REPUBLIC OF KENYA

MINISTRY OF HEALTH

# Guidelines on Case Management of COVID-19 in Kenya

2021 Edition

# Foreword

It has been over a year since Kenya identified the first case of COVID-19 in the country. The Government formed the National COVID-19 task force, which supported the country's response through multi-sectoral technical working groups on testing, case management, risk communication and community engagement among others. An earlier version of the COVID case management guideline was released in April 2020 and capacity building of health care workers on diagnosis and treatment of COVID-19 was quickly carried out, even as counties prepared themselves by setting up isolation centres and supplies.

As at 18th of July, 2021, we have confirmed 192 758 people to have COVID-19, with 3775 deaths reported. Through all this, our health care workers are now armed with more knowledge on COVID-19, they have learnt who is at risk for severe COVID-19, they have learnt what treatment works and, in some cases, what does not work. We know which public health measures we need to focus on in order to combat the pandemic, and also have a few more shields in our armament, such as the COVID-19 vaccines.

These consolidated guidelines for the prevention, control and management COVID-19 in Kenya provide updated recommendations for comprehensive prevention and case management strategies in Kenya. They cover infection prevention and control measures including the use of vaccines. They also target the diagnosis and case management of COVID-19. These guidelines come at a critical time, especially since we continue to see several waves of the pandemic, to build the capacity of health care workers to handle patients with COVID-19 from their diagnosis, treatment and management.

This has been a collaborative effort bringing together health workers from all sectors-our universities, private and government facilities managing COVID-19 clients to determine and institute the best practices in their management.

We look forward to health workers using these guidelines to improve the quality of care given to all Kenyans, as we strive towards a healthy and productive nation.

Dr. Patrick Amoth, EBS
**Ag. Director General for Health**
**Ministry of Health.**

# Acknowledgement

The Guidelines on Case Management of COVID-19 in Kenya 2021, have been developed through the contribution of many individuals and institutions that are committed to improving the outcome of persons infected with COVID-19, and reducing the risk associated with inappropriate therapies.

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**Ag. Head, Directorate of Public Health**
**Ministry of Health.**

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# List of Abbreviations

| | | |
|---|---|---|
| AEFI | - | Adverse Events Following Vaccination |
| ARI | - | Acute Respiratory Infection |
| ARDS | - | Acute Respiratory Distress Syndrome |
| APRV | - | Airway Pressure Release Ventilation |
| BP | - | Blood Pressure |
| Bpm | - | Beats/minute |
| BVM | - | Bag Valve Mask |
| EMS | - | Emergency Medical Services |
| CPAP | - | Continuous Positive Airway Pressure |
| COVID-19 | - | Coronavirus Disease 2019 |
| FiO2 | - | Fraction of inspired oxygen |
| IPC | - | Infection Prevention and Control |
| LRT | - | Lower Respiratory Tract |
| MAP | - | Mean Arterial Pressure |
| NIV | - | Non-invasive Ventilation |
| OI | - | Oxygenation Index |
| OSI | - | Oxygenation Index using SpO2 |
| PaO2 | - | Partial Pressure of Oxygen |
| PCR | - | Polymerase Chain Reaction |
| PEEP | - | Positive End-Expiratory Pressure |
| PPE | - | Personal Protective Equipment |
| RRT | - | Rapid Response Team |
| RT-PCR | - | Reverse Transcriptase – Polymerase Chain Reaction |
| SBP | - | Systolic Blood Pressure |
| SARI | - | Severe Acute Respiratory Illness |
| SARS-COV-2 | - | Severe Acute Respiratory Syndrome – Coronavirus -2 |
| SD | - | Standard Deviation |
| SIRS | - | Systemic Inflammatory Response Syndrome |
| SpO2 | - | Oxygen Saturation |
| URT | - | Upper Respiratory Tract |
| ROX | - | Respiratory Oxygenation Index |

# Chapter 1: Introduction to COVID-19

Coronavirus disease 2019 (COVID-19) is an acute respiratory infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (1). SARS-CoV-2 belongs to the Sarbecovirus subgenus of the Coronaviridae family, and is the seventh coronavirus known to infect humans. Coronaviruses are a large family of enveloped RNA viruses, some of which cause illness in people (e.g., common cold, SARS, MERS), and others that circulate among mammals (e.g., bats, camels) and birds (2). Rarely, animal coronaviruses can spread to humans and subsequently spread between humans. Similar to SARS and MERS, it is thought that human transmission occurs via respiratory droplets produced when a person sneezes or coughs and, aerosol in certain circumstances including airway manipulation. The situations where aerosol generation occurs include coughing, nebulization, tracheal intubation and airway suctioning (1).

WHO first declared COVID-19 to be a public health emergency of international concern on 30 January 2020 and subsequently declared it a pandemic on 11th March, 2020. The pace at which COVID -19 spread throughout the world and in Kenya was hitherto unprecedented. Kenya discovered the first documented case of COVID-19 within its borders on 13th March, 2021 and as at 18th July 2021, the total number of confirmed cases was reported as 192,758, with 3775 deaths since the beginning of the outbreak (3). COVID-19 is highly transmissible and infectious, and runs the risk of overwhelming the capacity of the health system, with the need to support not just those with COVID-19, but also those with other illnesses. A lot of efforts have gone into reducing transmission of the virus, including restrictions on gatherings, contract-tracing, quarantine and isolation. With the spread of COVID-19 in the communities, the importance of preventive public health measures such as hand-washing and proper use of face-masks cannot be overemphasised. The introduction of the COVID-19 vaccines with a focus on groups at high risk such as health-workers and persons aged above 58 years and those who have comorbidities such as Diabetes Mellitus and Hypertension has added another prong to prevention measures against COVID-19.

The most common symptoms of COVID-19 include cough, loss of smell and/or taste, fever, difficulty in breathing, headache, sore throat, running nose, chest pain, myalgia, fatigue, general weakness and diarrhoea. The most common clinical presentation is that of a respiratory infection with a symptom severity ranging from a mild common cold-like illness (estimated to be 80% of cases), to a severe viral pneumonia in approximately 14%, leading to acute respiratory distress syndrome that is potentially fatal in about 5%. Current estimates of the incubation period range from 1 to 14 days, with a median incubation period of five to six days (4). Transmission can occur during the incubation period, even in the absence of symptoms.

Certain groups of people are at higher risk for transmission and severe disease including healthcare workers who work with COVID-19 patients. Vulnerable and marginalized groups such as people with disabilities may face challenges in accessing healthcare and have worse outcomes from COVID-19.

People of any age can catch COVID-19, but it most commonly affects middle-aged and older adults. The risk of developing severe COVID-19 disease increases with age from age 58. More than 80% of COVID-19 deaths occur in people over age 65, and more than 95% of COVID-19 deaths occur in people older than 45(5). Some conditions can result in higher severity of disease in adults of any age;

- Diabetes Mellitus (Type 1 or 2)
- Heart conditions (such as heart failure, coronary artery disease, cardiomyopathies or hypertension)

- Overweight and Obesity
- Smoking
- Cancer
- Chronic Kidney Disease
- Chronic lung diseases, including COPD (chronic obstructive pulmonary disease), asthma (moderate-to-severe), interstitial lung disease, cystic fibrosis, and pulmonary hypertension
- HIV Infection
- Immune Suppression
- Liver Disease
- Pregnancy
- Sickle cell disease
- Solid organ or blood stem cell transplant
- Cerebrovascular disease
- substance use disorders

Clinical manifestations of COVID-19 are generally milder in children compared with adults. Symptomatic children may present with non-respiratory symptoms such gastroenteritis more frequently than adults. An acute hyperinflammatory syndrome leading to shock or multi-organ failure has been described, known as the Multisystem Inflammatory Syndrome (MIS-C) which is temporally associated with COVID-19 in children and adolescents.

A notable challenge in the war against the pandemic appears to be the rate at which mutations occur, resulting in several variants of concern such as the Delta Variant B.1.617.2, that have been noted to be more transmissible and evade the immune system, resulting in more infections and increased severity of the disease. This brings out the importance of strengthening public health measures and vaccination strategies early in the response.

This document offers guidance on the following areas of COVID-19 management: case definition, infection prevention and control, diagnosis, stratification of patients according to severity of illness, management of asymptomatic, mild, severe and critical illness, management of co-morbidities such as diabetes in the context of COVID-19, discharge and de-isolation, management of post-acute covid illness and issues related to COVID-19 vaccination.

This is a living document and will be updated from time-to-time as more data and evidence becomes available.

## Case definition:

Suspected case of SARS-CoV-2 infection:

**1. A person who meets the clinical AND epidemiological criteria:**

**Clinical criteria:**

- Acute onset cough AND fever; OR
- Acute onset of ANY TWO OR MORE of the following signs or symptoms:

Cough, fever, loss of taste or smell, difficulty breathing, sore throat, running nose, chest pain, fatigue/general weakness, headache, diarrhoea, altered mental status (Children may present with atypical symptoms)

**AND**

**Epidemiologic criteria:**

- Residing, working or travel (within the last 14 days) to an area with high risk of transmission of virus (In Kenya, this will be as reported by the Ministry of Health
- Where there is widespread community transmission in several regions of the country, then all patients will be considered to have met epidemiologic criteria
- Working in a healthcare facility
- International travel in the last 14 days

**2. A patient with severe acute respiratory illness (SARI)**

(SARI: Acute respiratory infection with or without fever; and cough; with onset within the last 10 days; and requires hospitalization)

**Probable case of SARS-CoV-2 infection**

- **A patient who meets clinical criteria above AND is a contact of a probable or confirmed case, or linked to a COVID-19 cluster**
- **A suspected case with chest imaging showing findings suggestive of COVID-19 disease**
- Recent onset loss of taste or loss of smell with no other identified cause
  (Common imaging findings include bilateral peripheral opacities with lower lung distribution. Opacities usually ground glass opacities that may progress to consolidations)
- Unexplained death in an adult with SARI prior to death AND had contact with a probable or confirmed case or linked to a COVID-19 cluster

**Confirmed case of SARS-CoV-2 infection**

- A person with a positive SARS-CoV-2 PCR test
- A person with a positive SARS-CoV-2 Antigen RDT AND meeting criteria for either suspected or probable case; OR has contact with a probable or confirmed case.

**Multisystem Inflammatory Syndrome in Children (MIS-C**

- Preliminary case definition: Children and adolescents 0–19 years of age with fever > 3 days
  AND
- Two of the following: rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet); hypotension or shock; features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities; evidence of Coagulopathy, acute gastrointestinal problems;
  AND
- No other obvious microbial cause of inflammation
  AND
- Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.

# Chapter 2: Infection Prevention and Control (IPC) plan in response to COVID-19

### Introduction

- The main aim for IPC is to prevent or limit the spread of SARS-COV 2 at all levels of healthcare

### Facility preparedness

All facilities should have:

- An IPC program or a dedicated IPC focal person
- A functional screening and triage area for early case identification
- A holding area for cases awaiting results or transfer
- A mechanism to ensure standard and transmission-based precautions.
- Adequate healthcare workers to provide 24-hour patient care without exhaustion.
- A plan to conduct health worker exposure risk assessment
- Continuous training and refresher courses to the existing staff and any new staff.
- Adequate IPC supplies and equipment

### 1. Quarantine and Isolation

### Quarantine

Quarantine is separation and restricted movement of well persons who have been exposed to persons with COVID-19. It can be applied at the individual, family or community level. All persons who have had contact with a confirmed case of COVID 19 should quarantine for 14 days and get a COVID 19 test if they develop any symptoms. Quarantine can either be self-quarantine or carried out at a designated facility.

Instructions for self-quarantine include:

- Limit the number of visitors
- Continue to observe respiratory hygiene and cough etiquette
- Observe hand hygiene by either use of soap and water or an alcohol-based hand rub
- Ensure proper ventilation of the facility or home
- Observe for fever or other symptoms daily.
- Watch for danger signs or signs of deterioration like dyspnoea and report to a health facility
- Use of either separate utensils or disposable utensils

### Isolation

Isolation is the separation of sick people with a contagious disease from people who are not sick. All confirmed COVID-19 cases identified should be isolated. The location of isolation can be in a health facility for those with severe illness, at home for those who meet the self-isolation criteria or at a community isolation facility. Isolation precautions may be dropped 10 days after onset of symptoms, provided that one has had no fever without antipyretics for at least 24 hours.

**Requirements for an isolation center**

- The isolation facility should be set up relatively away from the main hospital facility or can be a designated isolation space set up with an exclusive passage at the entrance and exit to assist in proper flow of patients and staff.
- Should have provision for hand hygiene and waste management
- The designated area should have the three zones which can be colour coded green, red and the decontamination area. Zoning helps with cohorting of patients. The Green zone is the clean area where staff and persons who are presumed to not be infected can access. The red zone is the contaminated area such as the isolation ward for COVID-19 positive cases.
- Any COVID-19 service area, either outpatient, inpatient or clinic should have the 3 zones

**GREEN ZONE areas** (clean area)

1. Nurses and doctors' rooms and stations.
2. Medication preparation room
3. Tea room
4. Patients' pantry room
5. Non health workers offices

The area should accommodate minimal staff at any specific time to prevent infections

**RED ZONE areas** (Patient's area) -contaminated

1. Triage, Examination rooms and filter clinics where patients will be cohorted in groups according to signs and symptoms
2. Patients wards and isolation room, if possible, with negative pressure or well-ventilated rooms with beds spaced 1-2 meters apart
3. Laboratory or laboratory specimen holding area, if possible, with a refrigerator
4. Theatre, Critical care Unit, and delivery room

**DECONTAMINATION ZONE areas** (contaminated area)

1. Body holding area with a gate leading to the farewell home where bodies will be packed ready for collection to the farewell home
2. Equipment cleaning area where equipment will be cleaned and decontaminated before being taken for sterilization
3. Linen decontamination area
4. Boots and staff cleaning room
5. Waste management area

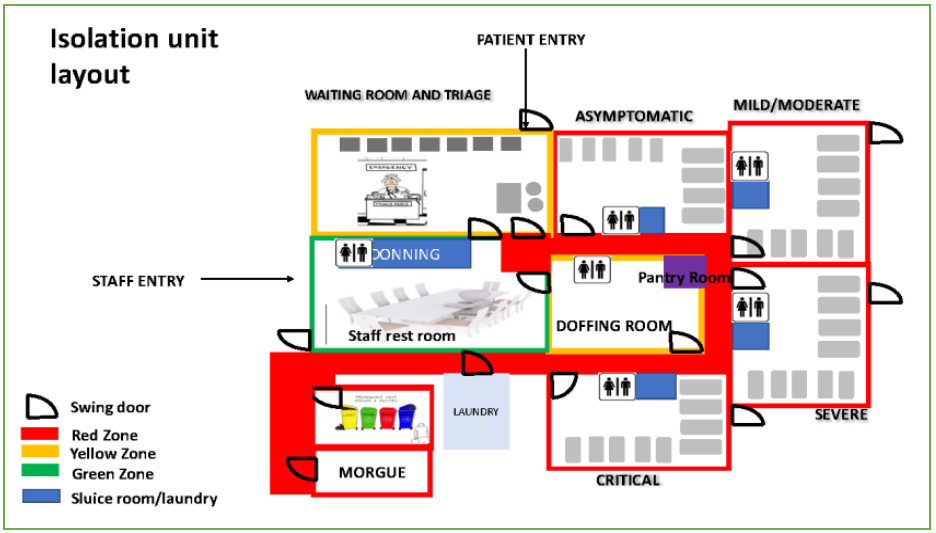


*Figure 1: Facility Patient flow*

**Table 1: PPE to Be Provided to Staff According to Risk Categories**

| PROTECTION LEVEL | PROTECTIVE EQUIPMENT | SCOPE OF APPLICATION |
|---|---|---|
| LEVEL 1 PROTECTION | • Disposable surgical mask<br>• Facility uniform<br>• Gloves | • Triage<br>• Outpatients' clinic<br>• Private clinics |
| LEVEL 2 PROTECTION | • Facility uniform<br>• N95 mask<br>• Caps<br>• Waterproof Surgical gowns<br>• Gloves<br>• Eye protection e.g., face shield or goggles<br>• Plastic apron | • Covid 19 clinics<br>• Isolation wards and CCU<br>• Radiology Unit for confirmed covid 19 patients<br>• Decontamination and cleaning unit (public health)<br>• Laboratory<br>• Farewell home |
| LEVEL 3 PROTECTION | • Disposable scrubs<br>• N95 mask<br>• Waterproof surgical gown<br>• Plastic apron<br>• Face shield or goggle if available<br>• Caps<br>• Gloves | • During suctioning<br>• Intubation<br>• Bronchoscopy<br>• Surgery<br>• Endoscopy or colonoscopy |

## Key IPC measures when handling suspected or confirmed COVID-19 cases

### Screening and triage:

- Give the patient with suspected COVID-19 a medical mask and direct the patient to a separate area or an isolation room if available.
- Keep at least 1 meter distance between patients with suspected COVID-19 and other patients.
- Ensure areas are well ventilated with good airflow
- Instruct all patients to cover nose and mouth with tissue or flexed elbow during coughing or sneezing
- Perform hand hygiene after contact with patient or patient environment
- Use posters signage, audios and television clips advising all patients and relatives on signs and symptoms of COVID- 19 and IPC measures
- Parents/caregivers need to support their children in maintaining cough hygiene by ensuring the child wears the mask or if the child becomes irritable and unable to tolerate the mask, the parent/caregiver should ensure they provide tissue for the child to cough into.
- Parents should ensure they guide hand washing for young children using soap and water.
- Ensure rational use of PPE in order to avoid wastage.

