

# **Handbook: Control & Management Protocol for COVID – 19**

**Chitwan Medical College**

**Bharatpur – 10, Chitwan  
Nepal**

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## Acknowledgment

To prepare ourselves to combat with the spread of pandemic of Corona virus, this '**Handbook on Control and Management Protocol for COVID – 19**' has been prepared from the limited resources and evidences available till date.

This handbook covers the different aspects on dealing with COVID -19 suspected and confirmed cases. It mainly focuses on screening and testing, assessment of severity, management of cases including critically ill COVID -19 patients. Nursing management, use of PPE, environmental decontamination and waste management protocols are also included.

Thanks to all those who have contributed to this handbook with special gratitude to **Dr. Dipen Kalaria and Dr. Amik Sodhi** from Division of Pulmonary and Critical Care, University of Tennessee, USA. A deep sense of appreciation to **Prof. Dr. Harish Chandra Neupane**, Chairman and Managing Director, Chitwan Medical College.

We hope, together we can face this pandemic successfully. Sharing resources, experiences and lessons learnt are important weapons in this situation.

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## **Brief Introduction**

**Coronavirus disease 2019 (COVID-19)**, declared as a pandemic and public health emergency of international concern by WHO was first detected in Wuhan, China, in December 2019. Until now (4/5/2020; 2:00 PM) only nine cases have been detected as positive in Nepal with zero mortality.

### **Biology of SARS-CoV-2**

- SARS-CoV-2 is a single stranded RNA enveloped virus
- Spread-
  - Respiratory droplet and fomites
  - Can be transmitted by even asymptomatic individuals
- Binds to the ACE2 receptors on type II pneumocytes

**Incubation time:** 3-12 days with 20 days of shedding by infected patient

**Period of infectivity:** uncertain, but viral RNA levels from upper respiratory specimens appear to be higher soon after symptom onset compared with later in the illness. The duration of viral shedding is also variable though might depends on severity of illness.

## **Part 1: Prevention and Control Management**

### **I. Isolation Area Management**

#### **Fever Clinic**

##### **1.1 Layout**

- There is a relatively independent fever clinic including an exclusive one-way passage at the entrance of the hospital with a visible sign.
- The movement of people should follow the principle of “three zones” (triage): a contaminated zone, a potentially contaminated zone and a clean zone provided and clearly demarcated.
- Appropriate procedures are standardized for medical personnel to put on and take of their protective equipment.
- Infection prevention and control technicians are assigned to supervise the medical personnel on putting on and removing protective equipment to prevent contamination;
- All items in the contaminated zone that have not been disinfected should not be removed.

## **1.2 Zone Arrangement**

- An independent examination room, a laboratory, a room with portable X-ray, an observation room, and a resuscitation room are set up.
- Separate diagnosis and treatment zones: those patients with an epidemiological history and fever and/or respiratory symptoms should be guided into a suspected COVID-19 patient zone; those patients with regular fever but no clear epidemiological history should be guided into a regular fever patient zone.

### **Triage**

- Give suspected patient a triple layer surgical mask and direct patient to separate area, an isolation room if available.
- Keep at least 1-meter distance between suspected patients.
- Instruct all patients to cover nose and mouth during coughing or sneezing with tissue or flexed elbow.
- Perform hand hygiene principle strictly

## **1.3 Patient Management**

- Patients with fevers must wear medical surgical masks;
- Only patients are allowed to enter the waiting area in order to avoid overcrowding;
- The duration of the patient's visit shall be minimized so as to avoid cross infections;
- Educate patients and their families about early identification of symptoms and essential preventive actions.

## **1.4 Moving and transferring patients**

### **Moving patients within the same hospital**

- The movement and transport of patients from their single room/cohort area should be limited to essential purposes only. Staff at the receiving destination must be informed that the patient has possible or confirmed COVID-19
- If transport/movement is necessary, consider offering the patient a surgical face mask to be worn during transportation, to minimise the dispersal of respiratory droplets when this can be tolerated and providing this does not compromise clinical care

- Patients must be taken straight to and returned from clinical departments and must not wait in communal areas
- If possible, patients should be placed at the end of clinical lists

### **Transfer from primary care/community settings**

- If transfer from a primary care facility or community setting to hospital is required, the ambulance service should be informed of the infectious status of the patient
- Staff of the receiving ward/department should be notified in advance of any transfer and must be informed that the patient has possible or confirmed COVID-19

### **Moving patients between different hospitals**

- Patient transfer from one healthcare facility may be undertaken if medically necessary for specialist care arising out of complications or concurrent medical events (for example, cardiac angioplasty and renal dialysis).
- If transfer is essential, the ambulance service and receiving hospital must be advised in advance of the infectious status of the patient.

