not use positive pressure until cuff is inflated.
- Use capnography to confirm the placement of the ET tube to avert the need for clinical examination. Avoid auscultation to confirm the position.
- Use a closed suction system.
- Ensure the availability of emergency drugs and vasopressors for bolus or infusion to manage hypotension and arrhythmias.
- Ensure meticulous removal, placement and discarding of equipment used and PPEs following the procedure.

ANNEXURE 6 – Guide for fluid therapy COVID-19 patients in ICU



Source: College of Anaesthesiologists and intensivists of Sri Lanka

ANNEXURE 7 - Generic measures of ICU Care for patients with COVID-19

A. VAP bundle strategies should be strictly implemented.

- Keep patient in semi-recumbent position (head of the bed elevation 30–45°)
- Use a closed suctioning system; periodically drain and discard condensate in the tubing.
- Sedation intervals and spontaneous breathing trials when weaning off ventilator support
- Avoid circuit change regularly. Perform only if it is soiled or damaged,
- Change heat and moisture exchanger when it malfunctions or when soiled

B. Rational use of antibiotics for co-infections

Prescribe meticulously and only in severe patients based on their clinical condition. Secondary bacterial infections have been observed in up to 50% of severe cases of COVID -19. However, routine use of broad- spectrum antibiotics has led to increased incidence of candidaemia and aspergillous pneumonia. Antibiotics may be empirically started in the following conditions:

- Excessive bronchial secretions
- Dark or yellow colour sputum
- Change in fever pattern; continuous fever is suggestive of bacterial infection
- Marked increase in WBC counts / neutrophils
- Procalcitonin > 0.5 ng/ml
- Deterioration of oxygenation index or circulatory disturbance
- Extensive lung lesions
- Evidence of bacterial colonization in the lower respiratory tract
- Immunosuppressed patients

Initial empiric therapy with neuraminidase inhibitors can be used if there is concern that the patient might have influenza pneumonia. Empirical antibiotics should be considered early in patients with evidence of secondary bacterial infection.

C. Enteral nutrition; should be started early. Energy supply 20-30 kcal / kg body weight. Target protein content is 1.2-1.5 g/kg daily Glycemic target of 140-180 mg/dL.

D. Reduce incidence of pressure ulcers

- Always use air mattress
- Turn the patient every 4- hourly

F. Reduce incidence of stress ulcers and gastrointestinal bleeding.

- Give early enteral nutrition (within 24–48 hours of admission).
- Histamine-2 receptor blockers or proton-pump inhibitors in patients with risk factors for GI bleeding. (Mechanical ventilation for ≥ 48 hours, coagulopathy, renal replacement therapy, liver disease, multiple comorbidities, and higher organ failure score.)

G. Reduce incidence of ICU-related myopathy.

- Actively mobilize the patient early in the course of illness when safe to do so.
- Those who are mechanically ventilated for more than 24 hours should be carefully assessed and started on chest and limb physiotherapy.

ANNEXURE 8 – Acute Kidney Injury and Renal Replacement Therapy (RRT)

Kidney injury is defined by the acute rise of serum creatinine or rapid onset oliguria overwhelming the renal capacity to handle the solute and volume load. It is estimated that approximately 20% of the critically ill patients with COVID 19 infection may progress to acute kidney injury.

1. **Availability of RRT;** It is essential that renal replacement therapy eg;CRRT or HD should be available onsite where critically ill COVID-19 cases are admitted and managed. High -risk transfers for RRT to another hospital is not justifiable considering the relatively poor outcome of patients with AKI and the risk involved to others.

Indications for RRT; Continuous renal replacement therapy has to be reserved for patients with favorable outcomes. RRT has to be considered in patients with progressive multi organ failure not limited to those who develop AKI with:

- i. Refractory acidosis
 - ii. Refractory hyperkalemia
 - iii. Refractory fluid overload
 - iv. Uremic complications
2. **Vascular access;** Right internal jugular line has to be used as the first line for vascular access and always confirm it' position by chest X ray before commencing RRT.
 3. **SLEDD** (sustained low efficiency daily dialysis) which is more affordable and less labor intensive should be attempted over CRRT in those with AKI (including patients dependent on vasoactive medications.)
 4. **CRRT dose** (volume based) is 20-25 ml/Kg/h. CRRT is less likely to be successful when the ICU staff is not well trained as therapy delivered should always be titrated and continued without interruption for 48-72 hours.
 5. **Circuit life;** whenever CRRT is started, the principle challenge is to extend the circuit life. Circuit life in CRRT is mainly affected by position of the vascath, blood flow rate, ultrafiltration and anticoagulation.
 6. **De-escalation;** CRRT can be de-escalated as the patient improves (better solute control, resumption of urine output and haemodynamic stability) initially to SLEDD and subsequently to HD if required.