### Applying standard precautions for all patients

These include

- Hand hygiene before and after contact with patients and patient environment
- Waste management
- Respiratory hygiene
- Rational use of PPE
- Physical distancing
- Environmental cleaning

### Applying transmission-based precautions

***Apply contact and droplet precautions:***

Droplet precautions prevent large droplet transmission of respiratory viruses

- Perform hand hygiene after touching each patient or patient environment
- Use a medical mask if working within 1-2 metres from the patient
- Rational use of PPE for contact and droplet precaution (Gloves, medical masks, gown and Apron)
- Place patients in single rooms, or group together those with the same etiological diagnosis
- If an etiological diagnosis is not possible, cohort patients with similar clinical diagnosis and epidemiological risk factors, with a spatial separation
- When providing care in close contact with a patient with respiratory symptoms (e.g., coughing or sneezing), use eye protection (face-mask or goggles)
- Limit patient movement within the institution and ensure that patients wear medical masks when outside their rooms and that patients' clean hands frequently either by washing with soap and water or use an alcohol hand rub
- Ensure that health care workers refrain from touching their eyes, nose, and mouth with potentially contaminated gloves or ungloved hands
- Avoid contaminating environmental surfaces that are not directly related to patient care (e.g., door handles and light switches)
- Ensure vehicles and ambulances for transporting patients are cleaned and disinfected regularly

.

***Apply airborne precautions when performing an aerosol generating procedure***

- Ensure that healthcare workers obtaining nasopharyngeal swabs, performing dental procedures and performing aerosol-generating procedures (i.e., open suctioning of respiratory tract, intubation, bronchoscopy, cardiopulmonary resuscitation) use PPE, including gloves, long-sleeved gowns, eye protection, and fit-tested particulate respirators (N95 or equivalent, or higher level of protection)
- When possible, use adequately ventilated single rooms when performing aerosol-generating procedures. This could be either, meaning negative pressure rooms or well-ventilated single rooms
- Minimize the number of individuals present during the aerosol-generating procedure by avoiding the presence of unnecessary individuals in the room
- Care for the patient in the same type of room after mechanical ventilation commences

### Cleaning and disinfection

- All surfaces in health facilities, especially frequently touched surfaces and those visibly soiled or contaminated by body fluids, should be **routinely** cleaned and disinfected.
- Use soap and water or enzymatic detergent for cleaning
- 0.5 % chlorine solution is recommended for routine disinfection.
- Patients' linen should be laundered in the decontamination zone and disinfected with 0.05 % chlorine solution
- Tubing and surgical equipment should be cleaned and disinfected following recommended guidelines
- On discharge, the patient's belongings should also be decontaminated and patient asked to take a shower prior leaving the isolation facility

## Infectious Period

Persons with COVID-19 should be considered potentially infectious from two days before to 10 days following illness onset. Persons who continue to be ill longer than 7 days after illness onset should be considered potentially contagious up to 20 days. Children, especially younger children, might potentially be contagious for longer periods.

Non-hospitalised ill persons who are a confirmed or suspected case of COVID-19 are recommended to stay at home (home isolation) for at least the first 10 days after checking with their health care provider about any special care they might need if they are pregnant or have a health condition such as diabetes, heart disease, asthma, or other chronic lung disease.

## Handling of bodies of suspected or confirmed covid patients

**Preparing and packing the body for transfer from a patient room in a health facility to an autopsy unit, mortuary, crematorium, or burial site**

- Ensure that personnel who interact with the body (health-care or mortuary staff, or the team preparing the body for burial or cremation) apply infection prevention and control (IPC) standard and transmission-based precautions after performing a risk assessment.
- Prepare the body for transfer including removal of all catheters and other indwelling devices.
- If an autopsy is to be performed, follow local guidance on the procedures for preparation of the body.

**Autopsy**

- If necessary, use level 3 PPE for conducting autopsies

**Burial or cremation**

- Follow national and local regulations during burials and cremations
- Family and friends may view the body after it has been prepared for burials
- Those tasked with placing the body in the grave should observe contact precautions
- If a body will be buried or cremated without a casket or body bag, use surgical or waterproof rubber gloves to place the body in the grave and perform hand hygiene afterwards.
- The number of individuals conducting the burial or cremation should be kept at a minimum.

### Donning and Doffing Steps (refer to figure 2 and 3)

**Donning:** putting on the personal protective equipment.

**Doffing;** Taking off the personal protective equipment.

- Each facility should prepare a room for donning which should be on the green zone and the doffing should be in the decontamination area, each of the rooms should have instructions on the steps and a full-length mirror to use during the steps.
- The donning area should be at the entry of the GREEN zone and the doffing at the DECONTAMINATION zone
- At the donning area there should be a log book indicating the entry time and body temperature and the doffing should have an exit book this is to approximate the time spent in the Covid treatment unit.
- A bathroom should be available at the doffing area

Rehydration is encouraged after exit to replace lost fluids after the ward procedures

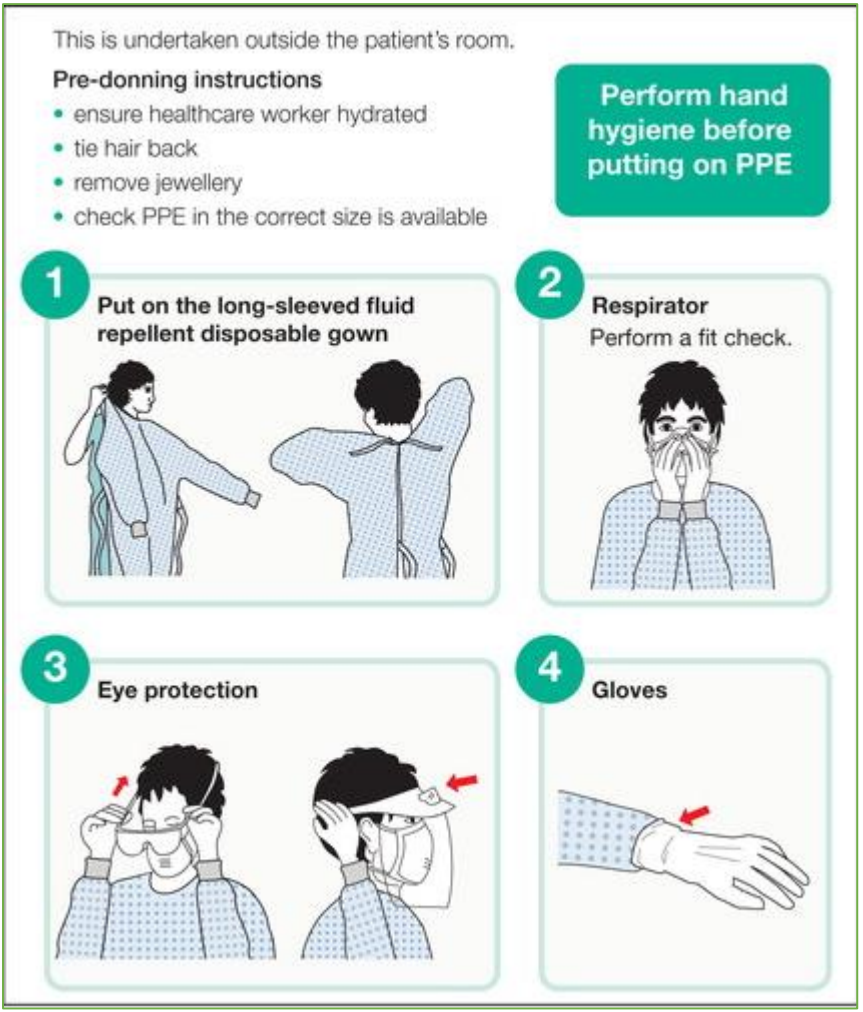


*Figure 2: Pre donning instructions*

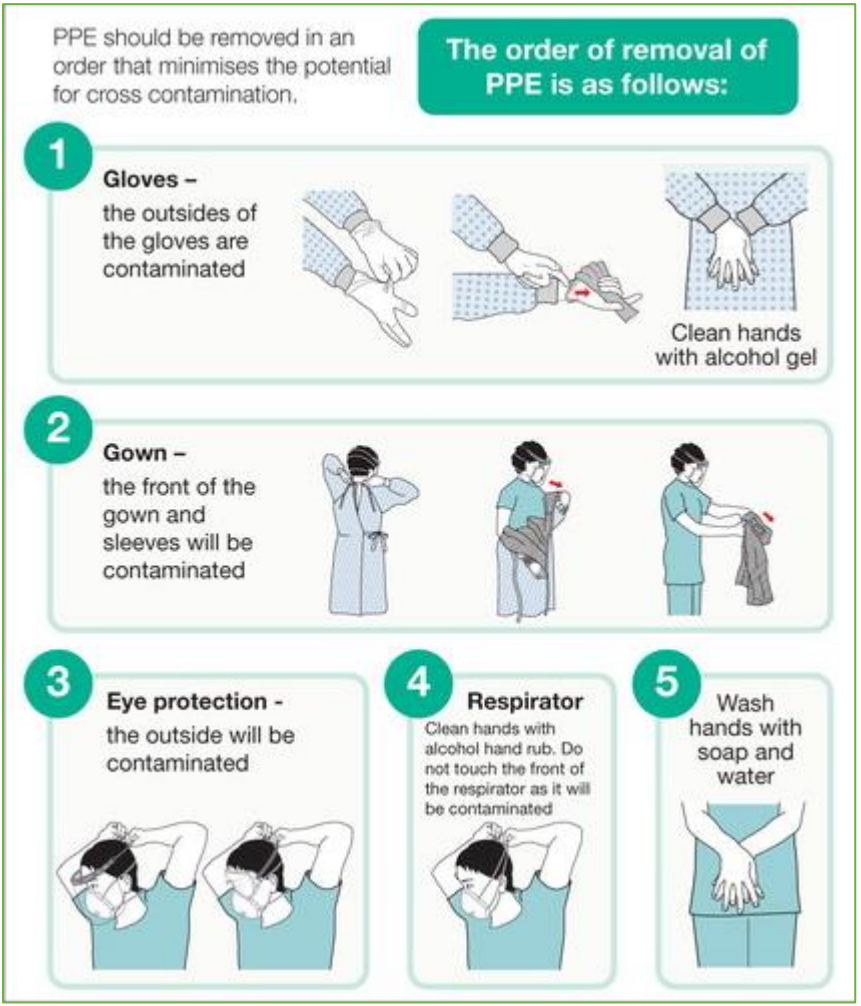


*Figure 3: Order of removal of PPE*

# Chapter 3: Diagnosis of COVID-19

This chapter aims to provide guidance on who to test for COVID-19 and the preferred tests to use in the clinical setting. Testing is only recommended for diagnosis and not as an indicator of recovery from COVID-19. Testing should be offered to all persons meeting the case definition (refer to case definition on page 3)

## Preferred Initial Tests

Nucleic Acid Amplification Tests (NAATs) such as the SARS-CoV-2 Polymerous Chain Reaction (PCR) are the preferred initial tests. Where access to a PCR test is limited or too costly then SARS-CoV-2 antigen testing can be utilized. Turn-around times for antigen tests are generally shorter than for PCR testing and thus an antigen test can help with quick identification of COVID-19 cases. Sensitivity of antigen tests is lower than that of NAATs. Therefore, a negative test may warrant confirmation by a PCR test in symptomatic patients. A positive antigen test does not warrant confirmation unless the patient is asymptomatic and the diagnosis is in doubt.

Serological tests i.e., SARS-COV-2 antibody detection tests should not be used for diagnosis of COVID-19. They can only be used to check for previous infection for example in the setting of serological surveys.

Indeterminate PCR test results usually indicate that only one of the 2 or more target genes being tested for was identified. These tests should be considered presumptively positive.

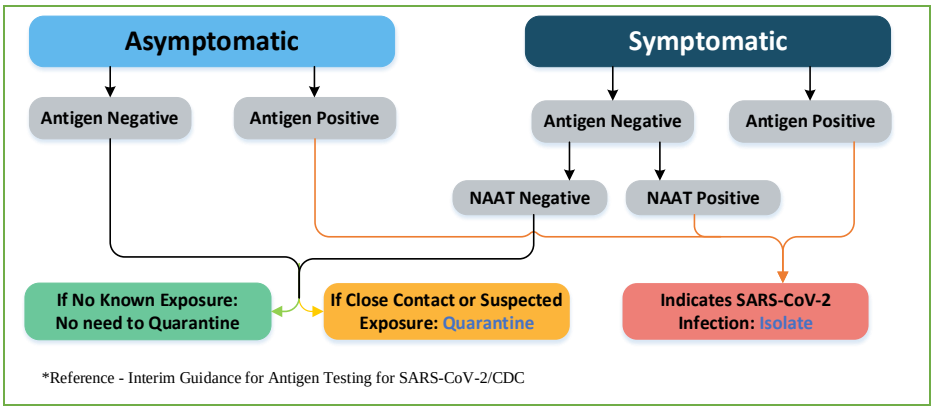


*Figure 4: Antigen Testing Algorithm.*

### Specimens for testing

Specimens can be taken from the upper respiratory tract or the lower respiratory tract. Upper respiratory tract samples include nasopharyngeal swabs, oropharyngeal swabs and nasopharyngeal aspirates. Lower respiratory tract specimens include bronchoalveolar lavage specimens and expectorated sputum.

### Collection of specimens for laboratory diagnosis

- Collect specimens from the upper respiratory tract (URT; nasopharyngeal and oropharyngeal) AND, where clinical suspicion remains and URT specimens are negative, collect specimens from the lower respiratory tract when readily available (LRT; expectorated sputum, endotracheal aspirate, or broncho-alveolar lavage in ventilated patient) for SARS-CoV-2 testing by RT-PCR and bacterial stains/cultures.

**NB:**

- Use appropriate PPE for specimen collection (droplet and contact precautions for URT specimens; airborne precautions for LRT specimens). When collecting URT samples, use viral swabs (sterile Dacron or rayon, not cotton) and viral transport media. Do not sample the nostrils or tonsils. In a patient with suspected SARS-CoV-2, especially with pneumonia or severe illness, a single negative URT sample does not exclude the diagnosis, and additional URT and LRT samples are recommended. LRT samples are more likely to be positive and for a longer period. Clinicians may elect to collect only LRT samples when these are readily available (for example, in mechanically ventilated patients). Sputum induction should be avoided due to increased risk of increasing aerosol transmission.
- Samples should be collected in a timely manner for clinical management and outbreak control. Ensure that staff responsible for collection of samples are well trained and available. Samples should be transported to the laboratory using Viral Transport Media and should be triple packaged. For further details on sample collection please refer to the Ministry of Health Targeted Testing Strategy for Coronavirus disease 2019 (COVID 19) in Kenya.

### The role of radiological tests for diagnosis of COVID-19

Imaging including chest radiographs and high-resolution CT scans are useful in monitoring of the clinical course and evaluating disease severity. Chest CT scan images from patients with COVID 19 typically demonstrate bilateral peripheral ground glass opacities which are non-specific. These can be found other kinds of pneumonia. This makes the diagnostic value of chest CT scan in COVID 19 low and dependent on radiographic interpretation. Given the variability in chest imaging findings, chest radiograph or CT scan alone is not recommended for the diagnosis of COVID 19. [22]

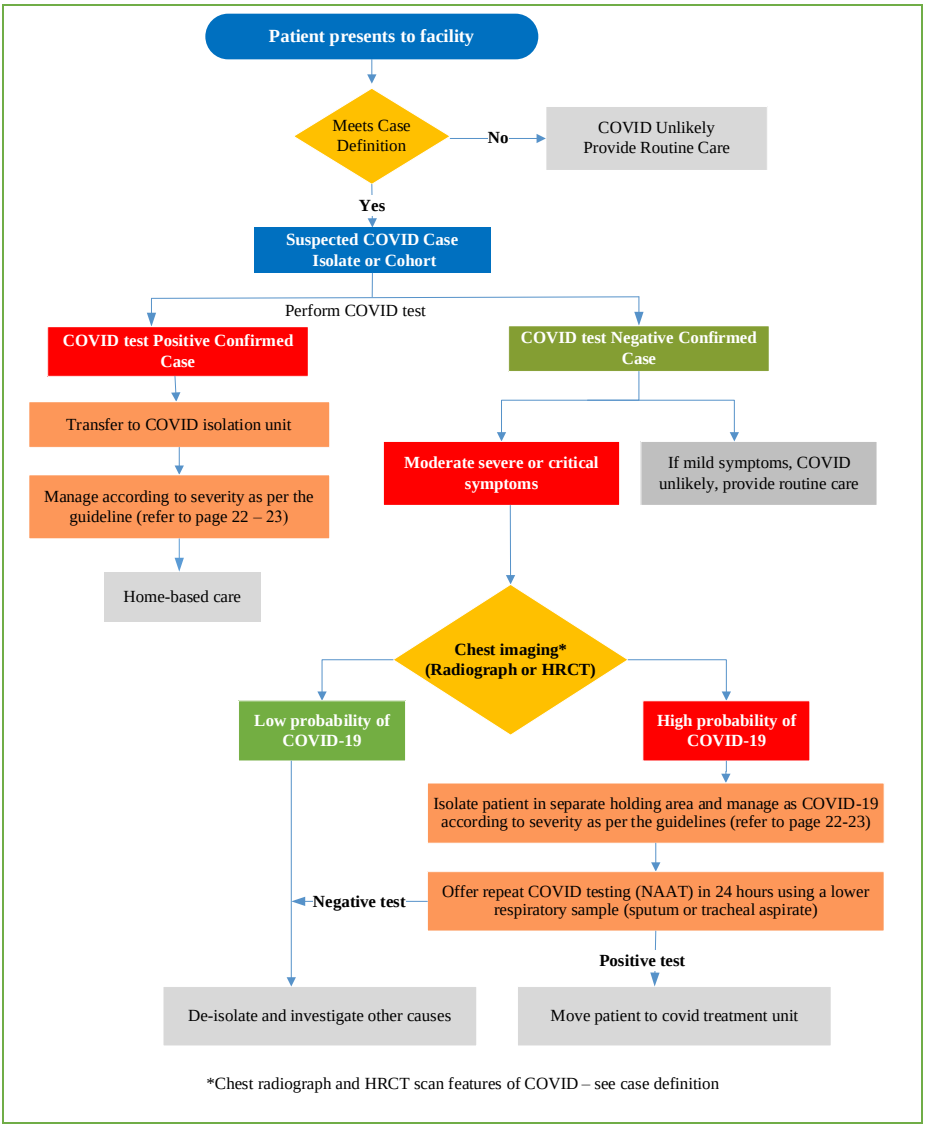


*Figure 5: Triage and management of a patient presenting with symptoms of Covid 19*

# Chapter 4: Management of COVID-19

The management of patients with COVID-19 depends on severity of disease at presentation.