## **Part 2: Screening and Exclusion**

- All healthcare workers should fully understand the epidemiological and clinical features of COVID-19 and screen patients in accordance with the screening criteria.

- **Criteria for Screening**

The possibility of COVID-19 should be considered in patients

- i. with new onset fever and/or respiratory tract symptoms (eg, cough, dyspnea etc.)
- ii. with severe lower respiratory tract illness without any clear cause.
- iii. who resides in or has traveled within the prior 14 days to a location where there is community transmission of COVID-19.
- iv. has had close contact (see below) with a confirmed or suspected case of COVID-19 in the prior 14 days, including through work in health care settings.

### **Operational Definition of “Close Contact”**

- Health care associated exposure-providing direct care for COVID – 19 patients, working with health care workers infected with COVID – 19,
- Visiting patients or staying in the same close environment of a COVID - 19 patients;

- Working together in close proximity or sharing the same classroom environment with a COVID - 19 patient.
- Travelling together with COVID - 19 patients in any kind of conveyance.
- Family member living in the same household with COVID - 19 patient.
- People sharing the same room with COVID.
- Collection of Respiratory samples will be arranged in Fever Clinic and all the inpatient wards. Nucleic acid testing (NAT) needs to be conducted on those patients who meet the screening criteria for suspected patients.
- Patients who do not meet the screening criteria above, if they do not have a confirmed epidemiological history, but cannot be ruled out from having COVID-19 based on their symptoms, especially through imaging, are recommended for further evaluation and to obtain a comprehensive diagnosis.
- Any patient who tests negative should be re-tested 24 hours later. If a patient has two negative NAT results and negative clinical manifestations, then he or she can be ruled out from having COVID-19 and should be taken care in different ward if not fit for discharge. If those patients cannot be ruled out from having COVID-19 infections based on their clinical manifestations, they need to be subjected to additional NAT tests every 24 hours until they are excluded or confirmed;
- Those confirmed cases with a positive NAT result should be admitted and treated collectively based on the severity of their conditions (Appendix 1). The evaluation of the patient will be done as per National Early Warning Score 2 adapted from Royal College of Physician, UK. (Appendix 2)

## **Isolation Ward Area**

### **2.1 Scope of Application**

The isolation ward includes an observation ward, isolation ward, and an isolated ICU. Medical providers will implement standardized management in accordance with relevant equipment.

### **2.2 Ward Requirements**

- Suspected and confirmed patients will be separated in different ward areas.
- Suspected patients will be isolated in separated ward and the patient's activity should be confined to the isolation ward.



- Confirmed patients can be arranged in the same room with bed spacing of not less than 1.0 meter.

### Part 3: Staff Management

#### **Workflow Management**

- Before working in a fever clinic and isolation ward, the staff must undergo strict training and examinations to ensure that they know how to put on and remove personal protective equipment. A few of our colleagues are already trained.
- The staff should be divided into different teams. Each team should be limited to a maximum of 6 hours of working in an isolation ward.
- Before going off duty, staff must wash themselves and conduct necessary personal hygiene regimens to prevent possible infection of their respiratory tracts and mucosa.

#### **Health Management**

- The front-line staff in the isolation areas – including healthcare personnel, medical technicians and property & logistics personnel – should stay in an isolation accommodation and shall not go out without permission.
- A nutritious diet to be provided to improve the immunity of medical personnel.
- Monitor and record the health status of all staff on the job, and conduct health monitoring for front-line staff, including monitoring body temperature and respiratory symptoms; help address any psychological and physiological problems that arise with experts.
- If the staffs have any symptoms that might suggest COVID-19 they should be isolated immediately and screened with a NAT.
- When the front-line staff including healthcare personnel, medical technicians and property & logistics personnel finish their work in the isolation area and are returning to normal life, they will first be NAT tested for SARS-CoV-2. If negative, they would be isolated collectively at a specified area for 14 days before being discharged from medical observation.