ANNEXURE 9 - Sepsis and Septic Shock in COVID -19

Septic shock is defined as:

- **In Adults:**

Persistent hypotension despite volume resuscitation, requiring vasopressors to maintain MAP \geq 65 mmHg and serum lactate level $>$ 2 mmol/L.

In the absence of a lactate measurement, use blood pressure and clinical signs of perfusion to define shock.

- **In Children:**

Any hypotension (SBP $<$ 5th centile or $>$ 2 SD below normal for age) or two to three of the following: altered mental state; bradycardia or tachycardia (HR $<$ 90 bpm or $>$ 160 bpm in infants and HR $<$ 70 bpm or $>$ 150 bpm in children); prolonged capillary refill ($>$ 2 sec) or feeble pulse; tachypnea; mottled or cool skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia

Treatment should be started within 1 hour of recognition:

1. Antimicrobial therapy,
2. Initiation of fluid bolus
3. Vasopressors

Initiation of fluid bolus

- In adults, give 250–500 mL crystalloid fluid (0.9% Saline and Ringer’s lactate) as a rapid bolus in 15–30 minutes and reassess for signs of fluid overload after each bolus.
- In children, give 10–20 mL/kg crystalloid fluid as a bolus in the first 30–60 minutes and reassess for signs of fluid overload after each bolus.
- Determine need for additional fluid boluses (250–500 mL in adults or 10–20 mL/kg in children) based on clinical response and improvement of perfusion targets which include MAP ($>$ 65 mmHg or age-appropriate targets in children), urine output ($>$ 0.5 mL/kg/hr. in adults, 1 mL/kg/hr. in children), and improvement of skin mottling and extremity perfusion, capillary refill, heart rate, level of consciousness, and normalization of serum lactate levels.

- Caution; In patients with hypoxemic respiratory failure, particularly with 'ARDS' type: Fluid resuscitation may lead to volume overload. If there is no response to fluid loading or there are signs of volume overload (e.g. jugular venous distension, crackles on lung auscultation, pulmonary oedema on imaging, or hepatomegaly in children), reduce or discontinue fluid administration.
- Do not use hypotonic crystalloids, starches or gelatins for resuscitation
- When patients require substantial amounts of fluid can consider the use of albumin for resuscitation.

Vasopressors

- In adults, administer vasopressors (i.e. norepinephrine, epinephrine, vasopressin, and dopamine) when shock persists during or after fluid resuscitation. Norepinephrine is considered first. Epinephrine or vasopressin can be added, reserving dopamine for selected patients with low risk of tachyarrhythmia or those with bradycardia. In children, epinephrine is considered first line, while norepinephrine can be added if shock persists.
- If signs of poor perfusion and cardiac dysfunction persist despite achieving the target MAP with fluids and vasopressors, consider an inotrope such as dobutamine.
- Steroids: not indicated in COVID-19 infections, unless there is a clear-cut indication for steroids (e.g. coronavirus plus exacerbation of asthma, refractory septic shock with escalating vasopressor support).
- Intravenous immunoglobulin: The routine use of standard intravenous immunoglobulins (IVIG) is not indicated due to lack of data on efficacy.

ANNEXURE 10 – Equipment and Drugs for management of critically ill patients with COVID-19

A. Infection control

1. PPE: N95 masks, surgical masks, overalls, visors, goggles
2. Parasafe (high level disinfectants)
3. 70% alcohol and TCL (low level disinfectants)
4. Hand wash stations
5. Hand wash solutions
6. Hand rubs

B. Monitoring devices

1. Multipara monitors
2. Pulse oximeters
3. Thermometers (infra-red)
4. Uribags
5. ABG analyser
6. Glucometers
7. Portable X-ray

C. Organ support devices

1. ICU ventilators (1 per bed)
2. Portable ventilators (1 per 5 beds)
3. HFNC machines with accessories
4. Infusion pumps
5. CRRT machines
6. Haemodialysis machine
7. Syringe pumps
8. Pneumatic compression devices
9. Feeding pumps (NG)