Once patient is CONFIRMED positive by a PCR or rapid antigen test categorize them into the following groups based on presentation

**Table 2a: COVID-19 severity categorization in adults and adolescents**

| CATEGORY | FEATURES |
|---|---|
| **1. Mild illness** | Fever, cough, sore throat, malaise, headache, muscle pain<br>BUT<br>**No dyspnoea (shortness of breath)** and **No abnormalities on chest imaging** |
| **2. Moderate illness** | Clinical features of pneumonia (fever, cough, **dyspnoea**)<br>AND/OR<br>**radiological features of pneumonia**<br>BUT<br>**Oxygen saturations (SPO2) greater than or equal to 94% on room air** |
| **3. Severe illness** | Clinical and radiological features of pneumonia, tachypnea with RR>30<br>AND<br>**oxygen saturation (SPO2) less than 94% on room air** |
| **4. Critical illness** | Features of severe illness<br>AND<br>Any of the following:<br>• **respiratory failure**<br>• **sepsis/septic shock**<br>• **multiorgan dysfunction**<br>• **acute thrombosis** |

**Table 2b: COVID-19 severity categorization in children**

| CATEGORY | FEATURES |
|---|---|
| 1. Mild illness | Fever, cough, sore throat, malaise, headache, muscle pain<br>**BUT**<br>No dyspnoea (shortness of breath and No abnormalities on chest imaging |
| 2. Moderate illness | Clinical signs of non-severe pneumonia (cough or difficulty breathing)<br>**AND**<br>Fast breathing*<br>**AND/OR**<br>chest indrawing<br>*Fast breathing (in breaths/min): <2months: 60; 2-11months: 50; 1-5years: 40 |

| | |
|---|---|
| 3. **Severe illness** | Child with clinical signs of pneumonia (cough or difficulty in breathing) + at least one of the following:<br>• Central cyanosis or SPO2 <90%;<br>• Severe respiratory distress (e.g., fast breathing*, grunting, very severe chest indrawing);<br>• General danger sign: inability to breastfeed or drink, lethargy or unconsciousness, or convulsions<br><br>*Fast breathing (breaths/min): <2months: ³60; 2-11months: ³50; 1-5years: ³40 |
| 4. **Critical illness** | Features of severe illness<br>**AND**<br>Any of the following:<br>• Acute respiratory distress syndrome<br>• Respiratory failure requiring mechanical ventilation<br>• Sepsis/Septic shock<br>• Other organ failure requiring ICU care |
| 5. **MIS-C** | Preliminary case definition: Children and adolescents 0–19 years of age with fever > 3 days<br>**AND**<br>Two/more of the following:<br>• Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet);<br>• Hypotension or shock;<br>• Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities;<br>• Evidence of coagulopathy,<br>• Acute gastrointestinal problems;<br>**AND**<br>No other obvious microbial cause of inflammation<br>**AND**<br>Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19. |

**Supportive care**

Supportive care should be offered to all patients diagnosed with COVID-19. This includes the following:

1. Counselling and psychosocial support
2. Symptomatic treatment
3. Adequate nutrition and hydration

**Table 3: Management of asymptomatic, mild and moderate COVID-19**

| | |
|---|---|
| **Asymptomatic or mild illness** | **Assess for eligibility for home-based care**<br>Patient qualifies if they have no risk factors for disease progression or poor outcomes (see below) and a suitable space is available at home (separate room with separate bathroom), has resources to access basic PPE for family members e.g., face masks and gloves, no house members who are increased risk of severe illness if exposed e.g., see below<br>**Risk factors for poor outcome:**<br>Age >60, coronary artery disease, stroke, diabetes, hypertension, cancer, chronic lung disease, frailty, pregnancy, immunosuppression, chronic kidney disease<br>**Management**<br>Symptomatic treatment for mild disease (paracetamol, antihistamines). **Steroids should NOT be used for patients with asymptomatic, mild or moderate disease.**<br>(Isolation precautions as outlined in the IPC section) |
| **Moderate Illness** | • Baseline tests - blood count, renal and liver function, HIV test, random blood sugar.<br>• symptomatic treatment:<br>  • Fever - Paracetamol<br>  • Sore throat - gargles<br>  • cough, nasal congestion - antihistamine<br>• VTE prophylaxis with Enoxaparin 40mg once a day if admitted to a health facility<br>  • Where enoxaparin is not available, use low dose unfractionated heparin at 5000units subcutaneous BD)<br>  • Where patient unable to use standard anticoagulation therapy, consider use of direct-acting anticoagulants<br>  • Consider prophylaxis for children older than 5 years with comorbidities and not ambulant. Refer to BNF for dosage guidelines for pediatrics<br>Where there is pressure for space for isolation of patients, the following patients with moderate illness can be managed at home:<br>• Young <60 years<br>• Oxygen saturations >94% on room air<br>• No comorbidities<br>• Have easy access to a health facility in case of worsening of symptoms<br>• Physically active |

*Where the standard of care highlighted above cannot be offered to the patient due to contraindications or adverse reactions then consult a specialist

*Monitor patients for suspected adverse reactions and report at http://pv.pharmacyboardkenya.org/

**Table 4: Management of severe and critical COVID-19**

| | |
|---|---|
| **Severe illness** | • Baseline Tests (Total blood count, renal and liver function, HIV test, random blood sugar)<br>• Symptomatic treatment<br>• Oxygen supplementation to maintain SPO2s above 90% and above 92% in pregnant women (oxygen supplementation can be via nasal prongs, masks, non-rebreather masks or high flow nasal cannula - see below)<br>• Dexamethasone 6mg per day for up to 10 days (where dexamethasone is not available, consider using prednisone 40 mg OD or methyl prednisone 32mg OD. This short duration of dosing does not require tapering)<br>  • For children - Dexamethasone 0.15mg/kg iv/PO OD to a maximum of 6mg or prednisolone 1mg/kg OD maximum 40mg OD, methylprednisolone 0.8 mg/kg IV OD maximum 32mg OD<br>• VTE prophylaxis Enoxaparin 40mg OD once a day for the duration of hospitalization (Where enoxaparin is not available, use low dose unfractionated heparin at 5000units subcutaneous BD)<br>• Self proning for 12 to 16 hours a day (see self-proning guide below) as tolerated |
| **Critical Illness** | • Baseline tests- total blood count, renal and liver function tests, HIV test, random bold sugar<br>• Symptomatic treatment<br>• Admit to a **Critical Care Unit.**<br>• Mechanical Ventilation if no improvement in oxygenation with maximal oxygen flows with other modalities - see guide to noninvasive ventilation, tracheal intubation and ventilation below<br>• Prone for 12 to 16 hours per day<br>• Conservative fluid management i.e., give IV fluid only if hypovolemic<br>• Closed suctioning of secretions where available<br>• Give Dexamethasone 6 mg per day for up to 10 days (where dexamethasone is not available, consider using prednisone 40 mg OD or methylprednisolone 32mg OD. This short duration of dosing does not require tapering)<br>  • For children - Dexamethasone 0.15mg/kg iv/ PO OD to a maximum of 6mg or prednisolone 1mg/kg OD maximum 40mg OD, methylprednisolone 0.8 mg/kg IV OD maximum 32mg OD<br>• VTE prophylaxis 40mg Enoxaparin OD SC (Where enoxaparin is not available, use low dose unfractionated heparin at 5000units subcutaneous BD)<br>**Where possible, document advance directives for all patients e.g., do not resuscitate for patients who are unlikely to do well or have another terminal condition** |

## Baseline Tests

Should be done for all patients who are admitted and all patients with risk factors for poor outcomes: total blood count, random blood sugar, Urea Electrolytes Creatinine, Liver function tests. HIV testing should be offered to all patients.

Chest imaging is recommended in patients with severe illness who fail to improve on standard therapy and in all patients with critical illness. Include an ECG if indicated.

Where available a C-Reactive Protein (CRP) may be useful in managing patients who acutely deteriorate.

## Other Therapeutic Agents

The following drugs may have a role in the management of COVID-19. Specialist input would be required in defining the appropriate patient population, weighing benefit against risk, and cost considerations. These agents are still investigational and under emergency use authorization. This means that a patient must be educated on the evidence around their use and must consent to their use prior to prescription. Their use should be reported to the Pharmacy and Poisons Board

**Table 5: Other Therapeutic Agents**

| Drug | Mechanism of Action | Potential Indications |
|---|---|---|
| **Tocilizumab** | monoclonal antibody against IL-6 | Hospitalized patients with severe and critical COVID-19 with disease progression and elevated markers of systemic inflammation (CRP >75) despite steroid use. |
| **Baricitinib (with remdesivir)** | Janus Kinase (JAK) 1 and 2 selective inhibitor | Hospitalized patients with severe COVID-19 with disease progression and elevated markers of systemic inflammation despite steroid use (Baricitinib alone) or in patients with severe COVID-19 in whom steroids are contraindicated (Baricitinib with remdesivir) |
| **Remdesivir** | an antiviral agent that inhibits SARS-Co-V-2 replication | Hospitalized patients with severe but not-critical COVID-19 who are within 10 days from the onset of symptoms.<br><br>There is conflicting data on the use of remdesivir, with most clinical trials showing no mortality benefit. Some studies have shown that remdesivir may reduce duration of illness by few days and only if initiated very early after disease onset rather than at the time a patient is deteriorating. |

Current evidence **does not support** the following interventions for treatment or prevention of COVID-19.

- Hydroxychloroquine or Chloroquine
- Azithromycin and empiric antibiotic therapy
- Ivermectin
- Convalescent plasma therapy
- Empiric therapeutic or intermediate dose anticoagulation
- Aspirin
- High dose steroids or steroid pulse or prolonged duration of steroid use beyond 10 days
- Vitamin C and D
- Zinc
- Ulinastatin
- Favipiravir

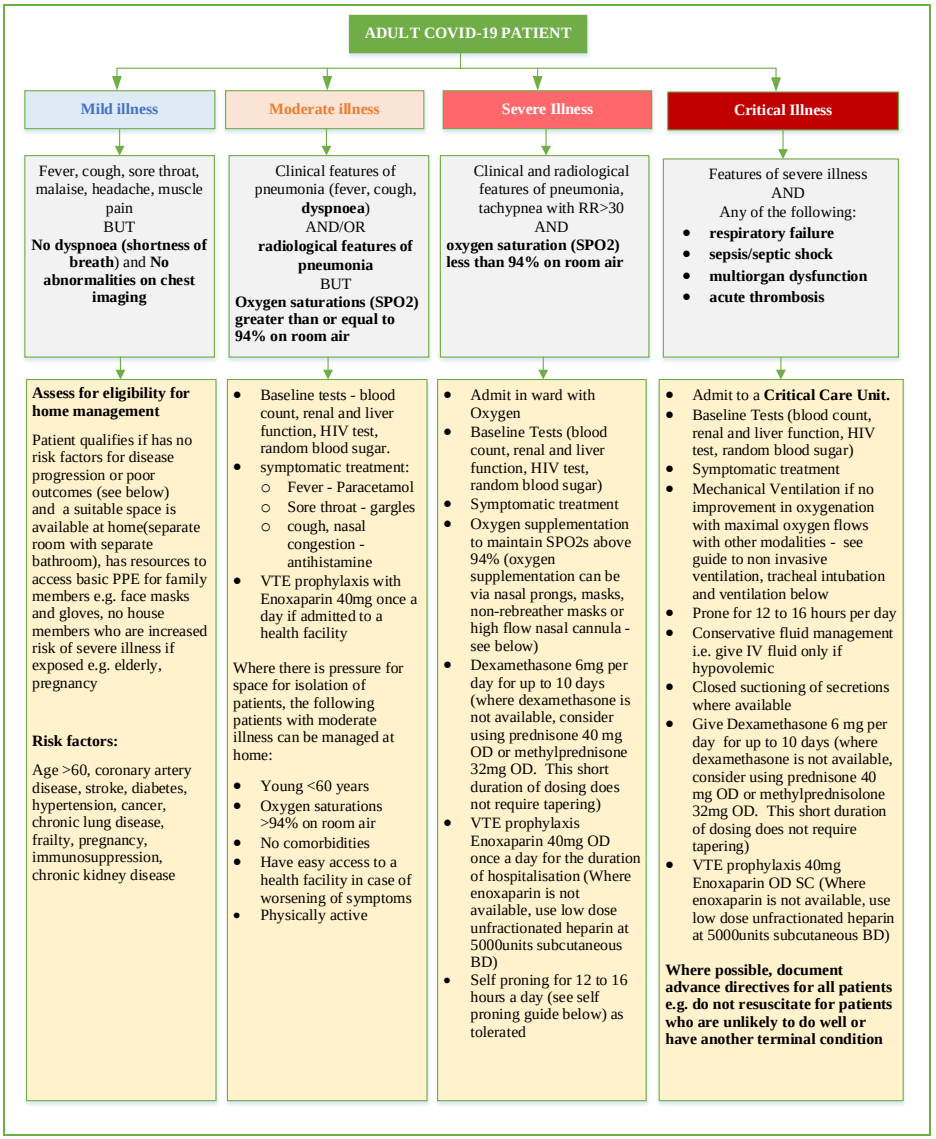


*Figure 6a: Management Algorithm for the adult patient with COVID-19*

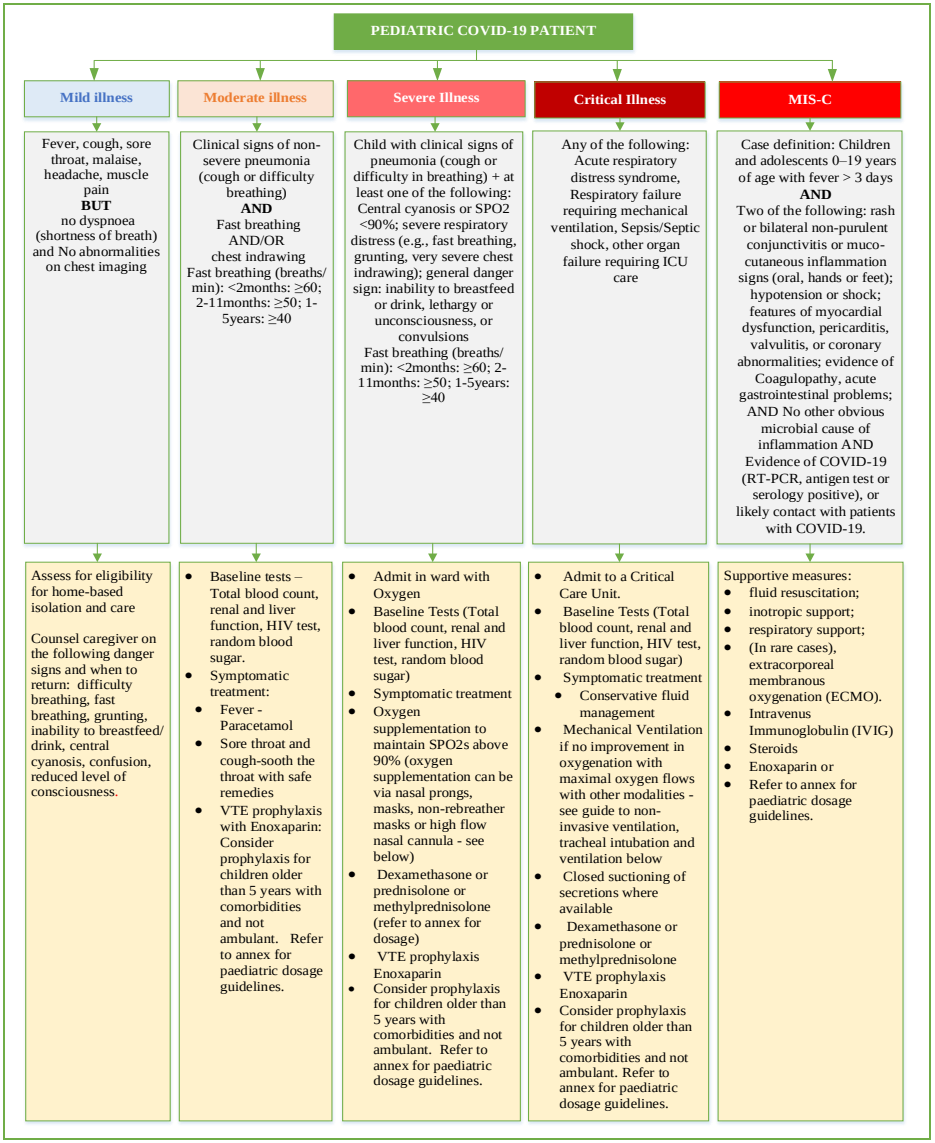


*Figure 6b: Management of Pediatric COVID-19 Patients*

### Oxygen therapy:

Oxygen therapy: Oxygen via nasal cannulae is indicated in those with saturations of 94% or below. Up to 4 litres of oxygen can be administered via this route. Monitoring of response can be done both via pulse oximetry and arterial blood gases.