#### **Linen Care**

- Linen is categorised as 'used' or 'infectious'.
- All linen used in the direct care of patients with possible and confirmed COVID-19 should be managed as 'infectious' linen. Linen must be handled, transported and processed in a manner that prevents exposure to the skin and mucous membranes of staff, contamination of their clothing and the environment.
- Disposable gloves and an apron should be worn when handling infectious linen.
- All linen should be handled inside the patient room/cohort area. A laundry receptacle should be available as close as possible to the point of use for immediate linen deposit

#### **When handling linen:**

- Do not rinse, shake or sort linen on removal from beds/trolleys
- Do not place used/infectious linen on the floor or any other surfaces such as a locker/table top
- Do not re-handle used/infectious linen once bag
- Do not overfill laundry receptacles
- Do not place inappropriate items, such as used equipment/needles, in the laundry receptacle

#### **When managing infectious linen:**

- Place directly into a clear polythene bag and secure
- Place the polythene bag into in the appropriately coloured (as per local policy) linen bag (hamper)
- All linen bags/receptacles must be tagged with ward/care area and date. Store all used/infectious linen in a designated, safe, lockable area whilst awaiting uplift.

### **Part 4: Guidelines for Use of Personal Protective equipment in relation with Covid-19**

#### **A. For Aerosol Generating procedures:**

Dental procedures, bronchoscopy, Upper GI Endoscopy, ENT procedure, nebulization, intubation of a patient, CPR, non-invasive ventilation, endotracheal suctioning, when obtaining nasopharyngeal or oropharyngeal swab, etc. **in Covid-19 suspected or confirmed cases health personnel need to use the following equipments (Category I PPE):**

- i. N-95 mask

- ii. Goggles or visor
- iii. Gloves (loose gloves acceptable)
- iv. Water resistant OR standard disposable gowns
- v. Cap: regular disposable

**B. For Non-Aerosol generating covid-19 suspected or confirmed patients: Health personnel need to use the following equipment: Category II PPE:**

- i. Surgical mask (seal the top edge with tape)
- ii. Goggles or visor
- iii. Gloves (loose gloves acceptable)
- iv. Water resistant or standard disposable gowns
- v. Cap: Regular disposable

**C. Physicians examining the patients in the fever/screening clinics the following PPE is recommended: Category II PPE**

- i. Surgical mask, (seal the top edge with a tape)
- ii. Goggles or visor
- iii. Water resistant or standard disposable gowns
- iv. Regular disposable Cap
- v. Gloves (loose gloves acceptable)

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

- i. Surgical masks
- ii. Gloves
- iii. Gowns (if physical contact expected)

Follow hand hygiene and keep minimum 3 to 6 feet distance from the patient.

**E. Laboratory staff: Category II or III PPE; depending upon the chance of splash:**

- i. surgical mask
- ii. Gown
- iii. Loose Gloves
- iv. Eyes protection (if risk of splash)

#### **F. All staff; including healthcare worker:**

All staff, including healthcare worker involved in any activity that does not involve contact with COVID -19 patient and working in other areas of patient transit (e.g. wards, corridors).

#### **Surgical mask**

##### **For Everyone:**

- Maintain 3-6 feet distance while visiting patients, if no need to touch the patient.
- Mandatory hand-hygiene after each use of PPE and between patients.
- Mandatory surface cleaning of bed or furniture with 0.5 % Chlorine disinfectant (Virex\* or similar) between each patient in OPD or in an inpatient setting.

##### **Equipment Care**

- Patient care equipment should be single-use items if possible. Reusable (communal) non-invasive equipment should as far as possible be allocated to the individual patient or cohort of patients.
- Reusable (communal) non-invasive equipment must be decontaminated:
  - ❖ between each patient and after patient use
  - ❖ after blood and body fluid contamination
  - ❖ at regular intervals as part of equipment cleaning
- An increased frequency of decontamination should be considered for reusable non-invasive care equipment when used in isolation/cohort areas.
  - ❖ ventilators should be protected with a high efficiency filter,
  - ❖ closed system suction should be used
- Avoid the use of fans that re-circulate the air.
- There is no need to use disposable plates or cutlery. Crockery and cutlery can be washed by hand or in a dishwasher using household detergent and hand-hot water after use.