D. Drugs (IV)

1. Fentanyl vials
2. Morphine vials
3. Propofol 1%
4. Midazolam
5. Rocuronium
6. Suxamethonium
7. Atracurium
8. Vecuronium
9. Glycopyrrolate
10. Adrenalin vials
11. Noradrenaline vials
12. Atropine vials
13. Dobutamine vials
14. Vasopressin vials
15. Ephedrine vials
16. Antibiotics
17. Insulin (Actrapid)
18. Amiodarone IV
19. Amiodarone oral
20. Thiamine vials
21. Ranitidine vials
22. Enoxaparin
23. Heparin vials
24. Haloperidol
25. KCL (potassium chloride)
26. MgSO₄
27. Crystalloids (saline, RL, dextrose, 50%)
28. Lignocaine 2%
29. Nebuliser solutions (salbutamol)

ANNEXURE 11 – Required specifications of High Dependency Areas:

- Two oxygen outlets
- One air outlet
- Suction outlets
- Twelve mains electricity outlets
- Appropriate physiological monitoring; pulse oximeters, NIBP, ECG
- Disposable, single-use, oxygen-delivering interfaces
(nasal cannula, nasal prongs, simple face mask, mask with reservoir bag).
- High flow oxygen device
- 2-4 Syringe pumps

ANNEXURE 12 – List of Drugs and Equipment that may be needed during the transfer of a patient with COVID-19

EQUIPMENTS

1. **Monitors:**

Multi para portable monitor capable of displaying minimum of ECG, SpO₂, NIBP ETCO₂
Optional to have invasive blood pressure, CVP

2. **Airway and ventilation Equipment:**

Face masks, Oro-pharyngeal Airways, Tracheal tubes (size 6-9), LMA, Laryngoscopes (3,4 and spare bulbs and batteries, intubating stylet, bougie, Magill's forceps, scissors, stethoscope, Ambu bag, HME filters Portable ventilator Suction apparatus, suction catheters, nasogastric tubes)

3. **Circulation Equipment:**

Syringes, needles, swabs, cannulae, intravenous fluids, 3- way taps, dressings, syringe and or infusion pumps adequate in numbers, drip sets, defibrillator (lower case)

DRUGS

Adrenaline	Atracurium
Atropine	Vecuronium
Amiodaron	Mannitol
Dopamine	Normal saline
Dobutamine	Hartmann
Ephedrine	Dextrose
Noradrenaline	Calcium Gluconate
Propofol	GTN
Midazolam	Salbutamol solution
Suxamethonium	Any other drug depend on the clinical condition

Annexure 13 – Checklist before the transfer of suspected/confirmed COVID-19 patients

Before Transfer		Yes	No
1. Communication	Communication before the transfer		
2. Patient	Stabilization of the patient		
3. Mode of Transport	Satisfied with the checking of vehicle for the requirements		
4. Staff	a. Experienced staff members		
	b. Minimum number		
	c. Recommended PPE		
5. Equipment	Satisfactory		
6. Drugs	Satisfactory		
7. Monitoring	Charts ready		
8. Rescue plans during transport	Organized		
During Transport	Documentation		
On arrival			
	a. Inform the receiving unit		
	b. Documentation handed over		
Post transportation			
	a. Linen disposed		
	b. Clinical waste disposed		
	c. Equipment cleaned/disposed/decontaminated		
	d. Vehicle cleaned		
Decontamination			
	a. Equipment		
	b. Vehicle		
	c. Contact areas		
	d. Surfaces:		
	e. Floor		
Doffing	Completed in conveying staff		
	Completed in receiving staff		

ANNEXURE 14 - COVID-19 acute care isolation hospitals

	Hospitals with isolation facilities
1	NHSL
2	NH Kandy
3	LRH
4	CSHW
5	CNTH Ragama
6	TH Anuradhapura
7	TH Batticaloa
8	TH Ratnapura
9	TH Karapitiya
10	TH Kurunegala
11	TH Jaffna
12	PGH Badulla
13	DGH Negombo
14	DGH Gampaha
15	BH Chilaw
16	DGH Polonnaruwa
17	DGH Vavuniya
18	CSTH Kalubowila
19	DGH Monaragala
20	DGH Kalutara
21	DGH Matara
22	DGH Hambantota
23	Nevile Fernando Teaching Hospital
24	Iranawila special COVID Hospital
25	BH Kathankudi
26	BH Homagama
27	BH Minuwangoda
28	BH Beruwala
29	IDH / NIID
30	BH Mulleriyawa
31	BH Welikanda
32	KDU

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VERSIONS OF THE CLINICAL PRACTICE GUIDELINES

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