If the patient continues desaturating despite this, higher flow oxygen will be required. Current delivery systems available include the face mask (5-10L/min) and the non-rebreather mask (up to 15 L/min). High flow nasal cannula can support flows of up to 60L/min. If the patient requires high flow oxygen, please contact critical care/pulmonology team as escalation to the ICU may be necessary.

Remember that the risk of aerosolization increases once oxygen flows of above 4L/min per minute are required and an N95 mask should be used in addition to other precautions.

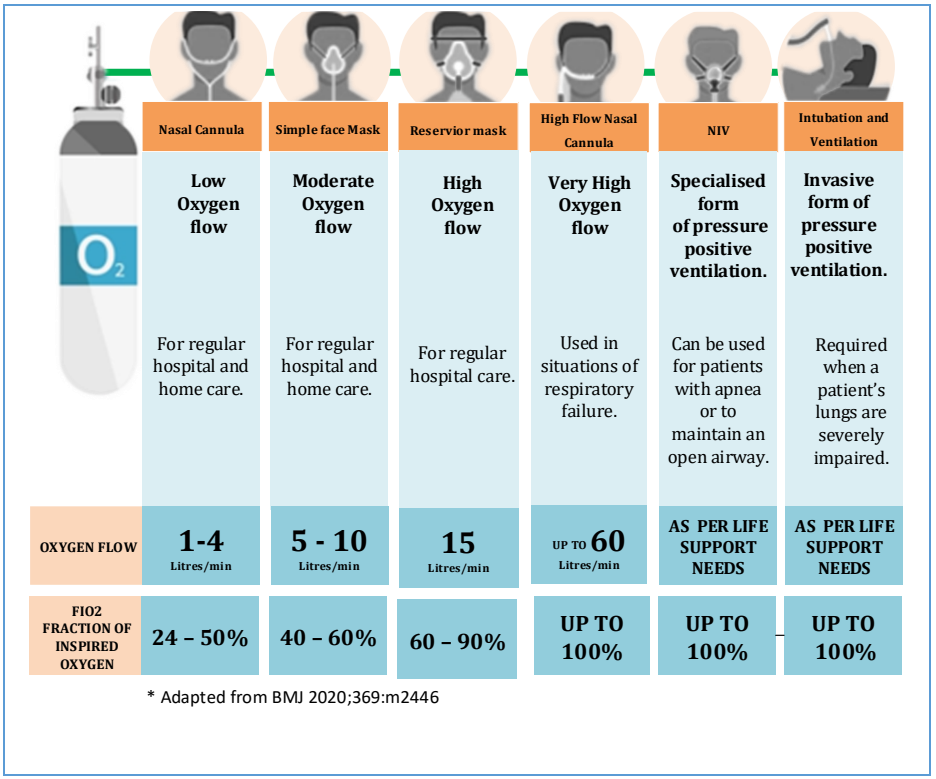


*Figure 7: Methods of oxygen delivery*

### Proning for non-intubated patients

Indicated for patients with oxygenation requirements exceeding 4 L/min to maintain goal saturations (>90% in non-chronic hypoxia cases) via nasal cannula or simple $O_2$ mask.

### Contraindications

- Chest wall and vertebral trauma or instability
- Trauma, fracture or major surgery to the anterior face, chest, abdomen or pelvis.
- In pregnancy states, one should seek obstetric clearance prior to proning
- Confusion, agitation, and physical inability to independently change position in bed
- Active nausea and/or vomiting

### Procedure

- Assess for contraindications as above, alertness and ability to reposition in bed
- Attach monitoring leads, continuous pulse oximetry, BP cuff and SpO2
- Distractions (phones, tablets, TV etc.) can be availed to make the position more tolerable
- Documentation of vital signs should be made per ICU protocol by the bedside nurse
- Worsening oxygenation, increased work-of-breathing, worsening hypercapnia, worsening mental status, and worsening hemodynamics should prompt assessment for intubation
- Discontinuation of proning will be recommended by the ICU consultant when demonstrable improvement in respiratory status is noted or if the patient is unable to tolerate the procedure.
- Protocols on proning (including videos) are available (https://www.nejm.org/doi/full/10.1056/NEJMoa1214103)
- There is little evidence on prone positioning in pregnant women. Pregnant women may benefit from being placed in the lateral decubitus position

**Table 6: Proning schedule**

| |
|---|
| Start: 30 minutes to 2 hours lying fully prone (bed flat)<br>• 30 minutes to 2 hours lying on right side (bed flat)<br>• 30 minutes to 2 hours sitting up (30-60 degrees) by adjusting head of the bed<br>• 30 minutes to 2 hours lying on left side (bed flat)<br>• 30 minutes to 2 hours lying prone again<br>• Continue to repeat the cycle……. |

### Decision making for ventilatory support for critically ill patients

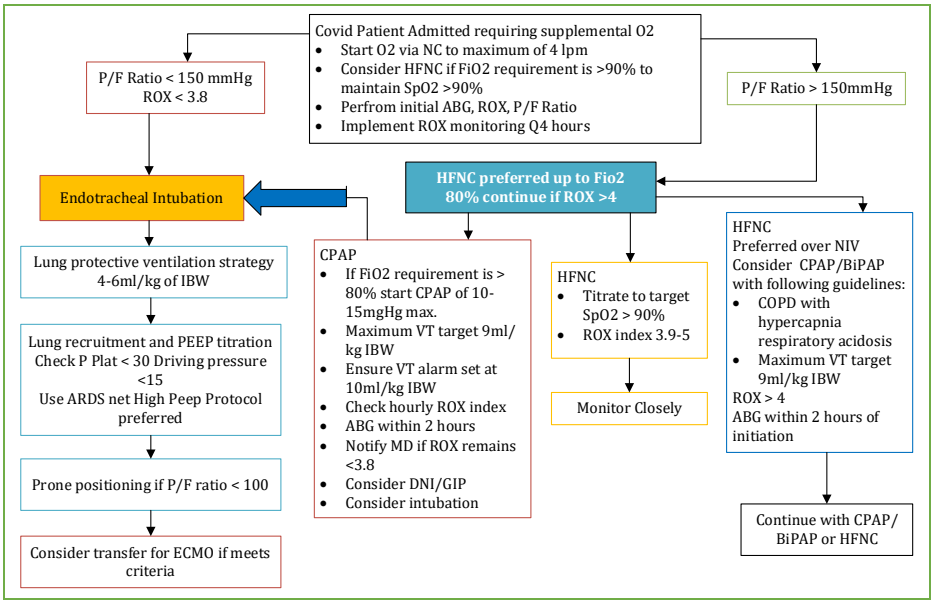


*Figure 8: Decision making for ventilatory support*

## COVID-19 Airway Management

**Table 7: COVID-19 Airway Management**

| | |
|---|---|
| **Planning** | ○ Intervene early - aim to avoid emergency intubation.<br>○ Negative Pressure room or Normal pressure with strict door policy.<br>○ Clinicians proficient with intubation to be involved to increase first-pass success.<br>○ Early airway assessment to be done to anticipate difficult airway. |
| **Prepare** | ○ Assemble 3-4-person Airway Team;<br>– Airway Operator<br>– Airway Assistant<br>– In room runner<br>– Door Runner<br>○ Share Airway Strategy.<br>○ Use a dedicated COVID intubation checklist<br>○ Use COVID-19 Intubation Tray (see below). |

| | |
|---|---|
| **PPE** | ○ Hand Hygiene (HH).<br>○ Donning: HH > Gown > Mask > Eye-protection > Hat > HH > Gloves.<br>○ Spotter to perform "Buddy Check" to ensure correct PPE fit.<br>○ PPE includes;<br>I. Impervious gown<br>II. Theatre hat/hair net<br>III. N95 mask<br>IV. Consider face shield rather than goggles for eye protection<br>V. Consider double gloves. |
| **Pre-Oxygenation** | ○ 45 degrees head up position.<br>○ Pre-oxygenate with100% $FiO_2$ via a NRM mask using 2 hands for full 5 minutes. (Cover with surgical mask)<br>○ Ensure a square $ETCO_2$ waveform, to be confident of no leaks (if available)<br>○ Avoid Apneic Oxygenation techniques due to aerosolization risk. |
| **Perform intubation** | ○ Use laryngoscope (with blade sized to patient)<br>○ Use rapid sequence intubation (RSI) technique. Initial neuromuscular blockade can be achieved with (1.5mg/kg IBW rocuronium OR 1.5mg/kg TBW suxamethonium).<br>○ Wait 60 seconds for paralysis to take effect - avoid triggering cough.<br>○ No ventilation prior to intubation unless for rescue oxygenation. |
| **Post-intubation** | ○ Inflate cuff BEFORE initiating ventilation and monitor cuff pressures to minimize leak.<br>○ A nasogastric tube should be placed at the time of intubation to avoid further close contact with the airway<br>○ If COVID-19 status not already confirmed take a deep tracheal aspirate for virology using closed suction<br>○ Remove outer gloves (if on), dispose of airway equipment in sealed bag.<br>○ Doffing: Gloves > Gown > HH > Hat > Eye Protection > Mask > HH. Use a Spotter.<br>○ Chest X-ray should usually be performed to confirm tube position but should be delayed until after central line insertion to minimize staff entries into the room.<br>○ Debrief and share lessons. |

**Additional notes:**

- To minimize the risk of virus aerosolization to the intubation team; Avoid nasal oxygen therapy, simple facemask and non-rebreather masks during pre-oxygenation.
- Awake intubation not indicated because of risk of aerosolization
- Connection / Disconnection (Apply the viral filter directly to the ETT. Only disconnect the circuit on the ventilator side of the viral filter). Clamp ETT prior to disconnection.
- Once the patient is intubated, closed suction systems should be used to minimize aerosolization of the virus.

## Intubation procedure and post-intubation management

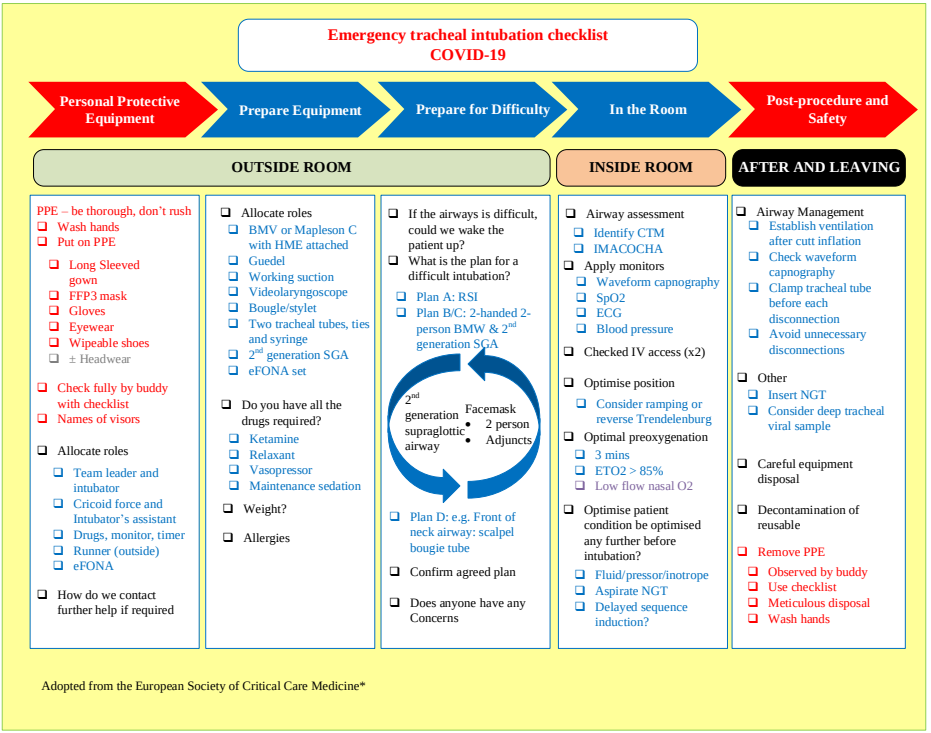


*Figure 9: Emergency tracheal intubation checklist COVID-19*

| ITEM (tick if available on tray) | TICK | ITEM (tick if available on tray) | TICK |
|---|---|---|---|
| 1. Adult/paediatric BVM | | 2. PPE Sets for 4- 5 persons of the intubation team. | |
| 3. Nasal Cannula/Non-rebreather mask | | 4. Cut down tray+ 2.0 Silk/Nylon stich- for CVC insertion | |
| 5. Sachet lubricant (Opti-lube/KY jelly in sachet) | | 6. 100ml N/Saline or 10 vials water for injection | |
| 7. In line suction catheter (closed tracheal suction system) | | 8. Sterile Wound dressing set- for urinary catheter insertion | |
| 9. Oropharyngeal airway and nasopharyngeal airway (sized to patient) | | 10. Artery forceps/tube clamp – for clamping ET tube prior to connection/disconnection (to ventilator/BVM) | |
| 11. Supraglottic airway/LMA/iGel (sized to patient | | 12. Local anaesthesia-1 bottle 1% Lidocaine for CVC | |
| 13. CVC adult or paediatric | | 14. Heparin | |
| 15. NG Tube | | 16. 70% alcohol or 2% chlorhexidine or Povidone-iodine | |
| 17. Silicon/Foley's urinary Catheter | | 18. Clear CVS dressing | |
| 19. Specimen bottles (Blood culture, red, purple, blue, green topped bottles, sputum, urine containers) | | 20. Clear Plastic(polythene) drape (plus frame) – to cover patient face during intubation | |
| 21. Resuscitation Drugs (Adrenaline, Atropine, Amiodarone, Thrombolytic agent e.g., reteplase or alteplase) | | 22. Syringes 10 mlx10, 50ml x 2 | |
| 23. Defibrillator/Pacing Adhesive Pads | | 24. Point of care ultrasound machine (must be dedicated to COVID care) | |

| | | |
|---|---|---|
| **Induction Drugs**<br><br>**Neuromuscular blockers (Muscle relaxants)** | • Ketamine 1.5-2 mg/kg IBW<br>OR<br>• Fentanyl 2-10 mcg/kg TBW<br>OR<br>• Midazolam 0.1-0.3 mg/kg TBW<br>OR<br>Propofol 1-2.5 mg/kg IBW + (0.4 x TBW) (others simply use 1.5 mg/kg x TBW as the general guide)<br>OR<br>Thiopental 3-5 mg/kg TBW<br>(Tailor to the patients and availability)<br>• Succinylcholine 1-2 mg/kg TBW<br>OR<br>• Atracurium 0.2-0.4 mg/kg<br>OR<br>• Rocuronium 1.5 mg/kg IBW<br>OR<br>• Vecuronium 0.15-0.25 mg/kg IBW<br>OR<br>• Cisatracurium 0.15-0.2mg/kg bolus<br>(Tailor to the patients and availability) | NO BAGGING BEFORE ETT<br>To prevent cough, Consider pre-medication with lidocaine0.5-1.0mg/kg IV +Glycopyrrolate 200mcg IV<br><br>USE BVM or NRM/NIV Mask(unvented) to pre-oxygenate. |
| **Sedation** | • 2% propofol 5-15ml/h OR<br>• Morphine 0.005mg/kg/hour OR<br>• Midazolam(50mg/50ml) 2-5ml/hr.<br>• Dexmedetomidine 0.02-0.7 mcg/kg/hr.<br>• Ketamine 1.5-2 mg/kg IBW | Refer to Table 8 |
| **Endotracheal tube** | ETT tubes 7.0;7.5; 8.0 (Secure ET at level ET tube size X3 e.g., ET tube size 7, then secure tube at 21 cm mark. | |
| **CVC** | 16cm Right sided insertion/20cm Left sided insertion sutured at hub | |
| **Nasogastric tubes** | 14/16 or 18 Fr | |

| | | |
|---|---|---|
| **Initial Ventilator Settings** | Individualize initial ventilator settings-based patient's mechanics. (NB: Pressure control modes may be preferable)<br>• FI02 100% (1.0)<br>• PEEP ≥6 cm H2O to achieve oxygenation goal (oxygen saturation between 88 and 95 percent)<br>• Ideal Tidal volume 4-6ml x Ideal Body Weight (estimate) but based on patient's lung mechanics.<br>• RR 14-22<br>• I: E ratio 1:1(Insp time 1.25) | Start weaning if saturation 95-100<br>PO2>10Kpa (>75mmHg) at next ABG |
| **Blood tests (Red, Blue, Green, Purple top, Blood Culture bottles, sputum containers)** | • Initial ABGA at 2 hrs. post intubation<br>• ABG every 4:6:12 hrs.<br>• FBC, LFT, UE/Cr, every 24hrs<br>• Procalcitonin when indicated<br>• Tracheal aspirate (for COVID PCR, GeneXpert, MCS) on admission and subsequently as indicated.<br>• Blood and urine culture on admission and subsequently when indicated<br>• Troponin and fungal studies when indicated | |
| **Acceptable parameters** | • SPO2 88-95%<br>• PaO2 between 55 and 80 mmHg (7.3 to 10.6 kPa)<br>• Respiratory acidosis with PH >7.25 especially if prone<br>• Plateau Pressure < 30mmHg | |
| **Paralyze with Neuromuscular Blockers if any of the following** | • Clinically significant Ventilator asynchrony despite optimum sedation.<br>• Refractory hypoxemia: for lung recruitment maneuvers.<br>• Intubated and prone position<br>• For safe transportation | Refer to Table 8 |

| | | |
|---|---|---|
| **Blood Pressure** | • Accept MAP>65mmHg<br>• Noradrenaline 0.01-3.3 mcg/kg/min<br>• DILUTION (Formulation of 1mg/ml Norepinephrine/noradrenaline add 2 ml to 48ml in 5% dextrose by syringe pump OR Formulation of 1mg/ml Norepinephrine/noradrenaline add 20ml to 480ml 5% dextrose by drip counter (Soluset) initial rate 10ml/hr.(0.16mg/hr.) to 20ml/hr.(0.33mg/hr.) -FIRST LINE<br>• If Noradrenaline>30ml/hr. add Adrenalin(epinephrine) (start at 20ml/hr.)<br>• 2 fluid boluses/24 hrs. max<br>• Consider dobutamine as 3rd line | Consider initial fluid bolus at 4ml/kg over 10-15 minutes to ascertain if the patient is fluid responsive. If fluid responsive then give maintenance infusion at 5ml-20/kg/24hr |
| **If PH <7.25 (metabolic acidosis)**<br><br>**Permissive hypercapnia** | • Match patient's minute ventilation demands.<br>  • Increase RR (I:E ratio target of 1:1)<br>  • Use flow-time scalar to avoid gas trapping<br>  • In severe acidosis consider NaHCO3 Calculate deficit (1/2 the volume as bolus and ½ as infusion) and dialysis<br><br>PH 7.25 and acceptable PCO2 55 mmHg | |