#### **Check list for PPE Donning and Doffing**

1. Name of staff: \_\_\_\_\_
2. Name of observer: \_\_\_\_\_
3. Date: \_\_\_\_\_

**Note:**

- Get into scrubs or comfortable clothes, remove jewelry, ensure you had water and food and visited washrooms etc. as the residents and nurses are expected to stay inside for at least 6 hrs.
- The observer needs to be in PPE when observing doffing.
- Two chairs should be placed in doffing area labeled **DIRTY & CLEAN**

**Check list for Donning**

S.N	Procedure	Yes/No
1.	Wash hands with soap and water	
2.	Wear shoe cover	
3.	Wear 1st pair of gloves	
4.	Wear gown	
5.	Wear the mask/respirator (check for any leaks)	
6.	Wear goggles/face shield	
7.	Wear hood	
8.	Wear 2nd pair of gloves	
9.	Gown fitness check (ask buddy to help)	

**Checklist for Doffing**

S.N	Procedure	Yes/No
1	Check for any leak or soiling in PPE before doffing, (disinfect site if contaminated)	
2	Disinfect the hands while wearing gloves (similar to hand hygiene procedure).	
3	Remove shoe covers only by touching the outer surface (by sitting on <b>DIRTY</b> chair)	
4	Perform hand hygiene	
5	Remove outer gloves	
6	Perform hand hygiene	
7	Remove hood	
8	Perform hand hygiene	
9	Remove gown	
10	Perform hand hygiene	

11	Remove goggles/face shield	
12	Perform hand hygiene.	
13	Remove second pair of gloves	
14	Perform hand hygiene	
15	Wear new pair for gloves	
16	Remove mask (don't touch the front of mask, handle with slings/bands)	
17	Perform hand hygiene	
18	Clean shoes with alcohol swabs (by sitting on <b>CLEAN</b> chair)	
19	Remove last pair of gloves and perform hand hygiene	

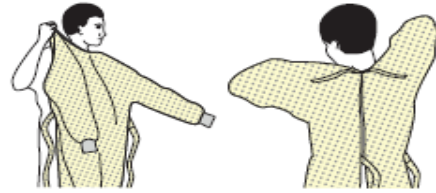
**Note:** All PPE to be discarded in **RED** bag. This red bag to be placed inside another red bag and sent for treatment (“double bagging”).

## SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

### 1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



### 2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator



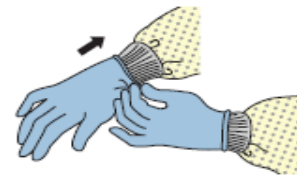
### 3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit



### 4. GLOVES

- Extend to cover wrist of isolation gown



## USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



## HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 1

There are a variety of ways to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. Here is one example. **Remove all PPE before exiting the patient room except a respirator, if worn. Remove the respirator after leaving the patient room and closing the door.** Remove PPE in the following sequence:

### 1. GLOVES

- Outside of gloves are contaminated!
- If your hands get contaminated during glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Using a gloved hand, grasp the palm area of the other gloved hand and peel off first glove
- Hold removed glove in gloved hand
- Slide fingers of ungloved hand under remaining glove at wrist and peel off second glove over first glove
- Discard gloves in a waste container



### 2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band or ear pieces
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container



### 3. GOWN

- Gown front and sleeves are contaminated!
- If your hands get contaminated during gown removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Unfasten gown ties, taking care that sleeves don't contact your body when reaching for ties
- Pull gown away from neck and shoulders, touching inside of gown only
- Turn gown inside out
- Fold or roll into a bundle and discard in a waste container

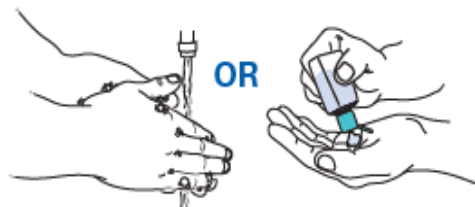


### 4. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — **DO NOT TOUCH!**
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container



### 5. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



**PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS  
BECOME CONTAMINATED AND IMMEDIATELY AFTER  
REMOVING ALL PPE**



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## Part 5: Guideline for Early supportive therapy and monitoring

1. Give supplemental oxygen therapy immediately to patients with respiratory distress, hypoxemia, or shock, (target SpO<sub>2</sub> ≥90% in adults)
2. Use conservative fluid management when there is no evidence of shock.
3. Give empiric antimicrobials to treat all likely pathogens preferably within one hour of initial patient assessment for patients with sepsis; examples: 3<sup>rd</sup> generation cephalosporin with or without azithromycin. Examples:
4. Do not routinely give systemic corticosteroids for treatment of viral pneumonia or ARDS unless they are indicated for another reason
5. Monitoring: RR, HR, SpO<sub>2</sub>, BP, urine output, conscious level, temperature as per Clinical response of NEWS2 (Appendix 2)

### Respiratory Support:

COVID-19 has a wide range of clinical presentations: mild URTIs to florid ARDS requiring mechanical ventilation .

1. Most of the patients admitted to the hospital will require some form of supplemental oxygen
2. All patients with SpO<sub>2</sub> < 92% should be placed on supplemental O<sub>2</sub> with nasal cannula
3. As disease progresses, the current recommendation is to **inform ICU team**
4. Avoid nebulized medications as these increase the aerosolization of respiratory particles. **Change all nebulization to metered dose inhalers (MDIs) when possible**

### Indications of Intubation:

1. Deteriorating patients should be considered for **early** endotracheal intubation.
2. Considerations for early invasive mechanical ventilation
  - Worsening hypercapnia/acidemia
  - Respiratory fatigue
  - Hemodynamic instability
  - Altered mental status

### **Tips for Intubation:**

Aim for early intubation as opposed to use of BIPAP or HFNC. (Adequate NMB is preferred to prevent coughing, gagging, and aerosolization of particles.)

1. Intubation should be done using video bronchoscope/laryngoscope
2. Don enhanced **respiratory PPE with N95** and use double-glove technique.
3. Limit to a **3-person intubation team, if possible**, with all necessary equipment at bedside, including video bronchoscope
4. Upon ETT placement, **immediately inflate cuff** prior to giving positive pressure breath

### **Ventilator strategies:**

1. Lung protective ventilation for those requiring mechanical ventilation.
2. Low tidal volume strategy (4-6mL/kg predicted body weight)
3. Limit plateau pressures to less than 30cmH<sub>2</sub>O
4. Permissive hypercapnia is usually well tolerated
5. Higher PEEP strategy over lower PEEP strategy (see below)
6. In the setting of persistent hypoxia despite low NMB, prone ventilation, inhaled pulmonary vasodilators, and recruitment maneuvers

### **Additional management:**

#### **a. Neuromuscular blockade (NMB):**

- i. Intermittent as-needed boluses of NMB agents over continuous NMB infusions to facilitate lung-protective ventilation
- ii. In the event of persistent ventilator desynchrony, the need for ongoing deep sedation, prone ventilation, or persistently high plateau pressures, we suggest using a continuous NMB agent infusion for up to 48 hours

#### **b. Prone positioning:**

- i. Current reports suggest prone ventilation is effective in improving hypoxia.
- ii. We recommend prone ventilation for 12-16 hours per day.

#### **c. Recruitment maneuver:**

In mechanically ventilated patients with severe ARDS and hypoxemia despite optimizing ventilation and other rescue strategies, we suggest using recruitment maneuvers.

#### d. Steroids

- i. Studies are not in agreement regarding steroid use in patients with and without ARDS secondary to COVID-19
- ii. Chinese Thoracic Society recommendations for treatment of COVID-19 patients with ARDS includes Methyl prednisone 0.5-1mg/kg for a duration of 7 days. The following table is from the guidelines of University of Tennessee, Health Service Center, USA.

Early moderate to severe ARDS (PaO <sub>2</sub> /FiO <sub>2</sub> on PEEP 5 cm of H <sub>2</sub> O	
Days 1 to 5	Dexamethasone 20 mg QD
Days 6 to 10	Dexamethasone 10 mg QD
Days 11 to 14	Dexamethasone 5 mg QD

#### Following medications have been used with some success when used for 4 days

- Vitamin C 1.5 g every 6 h
- Thiamine 200 mg every 12 h
- Vitamin D 480,000 IU dose (60ml) x 1 dose on day one; recheck level on day 5. If low, supplement 96,000 IU / day for 5 days.

#### Fluid Administration:

- Significant hemodynamic derangements are atypical.
- If hemodynamic instability present, consider concomitant bacterial infection or myocarditis
- Avoid the use of maintenance IV fluids, high volume enteral nutrition, and fluid boluses
- Consider early initiation of vasopressors to treat hypotension in patients who are not hypovolemic.
- If IV fluids are needed, crystalloids are preferred in the smallest possible amount as guided by clinical exam, vitals, and bedside ultrasound exam.