<table>
<tr>
<td>If PO2 still <7kpa(60mmHg)</td>
<td>Adjust PEEP according to FiO2/PEEP combinations table below
<table>
<tr><th colspan="2">Mild ARDS</th><th colspan="2">Moderate to Severe ARDS</th></tr>
<tr><td>FiO2</td><td>PEEP</td><td>$FiO_2$</td><td>PEEP</td></tr>
<tr><td>0.3</td><td>5</td><td>0.3</td><td>12</td></tr>
<tr><td>0.4</td><td>5</td><td>0.3</td><td>14</td></tr>
<tr><td>0.4</td><td>8</td><td>0.4</td><td>14</td></tr>
<tr><td>0.5</td><td>8</td><td>0.4</td><td>16</td></tr>
<tr><td>0.5</td><td>10</td><td>0.5</td><td>16</td></tr>
<tr><td>0.6</td><td>10</td><td>0.5</td><td>18</td></tr>
<tr><td>0.7</td><td>10</td><td>0.5-0.8</td><td>20</td></tr>
<tr><td>0.7</td><td>12</td><td>0.8</td><td>22</td></tr>
<tr><td>0.8</td><td>14</td><td>0.9</td><td>22</td></tr>
<tr><td>0.8</td><td>14</td><td>1.0</td><td>22-24</td></tr>
<tr><td>0.9</td><td>16</td><td></td><td></td></tr>
<tr><td>0.9</td><td>18</td><td></td><td></td></tr>
<tr><td>1.0</td><td>18-24</td><td></td><td></td></tr>
</table>
Stepwise PEEP titration (increments of up to 2- 5 cmH20<br>
Use lower inflexion point of deflection P-V loop<br>
Goal: PaO2 > 60 mmHg, Driving Pressure (Plateau pressure- PEEP) < 15cm H2O, best compliance (~50% of predicted compliance; > 40 cc/ cmH2oO)<br>
Prone positioning: P: F Ratio < 100<br>
Consult an Anaesthetist / Intensivist with PEEP >14</td>
<td>ardsnet.org</td>
</tr>
<tr>
<td>Electrolytes targets</td>
<td>• K>4.0 mmol<br>• Mg>1.0 mmol<br>• PO4 >0.7<br>• Na >135<br>• Ca >2.2</td>
<td>If abnormal, correct as per standard guidelines</td>
</tr>
</table>

**Table 8: Sedation and analgesia protocol**

| Aspects | Considerations |
|---|---|
| **Global** | • Patients with ARDS resulting in ventilator asynchrony despite ventilator adjustments may require lower RASS goals of -2 to -3.<br>• If ventilator asynchrony persists despite RASS goal of -2 to -3, a RASS goal of -4 to -5 should be attempted. If ventilator asynchrony persists, consider neuromuscular blockage with a RASS goal of -4 to -5.<br>• Daily evaluation of analgesia and sedation, as well as the need for neuromuscular blockade is imperative. Minimization of medications should be considered where possible to conserve supply.<br>• In general, patients on vasopressors who are not considered resuscitated should not receive oral therapies.<br>• When implementing the therapies below, consider patient specific factors such as history of substance abuse, age, or body weight.<br>• Selection of agent may be impacted by availability at each institution. |
| **Analgesia** | Analgesic therapy should not be used with a goal of achieving a determined RASS goal. If a patient has a BPS<6, but higher than desired RASS, a sedative medication should be initiated.<br>1. Intermittent IV analgesia: Use of intermittent IV analgesia to achieve goal BPS or RASS is recommended as first line.<br>2. If goal RASS is not achieved or BPS remains >6 with the above measures, refer to the UPHS PAD guidelines for initiation of IV continuous infusion therapy.<br>In mechanically ventilated patients that require continuous infusion analgesia that do NOT require frequent neurologic assessment, the following algorithm should be applied:<br>3. Continuous infusion analgesia:<br>**a.** Fentanyl is the preferred analgesic for continuous infusion. Hydromorphone is an alternative analgesic for continuous infusion.<br>**b.** Morphine is an alternative analgesic for continuous infusion, but not preferred in ICU patients. Patients with renal dysfunction may require lower doses due to accumulation. Monitor for hypotension upon initiation.<br>4. Oral analgesic therapy (Mechanical ventilation expected >24hrs): Following initiation of continuous infusion therapy, oral analgesic therapy could be considered to reduce intravenous requirements:<br>▪ Oxycodone 10-20 mg q6h standing (May titrate)<br>▪ Hydromorphone 4-6 mg Q4-6h standing (May titrate) |

| | |
|---|---|
| **Sedation** | • Sedation should be initiated in patients unable to achieve goal RASS despite achievement of BPS <6.<br>• In mechanically ventilated patients that require continuous sedation for agitation or ventilator synchrony, not requiring frequent neurologic assessment, the following algorithm should be applied.<br><br>A. If a patient has a RASS of -4/-5, but continues to demonstrate ventilator asynchrony, despite appropriate ventilator manipulation, therapy with a paralytic agent should be initiated.<br>B. Additional use of sedation with a low RASS WILL NOT aid in increased ventilator synchrony and will lead to inappropriate overdosing of patients and waste of medication.<br><br>**1. Continuous infusion sedation**<br>**a.** Propofol continuous infusion is the sedative of choice<br>**i.** Patients should be evaluated for baseline triglyceride (TG) monitoring and Q48h<br>**ii.** Discontinue agent if TG exceed 500 mg/dL.<br>**b.** Benzodiazepines<br>**i.** Midazolam or lorazepam are the preferred continuous infusion benzodiazepines (institutional preference or availability)<br>**c.** Dexmedetomidine<br>**i.** Achieves light sedation (RASS -1/-2). This agent should be used consistent with current UPHS guidelines and should not be used in patients requiring moderate to deep sedation (RASS -3 to -5) and/or neuromuscular blockade.<br>**ii.** Caution should be used in patients displaying signs of reduced ventricular function, bradycardia or heart block.<br>**d.** Ketamine 1.5-2 mg/kg IBW<br><br>**2. Intermittent sedation**<br>**a.** Consider the below therapies if propofol or continuous benzodiazepines are unavailable and dexmedetomidine is contraindicated or anticipated to be unsuccessful in achieving goal sedation.<br>**i.** Benzodiazepines<br>**ii.** Phenobarbital (IV to PO)<br>1. Loading dose: 130 mg IV x 1 dose<br>2. Maintenance therapy: 64.8 – 97.2 mg via gastric tube q8h (or 65 –130 mg IV q8h if unable to tolerate orals)<br>**b.** Titrate to sedation goal while not exceeding a level of 50mg/L<br><br>**3. Oral sedation therapy** |

| | |
|---|---|
| | **a.** Following initiation of continuous infusion therapy, oral therapies could be considered to reduce intravenous requirements:<br>**i.** Clonazepam 1-2 mg Q8h (May titrate)<br>**ii.** Lorazepam 1-2 mg Q6h (May titrate)<br>**iii.** Oxazepam 10 - 30 mg Q8h (May titrate)<br>**b.** Other<br>**i.** Quetiapine or alternative antipsychotic. Exercise caution in patients on adjunctive medications (consult with clinical pharmacy) other QTc prolonging medications.<br>**ii.** Gabapentin<br>**iii.** Valproic acid |
| **Neuromuscular blockade** | ❖ Neuromuscular blockade is only required in the presence of ventilator dyssynchrony and deep sedation (RASS -4 to -5)<br>❖ Ensure adequate sedation and analgesia are achieved prior to neuromuscular blockade as evidenced by RASS -4 to -5 and BPS <6. If BIS is available, titrate to 40-60.<br>❖ Do not reduce analgesia or sedation once neuromuscular blockade has been established.<br>❖ Analgesics and sedatives SHOULD NOT be titrated to reduce hypotension. Consider initiation of a vasopressor if hypotension persists.<br>❖ Paralytic requirement should be evaluated daily to limit use<br><br>**1. Intermittent dosing:**<br>• Vecuronium is the preferred agent for intermittent dosing (Alternative: Rocuronium)<br>o Dosing: 0.1 – 0.2 mg/kg every 4-6 hours<br>o Dose and frequency will vary based on organ dysfunction; Patients with significant organ dysfunction may require smaller and less frequent dosing<br>• If initial dosing of intermittent vecuronium or rocuronium does not achieve desired ventilator synchrony and/or TOF 1-2/4, increase dose or frequency as appropriate<br>• If patient goals are not achieved or requires more than Q4h dosing, begin continuous infusion neuromuscular blocking agent<br><br>**2. Continuous infusion:**<br>➢ Atracurium is the preferred NMBA for patients without renal/liver dysfunction<br>➢ Cisatracurium is permitted for patients with significant organ dysfunction |
| **Appendix 1: Opioid Conversion**<br>Equianalgesic Dosing of Intravenous Opioids | |

Patients transitioning between agents should be given as a bolus with an equianalgesic dose of the new medication and started on an appropriate dose of continuous infusion. Prior intravenous therapy should then be discontinued.

| Agent | Equianalgesic IV Dose |
|---|---|
| Fentanyl | 200 mcg |
| Hydromorphone | 3 mg |
| Morphine | 20 mg |

### Extubation practices

**The following recommendations should be observed:**

1. Patients should ideally be ready for extubation onto facemask. Patients should be assessed for readiness for extubation onto facemask.
2. NIV and HFNO should be avoided where possible.
3. Two staff members should perform extubation.
4. The same level of PPE should be worn for extubation as is worn by the team during intubation.
5. The patient should not be encouraged to cough.
6. A simple oxygen mask should be placed on the patient immediately post extubation to minimize aerosolization from coughing.
7. Oral suctioning may be performed, with care taken not to precipitate coughing

# HEMODYNAMIC SUPPORT

**up to 35%** Preliminary data from China reported highly variable prevalence of shock in adults with COVID-19 (17-35%), depending on population, severity of illness, and definition of shock.

**7 - 23%** Cardiac injury reported in 7% to 23% with shock frequently cited as main reason for death, maybe at least partly due to fulminant mycarditis.

For adults with COVID-19 and shock, using dynamic parameters, skin temperature, capillary refilling time, and/or lactate over static parameters to assess fluid responsiveness is suggested due to availability and possible improvements in mortality, lenght of stay and duration of MV.

## FLUIDS

Using a conservative, over a liberal fluid stragegy is suggested for acute resuscitation. In the abscence of data demostrating a benefit from the use of liberal fluid strategies in critically ill patients with sepsis/ARDS (majority of COVID-19 ICU pts develop ARDS). Using crystalloids over colloids is recommended, with some colloids being harmful, all colloids being more costly, and limitedly availability of colloids in some settings. Using buffered/balanced crystalloids suggested over unbalanced crystalloids, in the abscence of apparent harm, and roughly equivalent costs availability restricted NaCl 0.9% reasonable alternative. It is Not recommended:

- Using hydroxyethyl starches due to clinically important harm/no suggestion of benefits.
- Using gelatins, in the abscence of any benefit, and with higher costs.
- Using dextrans due to possible increased risk of blood transfusion (bleeding)/higher costs.
- Routinely using albumin for initial resuscitation, dut to abscence of benefit, cost/limited availability.

## VASOACTIVE AGENTS

Titrating to target MAP of 60-65 mmHg suggested due to indication of improved outcome if lower targets (& no firm indication of harm) **60 - 65 mmHg**

Norepinephrine (NE) suggested as firt-line agent, as most widely studied vasoactive agent with lower prior risk of undesirable effects. If NOT available, vasopressin or epinephrine suggested, both studied without clear evidence for harm; consider, when choosing, availability/contraindications (potential concerns for vasopressin include digital ischemia; tachycardia/excess lactate production for epinephrine).

Using dopamine is NOT recommended if NE is available, based on increased risk of harm including possible increased mortality. Adding vasopressin as a second-line agent is suggested, over titrating NE dose, if target MAP cannot be achieved. If shock with evidence of cardiac dysfunction & persistent hypoperfusion despite fluid resuscitation/NE, adding dobutamine, over increasing NE dose, is suggested based on a physiological rationale.

If refractory shock, low-dose corticosteroid therapy ("shock-reversal") is suggested, as may shorten time to resolution of shock, and ICU/hospital length of stay (major considerations with regards to costs)

SCC guidelines on management of critically ill with COVID-19



*Figure 10: Haemodynamic support*

**Table 9: Measures to prevent complications**

| Anticipated Outcome | Interventions |
|---|---|
| Reduce days of invasive mechanical ventilation | • Use weaning protocols that include daily assessment for readiness to breathe spontaneously<br>• Minimize continuous or intermittent sedation, targeting specific titration endpoints (light sedation unless contraindicated) or with daily interruption of continuous sedative infusions<br>• Proning for 12-16 hours per day |
| Reduce incidence of ventilator associated pneumonia | • Oral intubation is preferable to nasal intubation in adolescents and adults<br>• Keep patient in semi-recumbent position (head of bed elevation 30-45º)<br>• Use a closed suctioning system; periodically drain and discard condensate in tubing<br>• Use a new ventilator circuit for each patient; once patient is ventilated, change circuit if it is soiled or damaged but not routinely<br>• Change heat moisture exchanger when it malfunctions, when soiled, or every 5–7 days |
| Reduce incidence of other hospital acquired infections | • Central line associated infections - use a checklist with completion verified by a real-time observer to remind of each step needed for sterile insertion and as a daily reminder to remove catheter if no longer needed<br>• Catheter associated urinary tract infections - avoid urethral catheterization where possible. If a catheter is indicated, it should be removed as soon as possible<br>• Avoid using antibiotics unless there is a clear infection. Practice antimicrobial stewardship |
| Reduce incidence of venous thromboembolism | • Use pharmacological prophylaxis (low molecular-weight heparin 40mg SC [preferred if available] or heparin 5000 units subcutaneously twice daily) in adolescents and adults without contraindications.<br>• For patients who cannot use heparin consider direct acting anticoagulants e.g., fondaparinux and rivaroxaban<br>• For those with contraindications, use mechanical prophylaxis (intermittent pneumatic compression devices) |
| Reduce incidence of pressure ulcers | • Turn patient every two hours<br>• Use ripple mattresses for ICU patients |

| | |
|---|---|
| Reduce incidence of stress ulcers and gastrointestinal bleeding | • Give early enteral nutrition (within 24–48 hours of admission)<br>• Administer histamine-2 receptor blockers or proton-pump inhibitors in patients with risk factors for GI bleeding<br>*Risk factors for gastrointestinal bleeding include mechanical ventilation for ≥48 hours, coagulopathy, renal replacement therapy, liver disease, multiple comorbidities, and higher organ failure score |
| Reduce incidence of ICU-related weakness | • Actively mobilize the patient early in the course of illness when safe to do so |

## Management of special populations:

### Children

Reassure parents and involve them in caring for their child, most children will have mild symptoms - much milder than those seen in adults.

- Be extra-vigilant in children with pre-existing conditions (e.g., long-term respiratory conditions, immunocompromised from disease or treatment and cyanotic heart disease, sickle cell anemia).
- Chest radiographs, laboratory blood tests, and blood gases are not routinely indicated. Consider these only in children with persistent fever, altered fluid balance, signs of liver dysfunction, or respiratory failure.
- The following medical treatments are likely to have more side-effects than beneficial effects in children and are not routinely indicated: bronchodilators, antibiotics, antivirals, and diuretics.
- Escalate respiratory support as per the respiratory failure pathway – do not use high flow nasal cannula oxygen if the child is saturating adequately with low flow oxygen.

### Pregnant women

Pregnant women with suspected or confirmed COVID-19 should be treated with supportive therapies as described above, taking into account the physiologic adaptations of pregnancy. The use of investigational therapeutic agents outside of a research study should be guided by individual risk-benefit analysis based on potential benefit for mother and safety to foetus, with consultation from a specialist. Emergency delivery and pregnancy termination decisions are challenging and based on many factors: gestational age, maternal condition, and foetal stability. Consultations with obstetric, neonatal, infectious disease and intensive care specialists (depending on the condition of the mother) are essential.

### Lactating women

A mother with confirmed COVID-19 or who is symptomatic should take all possible precautions to avoid spreading the virus to her infant, including washing her hands before touching the infant and wearing a face mask, if possible, while breastfeeding. If expressing breast milk with a manual or electric breast pump, the mother should wash her hands before touching any pump or bottle parts and follow recommendations for proper pump cleaning after each use. If possible, consider having someone who is well to feed the expressed breast milk to the infant.

## Recognizing and managing co-morbidities in patients with COVID 19

Local experience has shown that up to 30% of patients presenting with severe disease have underlying poorly controlled comorbidities, the most common being cardiovascular disease, diabetes mellitus, HIV, hypertension, asthma and other chronic lung diseases.

It is important that comorbidities are identified early to allow appropriate management. Proper and complete history taking and physical examination is critical and should be carried out on each patient. A record of chronic medication should be indicated to avoid treatment disruptions. A multidisciplinary team should be involved in management of patients with comorbidities and early specialist consultation is encouraged.

### Considerations for individuals with diabetes mellitus

It is important to note that those patients living with diabetes who are well controlled with no significant comorbidities have a significantly lower risk of developing severe complications of COVID-19 and their risk is comparable to that of the general population. (12)

- The risk associated with COVID-19 infection is similar in individuals who have either type 1 or type 2 diabetes excluding other risk factors such as age, micro and macro vascular complications, comorbidities and glycemic control. (12)

The following individuals with diabetes are considered most vulnerable:

- Those with inadequately controlled diabetes mellitus, specifically with a HBA1c reading > 7.6% or those with recently fluctuating sugars.
- Patients more than 55 years of age.
- Patients with diabetes and concomitant comorbidities such as heart failure, hypertension, chronic obstructive pulmonary disease, chronic kidney disease, cancer and HIV who are already known to have a significant impairment in their immune function.

### Precautions with oral hypoglycemic agents

- Metformin should be withdrawn in patients with hypoxia or hypotension to avoid the risk of lactic acidosis.
- Sulfonylureas (chlorpropamide, glibenclamide, glimepiride, glyburide, glipizide) and meglitinides (repaglinide, nateglinide) should be used with caution in patients with reduced feeding to avoid risk of hypoglycemia.
- Sodium Glucose Transporter (SGLT-2) inhibitors (e.g., Dapagliflozin and Canagliflozin) should be stopped due to risk of dehydration and euglycemic ketoacidosis.

*Steroids can induce hyperglycemia even in a non-diabetic patient and steroid-induced hyperglycemia should be managed using insulin.

### Feeding

- Enteral feeding should be encouraged.
- In critically ill patients commercial enteral or parenteral feeds can increase the insulin requirements.

### Diabetic Ketoacidosis/Hyperosmolar Hyperglycemic State (DKA/HHS)

- COVID-19 infection in individuals who have either type 1 or type 2 diabetes can put them at a higher risk of developing diabetic ketoacidosis. The same treatment protocols for managing diabetic ketoacidosis are used to treat patients with diabetes who develop diabetic ketoacidosis (DKA) or Hyperosmolar hyperglycemic state (HHS) secondary to COVID-19 infection.
- Hyperglycemia without DKA/HHS
    - The management of diabetes in hospitalized patients with COVID-19 is similar to the management of other hospitalized patients with diabetes, except for the presence of often extreme, labile insulin resistance that resolves with improvement in COVID-19, and the need to minimize injection frequency in order to maximize safety for health care staff.
    - In general, the goals of treatment are the same as in other hospitalized patients (e.g., avoid severe hyperglycemia, volume depletion, electrolyte abnormalities, hypoglycemia and ensure adequate nutrition).
        - Insulin is the preferred treatment for hyperglycemia in patients hospitalized with moderate to severe COVID-19
    - A blood glucose target of 6 to 10 mmol/L is reasonable for most hospitalized patients. Many patients have severe insulin resistance and require high doses of insulin to achieve these goals.
- Patients with type 1 diabetes have an absolute requirement for insulin at all times to prevent ketosis, whether or not they are eating. For patients with type 2 diabetes, the need for insulin therapy may be temporary.
    - If possible, a basal –bolus regimen is preferred, which refers to the combination of a long-acting basal insulin (Glargine, NPH) with a rapid-acting insulin at mealtimes.
    - The clinician should watch out for hypoglycemia especially for those with reduced caloric intake and as the inflammation reduces, and the insulin dose should be adjusted accordingly.

**Table 10: Diagnostic criteria and severity of DKA/ HHS**

| | Mild DKA | Moderate DKA | Severe DKA | HHS |
|---|---|---|---|---|
| Plasma glucose (mmol/L) | >13.9 | >13.9 | >13.9 | >33.3 |
| Arterial pH | 7.25-7.30 | 7.00-7.24 | <7.00 | >7.3 |
| Serum bicarbonate (mEq/L | 15-18 | 10-<15 | <10 | >15 |
| Urinary ketones | Positive | Positive | Positive | Small |
| Mental status | Alert | Alert/ Drowsy | Stupor/ Coma | Stupor/Coma |

- Mild to moderate DKA/ HHS: Subcutaneous insulin protocols (rather than intravenous insulin infusions) are being used with increasing frequency to treat mild to moderate DKA or HHS during the COVID-19 pandemic, when intra-venous insulin may not be practical owing to the need to limit frequency of contact of staff with patients. In this setting, dosing and monitoring should be performed every two to four hours.
- Subcutaneous insulin protocols are best used in patients with mild to moderate DKA without other serious comorbidities.
- Severe DKA: Insulin infusions should be used for patients with severe DKA, acute heart failure or coronary syndrome, chronic kidney disease (CKD) stage 4 or 5 or end-stage renal disease (ESRD), acute liver failure or cirrhosis, anasarca, weight >120 kg, treatment with high-dose corticosteroids, or in women who are pregnant.
- Diabetes UK Protocol (http://www.diabetesorg.UK/resourcesCOVIDDKA-SC-v3.3pdf)
    - Initiate basal insulin (NPH, Glargine) at 0.15units/Kg and administer every 24 hours.
    - 0.4 units/Kg of soluble/regular insulin is administered every 4 hours. When RBS is less than 13.9mmol/l, reduce to 0.2units/Kg every 4hours until DKA/HHS resolves.

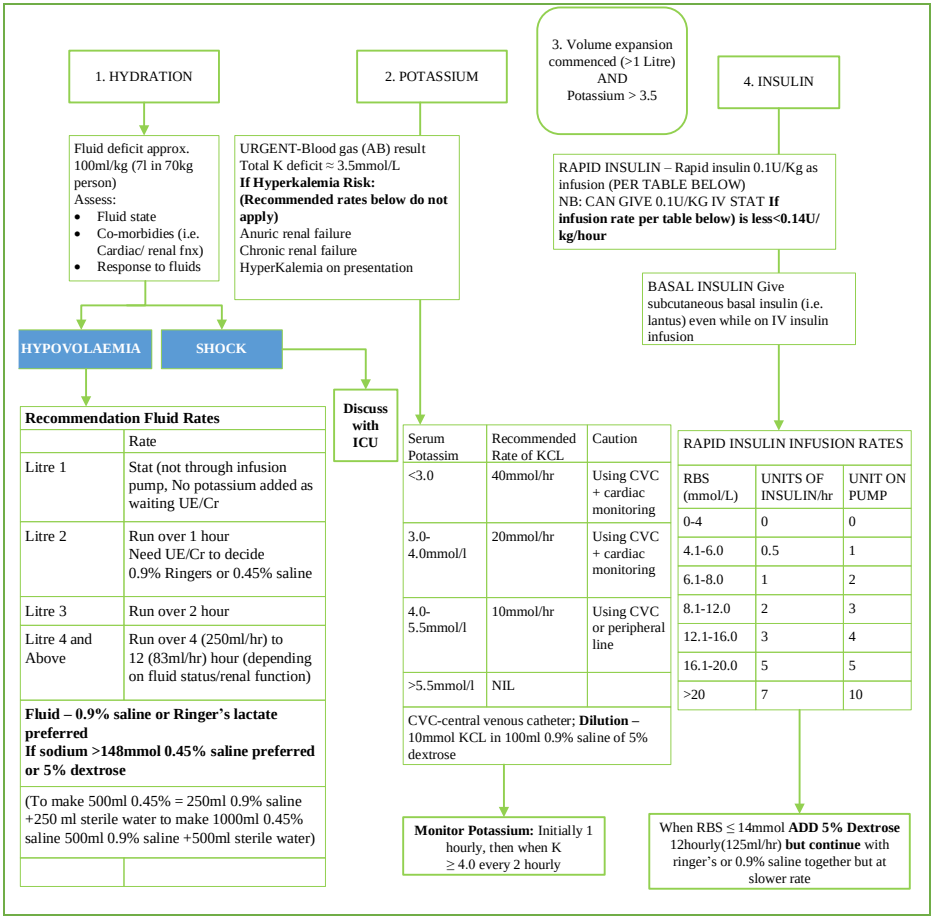


*Figure 11: Diabetic ketoacidosis treatment chart (adults)*

# Chapter 5: Guidance for ending isolation for COVID-19 patients Background

In order to stop transmission of COVID-19, and to aid public health prevention measures, it is paramount that at the time of discharge from isolation, patients are no longer transmitting infectious virus. In the context of widespread community transmission, there may be ongoing shortages of laboratory consumables and reagents that affect diagnostic capacity, as well as significant pressure on the health system. There is also an increasing need for timely discharge of stable patients from health facilities in order to maintain healthcare capacity for severe and critically ill patients.

This guidance for ending isolation for COVID-19 patients reflects information available at the time of publication and may change if more information on the incubation period, viral shedding, and infectivity of SARS-CoV-2 infection becomes available.

## Viral shedding

During the infectious course, COVID-19 viral RNA has been identified in respiratory tract specimens 1-2 days before symptom onset. Viral load persists up to eight days after symptom onset in mild cases and peaks 11 days after symptom onset in more severe cases, with detection of virus in nasopharyngeal swabs up to 37 days. In Kenya, we have had reports of patients testing positive for more than 40 days after diagnosis. RNA has been detected in stool (from day five after symptom onset and up to five weeks in moderate cases), as well as in whole blood, serum, saliva, and urine. Asymptomatic and pre-symptomatic transmission has been reported in many settings [9]. Additionally, patients with immune compromise may shed SARS-CoV-2 virus for prolonged periods. More data is still needed on viral dynamics in different patient populations and varying disease severity.

Detection of viral RNA does not necessarily mean that a person is infectious and able to transmit the virus to another person. Data suggests that viral shedding is highest prior to onset of symptoms and reduces thereafter, with most persons testing PCR negative on nasopharyngeal swabs by 21 days after onset of symptoms. Viable viruses have not been recovered in respiratory samples of patients with mild to moderate illness after 10days of symptom onset and 20 days in patients with severe illness or immunosuppressive conditions. This therefore guides the recommendation that patients can be discharged from isolation after 10 days post symptom onset for those with non-severe disease and after 20 days for those with severe disease or immune compromise.

## Recommendation for Discharge and ending Isolation for COVID-19 patients

Patients should be discharged from Covid-19 isolation when it is safe for the patient and when the likelihood of transmission of the virus to others is minimal. Patients who are stable and at low risk of disease progression can be discharged to home-based care to complete the isolation period. Stable patients who do not meet the criteria for home- based care should be discharged after they meet the criteria of ending transmission-based precautions. Patients in need of further in-patient care should meet the criteria of ending transmission-based precautions before being transferred to the general wards.

Our recommendation is to use the time-based approach for discharge from isolation for all COVID-19 patients for the following reasons:

1. Reduce long periods of isolation reducing access of patients to care
2. Insufficient testing capacity to meet the requirements for test-based discharge criteria
3. Prolonged viral shedding leading to multiple repeat positive tests, despite little risk of viable virus

**Table 11: Criteria for ending Isolation**

| | | |
|---|---|---|
| **Symptom-based** | At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications; **and**<br>Improvement of respiratory symptoms (e.g., cough, shortness of breath); **and**<br>At least 10 days have passed since the date of their first positive COVID-19 diagnostic test | Requires daily monitoring and recording of symptoms by patient. |
| **Time-based** | At least 10 days have passed since the date of their first positive COVID-19 diagnostic test, **and**<br>They have not developed symptoms since their positive test | If they develop symptoms, then symptoms cannot be used to gauge where these individuals are in the course of their illness, it is possible that the duration of viral shedding could be longer or shorter than 10 days after their first positive test. |

**There is no need for repeat testing prior to ending isolation if the above criteria have been met**

*Meeting criteria for discontinuation of Transmission-Based Precautions is not a prerequisite for hospital discharge

**Isolation should be extended to 20 days from symptom onset for those with severe disease or who are severely immunocompromised

***Isolation must be maintained at home (until the criteria above are met) if the patient returns home before discontinuation of Transmission-Based Precautions.

## Care of COVID-19 patients after acute illness

Patients with Covid-19 may remain symptomatic with new or persisting symptoms after recovery. The most common symptoms include dyspnoea, cough, fatigue, and muscle pains. Additionally, the patients may present with psychological and cognitive symptoms which include anxiety, depression, PTSD symptoms and problems with concentration, memory and continence. Patients who had severe or critical illness have a higher prevalence of symptoms when compared to patients with non-severe illness. The stages of post-covid 19 infections can be defined as follows:

- Acute COVID-19: signs and symptoms of COVID-19 for up to 4 weeks.
- Ongoing symptomatic COVID-19: signs and symptoms of COVID-19 from 4 to 12 weeks.

- Post-COVID-19 syndrome: signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis.

Time to complete recovery will depend on premorbid condition, severity of illness and the symptoms experienced by the patient during illness. Recovery time is different for everyone but for many people symptoms will resolve by 12 weeks

Patients who have had suspected or confirmed COVID-19 (of any disease severity) who have persistent, new, or changing symptoms should have access to follow-up care. Currently, there is limited information on the optimal strategies to manage persistent symptoms following recovery from acute covid-19 infection

## Management of post-COVID-19 symptoms

The goal of post-COVID-19 management is to optimize function and quality of life through provision of holistic patient-centred care and partnering with patients to identify achievable health goals.

Initial evaluation should include a detailed history of the patient's COVID-19 disease course, severity of illness, and treatments received. Past medical history should include assessment for prior conditions that could impact the severity of COVID-19 disease. Social history should include assessment of the level of material and social support and resources available to the patient, and their potential impact on the capacity of patients to access health and recuperation services.

No laboratory test can definitively distinguish post-COVID-19 conditions from other aetiologies, in part due to the heterogeneity of post-COVID-19 conditions. Clinicians should maintain a high index of suspicion for other conditions presenting with similar symptoms and Laboratory testing should be guided by the patient history, physical examination, and clinical findings

A comprehensive management plan should be developed in consultation with other specialists based on the patient's presenting symptoms, underlying medical and psychiatric conditions, personal and social situations, and treatment goals. Expectations should be set with patients and their families that outcomes from post-COVID-19 conditions differ among patients, with some patients experiencing symptom improvement within the first three months, whereas others may continue to experience prolonged symptoms.

Continue follow-up over the course of illness, with considerations of broadening the testing and management approach over time if symptoms do not improve or resolve, while remaining transparent that there is much more to learn about post-COVID-19 conditions. Manage all underlying chronic medical conditions as appropriate.

## COVID-19 and Vaccination

COVID-19 vaccination is an important public health measure, helping to decrease transmission, disease severity and death. All eligible persons should be vaccinated as per the current National COVID-19 Vaccination Guidelines and Deployment Plan. Health workers and those with comorbidities are particularly encouraged to be vaccinated.

### COVID-19 Vaccination after SARS COV-2 Infection

COVID-19 vaccination is recommended for all eligible persons including those who have previously been infected or tested positive for SARS-COV-2 infection. Eligible patients with active COVID-19 infection should be vaccinated after recovery from acute illness, that is, at least 2 weeks after. Having prolonged COVID-19 symptoms is not a contraindication to receiving the COVID-19 vaccine.

The ability of emerging virus variants to evade immune responses is however still under investigation.

### COVID-19 Vaccine Safety

COVID-19 vaccines have been found to be safe, though they may cause side-effects, most of which are minor. Adverse Events Following Immunization (AEFIs) include any untoward medical occurrence following vaccination, and may not necessarily have a causal relationship with the usage of the vaccine. Common side-effects include tenderness at the injection site with redness, swelling, itching or warmth, fever, fatigue, headache, myalgia, general body malaise, arthralgia and nausea (16). Most of these are self-limiting and may be managed supportively. Use of paracetamol does not affect the immune response to the vac-cine.

Look out for rare but severe adverse events following immunization such as anaphylaxis, high fever and thrombosis with thrombocytopenic syndrome (17). Appropriate consultations should be made in the management of these conditions.

AEFIs should be managed according to the current National guidelines for monitoring, reporting and managing adverse events following immunization (18) and Guidelines for safety and Vigilance of medical products and Health technologies (19). All AEFIS should be reported to the Pharmacy and Poisons Board via https://pv.pharmacyboardkenya.org/

### SARS-COV-2 Infection After Vaccination

It takes about 2 weeks to mount an adequate immune response after full vaccination, though there is some protection gained after the first dose. Full vaccination is recommended in order to get maximum protection against severe disease and death. While it remains possible for one to be infected with SARS-COV-2 after vaccination, most COVID-19 vaccines have been shown to be highly effective in protecting against severe disease and death.

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# Chapter 6: Management Of COVID-19 And Pregnancy

## Introduction

Pregnancy is a risk factor for poor outcome for the women who get COVID-19 infection. The physiological changes and altered immunity in pregnancy increases morbidity and mortality. The altered pulmonary physiology during pregnancy worsens COVID-19 associated pneumonia. Presentation, symptoms, COVID-19 severity categorization (table 2a), case definition, contact definition, diagnostics and infection prevention, and control measures are like in the non-pregnant state. **COVID-19 vaccination is safe in the pre-conception, conception, pregnancy, and lactation periods.**

The true prevalence of COVID-19 infection in pregnancy in Kenya is not known fully established, but a Kenyan study carried out during the peak wave in July 2021 showed a prevalence of 16 % among pregnant women admitted to Kenyatta National Hospital. Delayed case identification remains a challenge in our setting(1). Poor predictors of maternal outcome in pregnancy includes advanced maternal age ≥ 35 years, high body mass index (BMI) ≥25, hypertensive disorders, diabetes mellitus, being a health worker and low socio-economic status (2)**.** Box 1 summarizes some conditions that can result in higher severity of COVID-19 disease in adults of any age.

**Box 1: Conditions that can result in higher severity of COVID-19 disease in adults of any age**

- Diabetes Mellitus (Type 1 or 2)
- Heart conditions (such as heart failure, coronary artery disease, cardiomyopathies, or hypertension)
- Overweight and Obesity
- Smoking
- Cancer
- Chronic Kidney Disease
- Chronic lung diseases, including COPD (chronic obstructive pulmonary disease), asthma (moderate-to-severe), interstitial lung disease, cystic fibrosis, and pulmonary hypertension
- HIV Infection
- Immune Suppression
- Liver Disease
- Pregnancy
- Sickle cell disease
- Solid organ or blood stem cell transplant
- Cerebrovascular disease
- Substance use disorders

This section of the guidance will cover:

- Pre-conception and conception
- Pregnancy
- Management of COVID-19 in pregnancy
- Vaccination

### Pre- conception and conception care

Preconception care is a set of environmental biomedical, behavioral, and social health interventions before conception that promote the health and well-being of women and couples for better pregnancy outcomes. It is a critical and first step in the pregnancy continuum of care. COVID-19 management in the preconception period is similar to the case management in adults. Pre-conception care principles are summarized in table 12a.

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**Table 12a: Outline of preconception care principles**

| Table 12a: Outline of preconception care principles | |
|---|---|
| **COVID-19 specific principles** | **Other principles- remain the same** |
| • Universal COVID-19 precautions for prevention and management<br>• COVID-19 vaccination | • Reproductive health plan i.e., do not delay pregnancy<br>• Risk assessment, health promotion, education, and therapeutic interventions<br>• Contraception as indicated<br>• Nutrition<br>• Folic acid (up to 1000ug) and other supplementation<br>• Optimization of medical conditions e.g., diabetes, hypertension<br>• Social and mental health wellbeing<br>• Screening for cancers e.g., cervical cancer, breast cancer<br>• Vaccination for human papilloma virus (HPV) |

Pregnancy related risks associated with COVID-19 are not higher than risk associated with other conditions or exposures that are common among pregnant women. These risks can be reasonably minimized or mitigated by standard preventive measures and vaccination. Currently available vaccines for prevention of COVID-19 are not known to affect fertility or cause congenital abnormality in the fetus. Pregnancy testing is not a requirement prior to receiving any approved COVID-19 vaccine, and it is not necessary to delay pregnancy after vaccination. COVID-19 vaccines are not an established cause of pregnancy loss.

### Pregnancy

Pregnancy is a physiological state that predisposes women to viral respiratory infections including SARS-CoV-2. Physiological changes such as the immune and cardiovascular system enhance vulnerability for severe illness in pregnancy (3-5). Preterm birth is an untoward observed outcome in patients with COVID-19 infection which may be spontaneous, or provider initiated depending on maternal condition (6).

Pregnancy does not increase susceptibility to SARS-COV-2 infection but appears to worsen the clinical course of COVID-19. Symptomatic pregnant patients appear to be at an increased risk of severe disease and death compared with symptomatic non-pregnant counterparts (5, 7, 8). Risk factors for severe disease and

death in pregnancy include advanced mean age of ≥35 years, BMI≥ 25, being in the third trimester > 28 weeks and preexisting medical co-morbidities such as hypertension and diabetes or more than one comorbidity. Other major concerns in pregnancy are the increased oxygen requirements by the pregnant woman, risks associated with treatment of COVID-19 in pregnancy, and lack of evidence specific to pregnancy due to the exclusion of pregnant women from drugs and vaccination trials.

Congenital COVID-19 and pregnancy remains unclear with few documented cases of congenital infections (8, 9). The diagnosis of congenital SARS-CoV-2 is by polymerase chain reaction of umbilical cord blood or neonatal blood collected within the first 12 hours of birth, or amniotic fluid collected prior to rupture of membranes. Most placenta studied so far have shown changes at the level of the syncytiotrophoblast but with no evidence of SARS-CoV-2 infection. In the immediate postpartum period transmission can occur to the newborn from an infected mother/caregiver when precautions are not taken.

**Table 12b: Summary of complications of COVID-19 in pregnancy**

| **Table 12b: Summary of complications of COVID-19 in pregnancy** | |
|---|---|
| **Complications to the mother** | **Complications to the fetus and neonate** |
| • Preterm Labor<br>• Respiratory disorders such as pneumonia, respiratory failure, ARDS<br>• Cardiac disorders such as arrhythmias, acute cardiac injury<br>• Thromboembolic complications<br>• Thrombocytopenia<br>• *Secondary infections<br>• Acute kidney injury/failure<br>• Neurologic disorders such as headache, dizziness, myalgia, alteration of level of consciousness, disorders of smell and taste, weakness, strokes, seizures<br>• Gastrointestinal and liver disorders<br>• Mental health illness<br>• Increased risk of pre-eclampsia/eclampsia ± HELLP syndrome<br>• Maternal mortality | • Preterm birth<br>• Fetal growth restriction<br>• Perinatal morbidity and mortality<br>• *Secondary infections |
| ***Secondary infections are rare in COVID 19*** | |

### Management of COVID-19 in pregnancy

Triage and testing of pregnant women should follow the national case management guidelines (figure 4 and figure 5)

This section will cover:

1. Principles of management of COVID-19 and pregnancy
2. Ambulatory antenatal care management
3. Assessment of women in obstetric triage
4. Criteria for admission of patient
5. Intrapartum care
6. Management of the critically ill patient
7. Postpartum management
8. Care cascade of COVID 19 and pregnancy
9. Recommendation on vaccination program with COVID 19 pandemic

### Principles of management of COVID-19 and pregnancy

This takes a multidisciplinary team approach. Management follows the national case management algorithm for the adult patient with COVID-19 (figure 6a). Table 12c, outlines obstetric management as per COVID-19 severity categorization (4).

**Table 12c: Obstetric management as per COVID-19 severity categorization**

| COVID-19 Severity categorization | Obstetric management |
|---|---|
| Mild illness | • Routine obstetric care<br>• Consider discharge home unless other medical or obstetrical concern<br>• Follow COVID-19 management in Figure 6a |
| Moderate illness | • *Admit to the ward<br>• Fetal surveillance<br>• Follow COVID-19 management in Figure 6a |
| Severe illness | • *Admit to the ward<br>• Fetal surveillance<br>• Follow COVID-19 management in Figure 6a<br>• Consider delivery if it is felt that the pregnancy is compromising maternal care |
| Critical illness | • Admit to critical care unit<br>• Fetal surveillance<br>• Follow COVID-19 management in Figure 6a<br>• Consider delivery if it is felt that the pregnancy is compromising maternal care |
| **** A facility with Emergency Obstetric and Neonatal Care (EmNOC)*** | |

### Ambulatory antenatal care management

The principles of ambulatory antenatal care are:

- Follow standard antenatal care protocols for the number of visits
- Universal infection prevention and control measures
- Testing suspected cases for COVID-19
- Triage sick patients with obstetric complications or with co-morbidities, take precautionary measures and isolate where applicable
- Ask about mental health and intimate partner violence at each visit
- Discuss on safety networking i.e., social support, transport etc.
- Use of telehealth can be considered
- Timely decision to admit

Figure 12a shows the ambulatory antenatal care management algorithm (4).

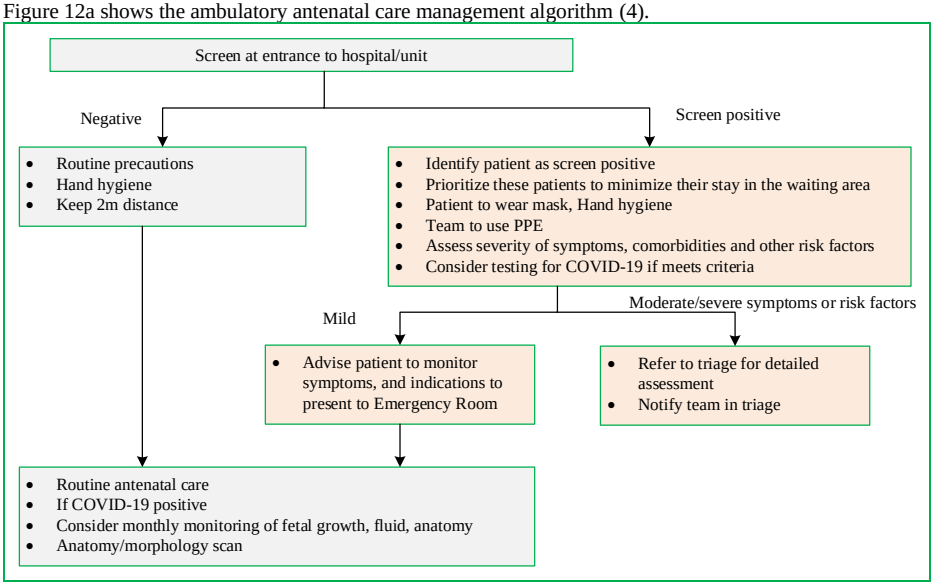


*Figure 12a: Ambulatory antenatal care management algorithm*

***Adapted from Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals***

### Assessment of women in obstetric triage

Triage, testing and severity categorization in the pregnant woman should follow the national case management guidelines (figure 4, figure 5 and table 2a) in addition to fetal surveillance appropriate for gestational age.

### Criteria for admission of patient

Assess the criteria for admission by monitoring of the vital signs and use the maternal early obstetrical warning score (MEOWS) chart for timely decision to escalate care (figure 12b)(10).

**MEOWS: Maternal Early Obstetrical Warning Score**

| Physiological rate | Normal Values | Yellow alert | Red Alert | |
|---|---|---|---|---|
| Oxygen saturation | 10-20 breaths per minute | 21-30 breaths per minute | <10 or >30 breaths per minute | **2 yellow or 1 red alert Triggers MD evaluation** |
| Temperature | 96-100% | | <95% | |
| Systolic blood pressure | 36.0 or 37.4°C | 35-36 or 37.5 - 38°C | <35 or > 38°C | |
| Diastolic blood pressure | 100-139 mmHg | 150 - 180 or 90 - 100 mmHg | > 180 or < 90 mmHg | |
| Heart rate | 50-99 beats per minute | 100-120 or 40-50 beats per minute | >120 or < 40 beats per minute | |
| Neurological response | Alert | Voice | Unresponsive, pain | |

*Figure 12b: Criteria for admission*

***Adapted from S. Nair, L. Dockrell, Siaghal Mac Colgain (2018). Maternal Early Warning Scores (MEWS)***

### Intrapartum care

The general considerations of intrapartum care are:

- Universal infection prevention precautions
- Categorize the status of the mother based on COVID-19 severity categorization
- Gestational age and considerations for corticosteroid use for lung maturity and magnesium sulphate (MgSo4) for neuroprotection
- Fetal status should be monitored using available modalities, preferably continuous cardiotocography (CTG) if available
- Look out and manage obstetric complications
- Look out and manage comorbidities such as diabetes and hypertension
- Decide on time and mode of delivery: note that, COVID 19 alone is not an absolute indication for delivery, other factors must be considered to arrive at the decision
- Pain management
- Encourage a birth companion if feasible

COVID-19 infection is NOT a direct indication for delivery. Decision to deliver is individualized and based on maternal status, fetal status and gestational age. Table 12d gives the guiding principles for delivery in relation to the gestational age and maternal status.

**Table 12d: Guiding principles for delivery**

| Gestational age | Maternal status | Principles that will guide management |
|---|---|---|
| < 28 weeks | Assess if the mother can maintain adequate oxygen saturations with *oxygen support | • Corticosteroid use for lung maturity and MgSo4 for neuroprotection<br>• At this gestation the newborn will be premature and access to NICU important. Consider in utero transfer<br>• Increased risk of intrauterine fetal death (IUFD) if not delivered in a timely manner |
| < 28 weeks | The mother CANNOT maintain adequate oxygen saturations with *oxygen support | • Consider delivery to improve ventilation status<br>• **Corticosteroid use for lung maturity and MgSo4 for neuroprotection<br>• At this gestation the newborn will be premature and access to neonatal intensive care unit (NICU) is important |
| > 28 weeks | The mother can maintain adequate oxygen saturations with *oxygen support | • Consider delivery if signs of non-reassuring fetal status<br>• Corticosteroid use for lung maturity and MgSo4 for neuroprotection where applicable |
| > 28 weeks | The mother CANNOT maintain adequate oxygen saturations with *oxygen support | • Consider delivery to manage maternal ventilation ***<br>• Corticosteroid use for lung maturity and MgSo4 for neuroprotection where applicable |
| *The oxygen support format will depend on the patient status and using the available type in the facility. (Mechanical ventilation, intubation, non-rebreather mask, helmet, nasal prongs)<br><br>** If delivery < 34 weeks gestation give MgSO4 4g IV bolus before delivery, over 1 hour to limit maternal respiratory depression<br><br>***NOT to improve maternal disease process, not to alter fetal/neonatal outcome, but to facilitate the ventilation | | |

Induction of labor for patients with COVID-19 is recommended unless there is a contraindication, a caesarean delivery may represent the most pragmatic option. Currently there is no evidence that the route of delivery adversely influences the maternal prognosis.

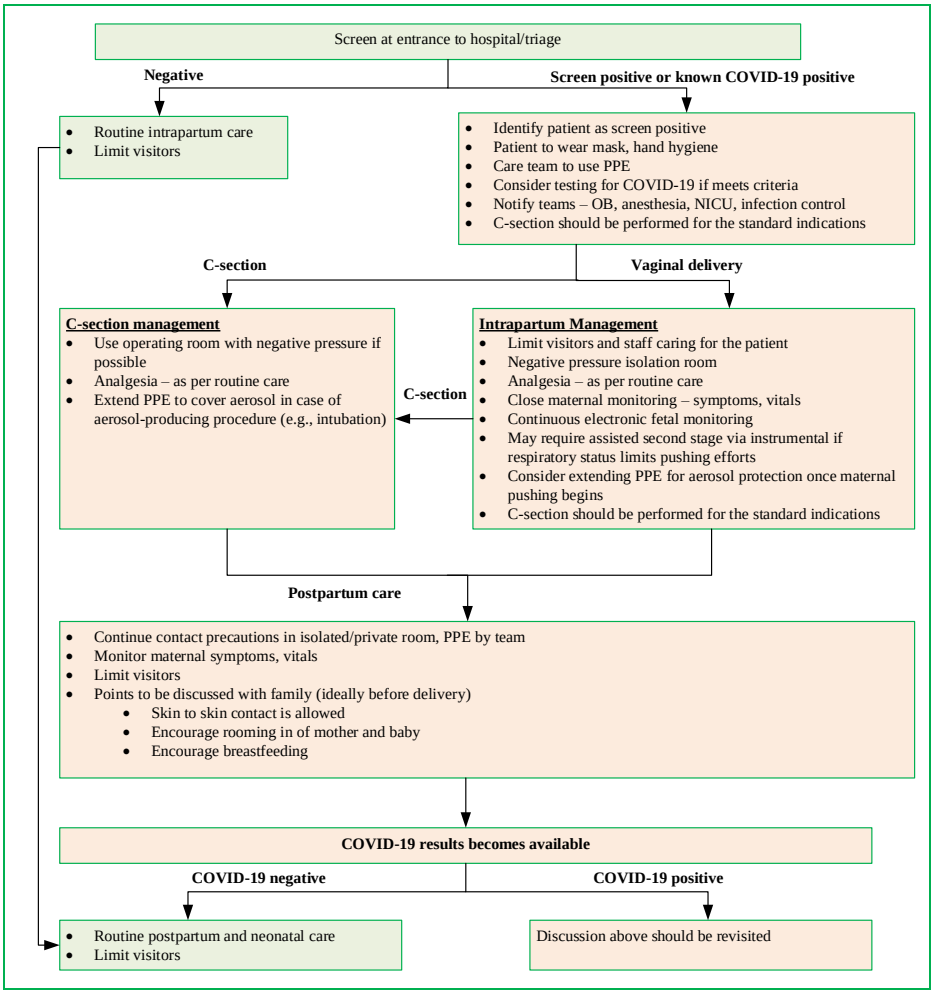


*Figure 12c: Summary of intrapartum and postpartum management*

***Adapted from Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals***

### Management of the critically ill patient

About 13% of pregnant patients who have COVID-19 progress to severe disease, with 4% requiring ICU admission. Figure 6 shows criteria for severe and critical COVID-19 disease. Both maternal and fetal status must be simultaneously considered. Timing the delivery in a critically ill COVID-19 pregnant patient presents a big challenge and a common cause of preterm birth. Pregnancy increases the risk for mechanical ventilation or extracorporeal membrane oxygenation (ECMO) where available. Anecdotal preliminary data suggest that preterm delivery is 15-29% among patients with COVID-19 and caesarean delivery is as high as 38-89%. The neonatal outcomes depend on the gestation at delivery with ≥32 week's gestation having more favorable outcomes. There is also a higher rate of intrauterine fetal demise. A multidisciplinary team approach must be constituted, and frequent family conferences must form part of the management for these patients.

**The criterion for maternal refractory hypoxemia is as follows:**

- A partial pressure of O2 (PaO2) of <60 mm Hg while receiving a fraction of inspired O2 (FIO2) of 1.0
- On a clinical basis, this definition can be expanded to include:
  - Severe hypoxemia (PaO2 to FIO2 ratio of <150) unresponsive to incremental increases in positive end expiratory pressure (PEEP)
  - Recruitment of lung volumes
  - Prone positioning
  - Deep sedation in ventilated patient
- Advanced therapies such as pulmonary vasodilator medications or veno-venous (V-V) ECMO, are often considered in these situations, however
  - Complications of hemorrhage requiring transfusion (57%−67%) and infection (58%) are frequent with ECMO, and
  - The recommendation of continuous anticoagulation therapy introduces hemorrhage as possible complication if an emergency delivery is required

**Prone position in a pregnant woman**

Adapted from: Tolcher MC, McKinney JR, Eppes CS, Muigai D, Shamshirsaz A, Guntupalli KK, et al. Prone positioning for pregnant

women with hypoxemia due to Coronavirus Disease 2019 (COVID-19). Obstet Gynecol 2020;136

**Parameters that necessitate urgent delivery of critically ill COVID-19 pregnant patient are:**

- Admission to the ICU for COVID-19 pneumonia does not constitute an intrinsic indication for delivery. Delivery is indicated if there is:
  - Refractory maternal hypoxemia
  - Non- reassuring fetal status
- If non-reassuring fetal status:
  - Antenatal corticosteroids for <34 weeks before delivery if the patient stabilizes with escalated O2 therapy
  - If maternal oxygenation does not improve (<94%) with escalating oxygen support, expedient delivery irrespective of gestational age
- Method of delivery is individualized based on the maternal clinical status, fetal condition, and obstetrical history

**Method of delivery in critically ill patient**

Successful induction of labor for mechanically ventilated patients with COVID-19 has been described. However, non -reassuring fetal status has been reported intrapartum in 34% of cases during induction of labor.

- A cesarean delivery may therefor represent the most pragmatic option
- Avoid pressures and manipulations which will irritate the diaphragm
- Currently there is no evidence that the route of delivery adversely influences the maternal prognosis

**Possible anesthetic complications**

- Aerosol spread of virus in the delivery/operating room during emergency endotracheal intubation can be minimized by Use of anesthetic hood. Intubation can be avoided by early insertion of an epidural catheter for labor and delivery. The epidural catheter can be used for spinal anesthesia if indicated
- Difficult endotracheal intubation due to COVID-19-induced laryngeal edema can lead to maternal and fetal hypoxia
- Iatrogenic pneumothorax and/or surgical emphysema due to pulmonary barotrauma from high PEEP to optimize maternal oxygenation can lead to ARDS
- Complications of spinal and epidural anesthesia such as total or high spinal can result in severe hypotension, convulsions, unconsciousness, respiratory and/or cardiac arrest

**Recommendations at the time of ICU admission**

- Retain the multidisciplinary approach
- Conduct regular debrief to patients extended family
- Provide prophylactic anticoagulation
- Undertake obstetric ultrasound and manage the patient in a critical care unit

**Management of the fetus by gestation**

***Pre- viable < 24 weeks' gestation***

- Perform interval auscultation of the fetal heart rate
- Delivery at these pre-viable gestational ages would only be indicated in the event of maternal cardiopulmonary arrest at a gestational age of ≥20 weeks (resuscitative cesarean delivery)
- The relatives should be involved and must be fully aware of the indications and the fetal outcomes

***24 To <34 weeks' gestation***

- Antenatal corticosteroids
- Daily fetal assessments in the setting of a stable maternal clinical status and oxygen requirement
- Convert to continuous fetal monitoring if the maternal condition becomes unstable
- Consent for caesarian delivery if need be
- Multidisciplinary team approach
- Family conferences
- Delivery if: non-reassuring fetal status in the setting of refractory hypoxemia despite optimization of all aspects of conventional and/or advanced therapies
    - Interventions to improve fetal status may be attempted briefly
- If a decision to deliver is made:
    - Discontinue anticoagulation therapy 12 to 24 hours in advance
    - Can give magnesium sulfate for fetal neuro-prophylaxis in selected patients

***34 weeks' gestation to term***

- Daily fetal assessments in the setting of a stable maternal clinical status and oxygen requirement
- Convert to continuous fetal monitoring if the maternal condition becomes unstable
- Consent for caesarian delivery if need be
- Multidisciplinary team
- Family conferences
- Delivery should be considered for any sustained deterioration in the maternal pulmonary status
- If a decision to deliver is made:
    - Discontinue anticoagulation therapy 12 to 24 hours in advance

**Multisystem inflammatory syndrome in adults**

Multisystem Inflammatory Syndrome in Adults (MIS-A) is a recently emerging condition that occurs as a delayed complication of COVID-19 infection. It involves inflammation of multiple extra-pulmonary organ systems noted to present after 2-5 weeks of an acute COVID-19 infection. It affects the hematological, cardiac, gastrointestinal tract, dermatological or the central nervous system. Suggested mechanisms of injury include direct virus-mediated cytotoxic effects; dysregulation of the renin-angiotensin-aldosterone system resulting from downregulation of angiotensin-converting enzyme 2 and causing viral-induced inflammation; endothelial damage and thrombo-inflammation; and dysregulation of the immune response with hyperinflammation caused by inhibition of interferon, depletion of T lymphocytes, and production of proinflammatory cytokines. Treatment includes anticoagulants, corticosteroids, immunoglobulins, and immune modulators to reduce related morbidity/ mortality (11, 12).

**Postpartum management**

- Post-partum mothers can deteriorate after delivery
- Monitor the vital signs including oxygen saturation closely
- Skin to skin contact is allowed with infection prevention precautionary measures
- Except in a critically ill patient breastfeeding is allowed as per guidelines with infection prevention precautionary measures. In a critically ill patient, there is possibility of viral shedding in breastmilk and fear of aerosol spread
- Provide other targeted postpartum care such as: sanitation and hygiene, wound care, contraception and immunization services
- Psychosocial support to the mother and extended family
- Neonatal care is shown figure 12d

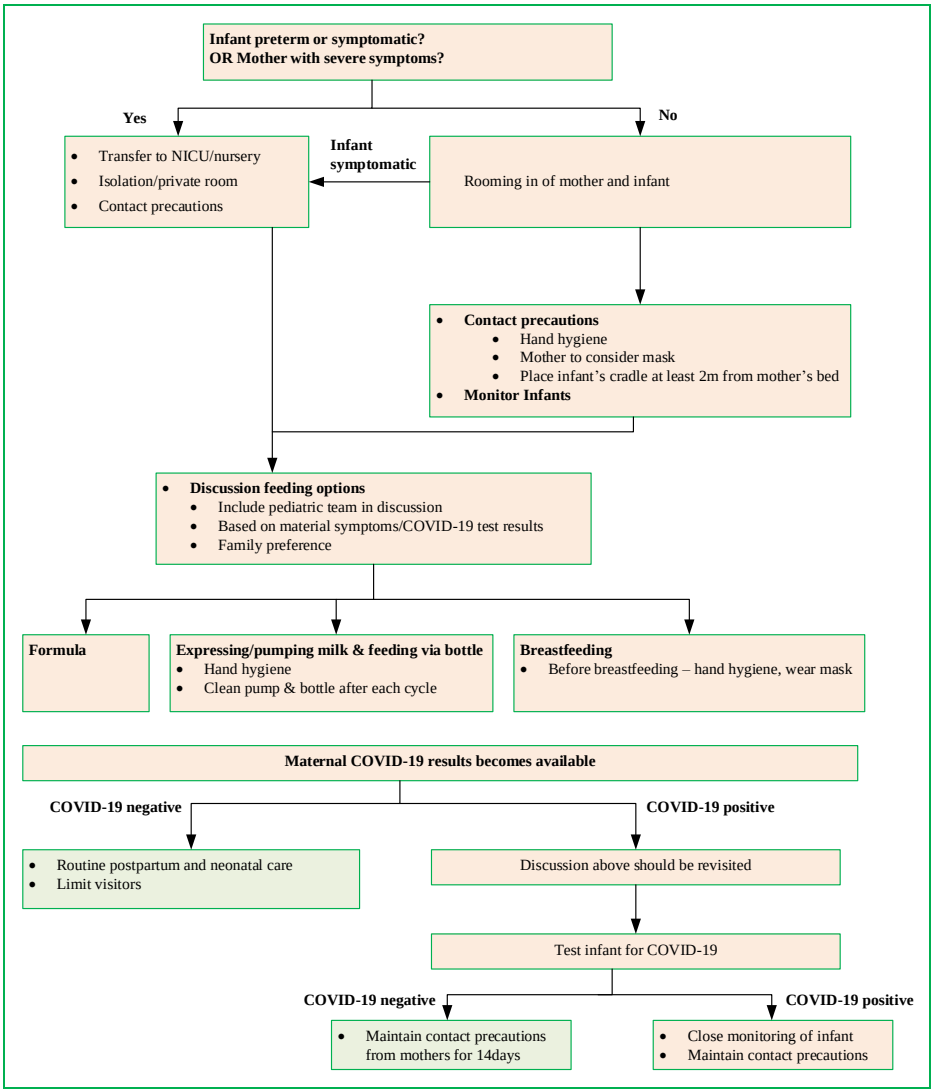


*Figure 12d: Neonatal care in women suspected or confirmed with COVID-19*

***Adapted from Global interim guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium from FIGO and allied partners: Information for healthcare professionals***

### Vaccination in patients with COVID 19 and pregnancy throughout the continuum of care

Pregnant women are usually excluded from drug clinical trials for ethical reasons relating to possible adverse effects on mother and the unborn fetus. Current evidence in non -pregnant population and from observational studies in pregnant women, show that vaccination in pregnancy is safe and recommended (12).

Vaccination and universal precautionary measures have reduced the risk of contracting COVID-19 in pregnancy. There is low information, access, and coverage of COVID-19 vaccination in pregnant women. There is a high vaccine hesitancy among pregnant women, yet they are the ones who have a high risk for severe/critical disease and death particularly in the third trimester. The perpetuation of vaccine hesitancy is aggravated by a cycle of exclusion. Other factors for vaccine hesitancy in this group include cultural beliefs, peer pressure, and innate effects of the vaccination (13).

There are various types of vaccination available:

- Non replicating viral vector vaccines
    - Oxford AstraZeneca
    - Janssen Johnson & Johnson
    - Sputnik V
- mRNA vaccines
    - Pfizer BioNTech mRNA
    - Moderna mRNA
- Inactive whole virus vaccines
    - CoronaVac Sinovac
    - Sinopharm
- Protein Subunit vaccines
    - Novavax

The Non replicating viral vector vaccines and mRNA are safe in pregnancy (14-16). The Kenya National Immunization Technical Advisory Group (KENITAG) on the use of COVID-19 vaccines recommends the following:

- **Vaccines to be used in pregnancy and lactation:** mRNA (Pfizer & Moderna) with the dosing schedule as recommended in the general population. However, as more evidence becomes available on other COVID - 19 vaccines, KENITAG will review accordingly

- **Vaccine schedule:** the vaccines can safely be administered at any gestational age and should be given at first ANC clinic or first contact with health services

- **Vaccine co–administration:** the vaccines can be safely administered with tetanus vaccines given during pregnancy

**SARS-COV-2 Infection after Vaccination**

It takes about 2 weeks to mount an adequate immune response after full vaccination, though there is some protection gained after the first dose. Full vaccination is recommended for maximum protection against severe disease and death. While it remains possible for one to be infected with SARS-COV-2 after vaccination, most COVID-19 vaccines have been shown to be highly effective in protecting against severe disease and death.

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# Annex

## List of related guidelines

| | Essential Health Service/ Area | Guidelines Available | Link on MOH Website |
|---|---|---|---|
| 1 | **COVID 19** | Case Management for COVID-19 | https://www.health.go.ke/wp-content/uploads/2020/06/Updated-Case-Management-Guidelines-26_03_20-1.pdf |
| | | Infection Prevention and Control | https://www.health.go.ke/wp-content/uploads/2020/04/Kenya-IPC_Considerations_For-Health-Care-Settings-1.pdf |
| | | Home Based Care guidelines<br><br>Addendum to the Home-based isolation and care-Paediatrics | https://www.health.go.ke/wp-content/uploads/2020/06/Home-Based-Isolation.pdf<br>Final-Adendum-of-Pediatrics-guide-on-HBIC-1.pdf (health.go.ke) |
| | | Home and Residential Communities | https://www.health.go.ke/wp-content/uploads/2020/04/Homes-and-residential-communities.pdf |
| | | Gated Communities | https://www.health.go.ke/wp-content/uploads/2020/03/Coronavirus_Gated_Community_Response.pdf.pdf |
| 2 | **Kenyan Guidance on Continuity of Essential Health Services** | Kenyan Guidance on Continuity of Essential Health Services | https://www.health.go.ke/wp-content/uploads/2020/05/KENYAN-GUIDANCE-ON-CONTINUITY-OF-ESSENTIAL-HEALTH-SERVICES-DURING-THE-COVID-OUTBREAK-20MAY-2020-complete.docx.pdf |
| 3 | **RMNH guidance** | Kenya COVID-19 RMNH guidance | https://www.health.go.ke/wp-content/uploads/2020/04/KENYA-COVID19-RMNH.pdf.pdf.pdf |
| 4 | **Nutrition** | Final guidance for nutrition management during COVID-19 | https://www.health.go.ke/wp-content/uploads/2020/03/FINAL-GUIDANCE-FOR-COVID-19-NUTRITION-MANAGEMENT.pdf |
| | | Nutrition management for the population | https://www.health.go.ke/wp-content/uploads/2020/03/FINAL- |

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| | | | NUTRITION-MESSAGES-FOR-THE-POPULATION.pdf |
| 5 | **Child Health Services** | Kenya Pediatric COVID-19 Guidance | https://www.health.go.ke/wp-content/uploads/2020/06/PAEDIATRIC-Covid-Guidelines-Final.pdf |
| 6 | **Community Health Service** | Kenyan guidance on continuity of Community Health Services during the COVID-19 pandemic | https://www.health.go.ke/wp-content/uploads/2020/06/Kenya-Guidelines-on-Continuity-of-Community-Health-Services-in-the-Context-of-COVID-19-Signed.pdf |
| | | Community Health Response Minimum Standards | https://www.health.go.ke/wp-content/uploads/2020/04/Covid-19-Community-Health-Response-Minimum-Standards.docx.pdf |
| | | Utilizing the Community Health Strategy to respond to COVID-19 | https://www.health.go.ke/wp-content/uploads/2020/04/Community-Response-to-COVID-2019_1.docx.pdf |
| 9 | **Pathology** | Targeted testing strategies for Coronavirus Disease 2019 in Kenya<br>Interim guidelines on handling of human re-mains infected with covid- 19 in Kenya | Targeted-Testing-Strategy-for-COVID-19-in-Kenya.pdf<br>https://www.health.go.ke/wp-content/uploads/2020/06/Interim-Guidance-on-Handling-of-Human-Remains-Infected-with-COVID-19.pdf |
| 10 | **HRH** | Human Resource for Health Protocol | https://www.health.go.ke/wp-content/uploads/2020/06/PROTOCOL-HRH-for-COVID_Draft-with-digital-signature.pdf |
| 11 | **Mental Health and Psychosocial services** | SOPs for Psychologists and Counsellors during the COVID-19 Pandemic<br>Comprehensive guide for mental and psychosocial support during the COVID-19 pandemic | SOPs-for-Counsellors-and-Psychologists-in-the-MHPSS-for-COVID-19-Response-1.pdf-1.pdf (health.go.ke)<br>GUIDE ON MENTAL HEALTH AND PSYCHOSOCIAL SUPPORT DURING THE COVID-19 PANDEMIC.cdr |

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