### **Antibiotics:**

- Secondary bacterial infections have been noted; however, the overall incidence of concomitant infections seems to vary between studies
- Isolated secondary infections include CRE Klebsiella, Aspergillus flavus, Aspergillus fumigatus, ESBL positive Klebsiella pneumonia, ESBL positive Pseudomonas aeruginosa, and ESBL negative E. coli
- In severe cases, we recommend:
  - ❖ Starting broad spectrum antibiotics initially
  - ❖ De-escalation based upon culture and procalcitonin results (if available)

### **Management for Hypoxemic respiratory failure and acute respiratory distress syndrome**

- Recognize severe hypoxemic respiratory failure: signs of respiratory distress and failing standard oxygen therapy.
- A trained and experienced provider using airborne precautions should perform endotracheal intubation.
- Implement mechanical ventilation:
  - ❖ lower tidal volumes (4–8 ml/kg predicted body weight, PBW)
  - ❖ Lower inspiratory pressures (plateau pressure <30 cmH<sub>2</sub>O)
  - ❖ In patients with severe ARDS, prone ventilation for >12 hours/day
  - ❖ Use a conservative fluid management strategy for ARDS patients without tissue hypoperfusion

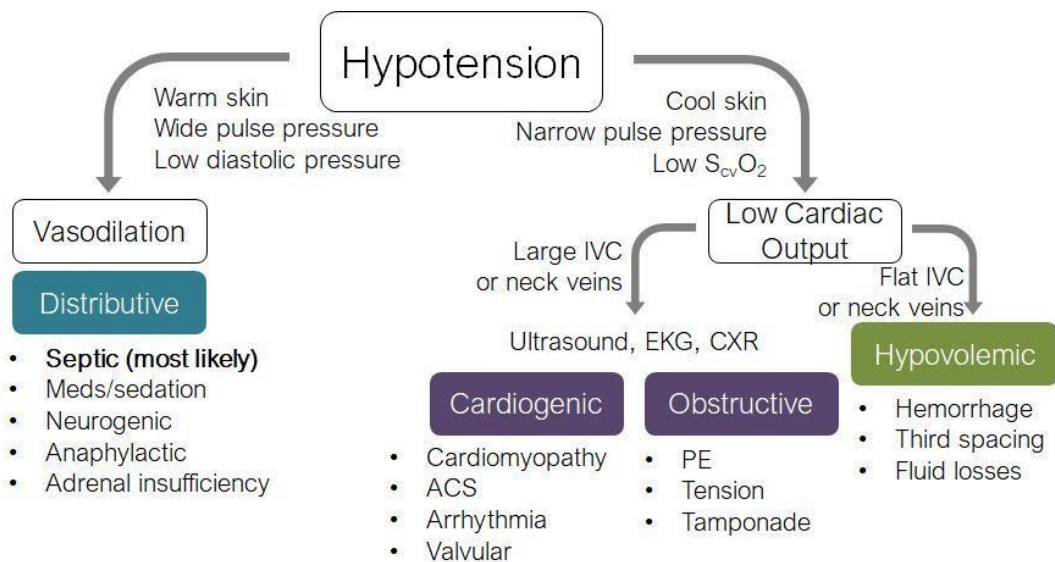
<b>Goals:</b> SpO <sub>2</sub> 88-92%, PaO <sub>2</sub> 60-90 mmHg, Pplat < 30 cm of H <sub>2</sub> O, PaCO <sub>2</sub> 30-50 cm of H <sub>2</sub> O, pH 7.3-7.5
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### **Assessment of Severity of Covid-19 (Appendix 1)**

#### **Part 6: Management of Critically Ill Patients**

##### **A. Hypotension**

##### **1. Think about cause (and treat immediately reversible ones)**



## 2. Assess for volume tolerance (additional volume will not hurt) and responsiveness (additional volume will improve the situation)

- Consider: comorbidities (e.g., heart failure, chronic kidney disease), severity of hypoxemia, cardiac function, volume status
- If volume tolerance and volume responsiveness are likely, move to Step 3 below
- If tolerance and responsiveness unlikely, skip to #4
- If uncertain:
  - ❖ Call for help
  - ❖ Advanced tools -USG, pulse pressure variation can be used

## 3. Give fluid bolus and reassess

- Give 500 mL Lactated Ringer's IV and reassess
- Consider additional 500 mL boluses if blood pressure rises or urine output increases
- For patients with ARDS, limit initial resuscitation to 1-2 L and be very judicious with additional fluids

## 4. Start norepinephrine

Start at 0.02 mcg/kg/min; titrate to mean arterial pressure (MAP) > 65 mmHg or the patient's typical baseline blood pressure

## **5. Hypotension despite fluid and noradrenaline**

### **a. Seek for help**

### **b. Reassess the situation**

- i. Are the BP measurements accurate?
- ii. Is the diagnosis correct?
- iii. Source control- surgical infection requiring drainage or debridement; parapneumonic effusion?
- iv. Is microbiological coverage appropriate?

### **c. Start vasopressin at 0.03 units/minutes if norepinephrine > 0.2 mcg/kg/min**

### **d. Consider placing arterial line and central venous catheter, if not already present**

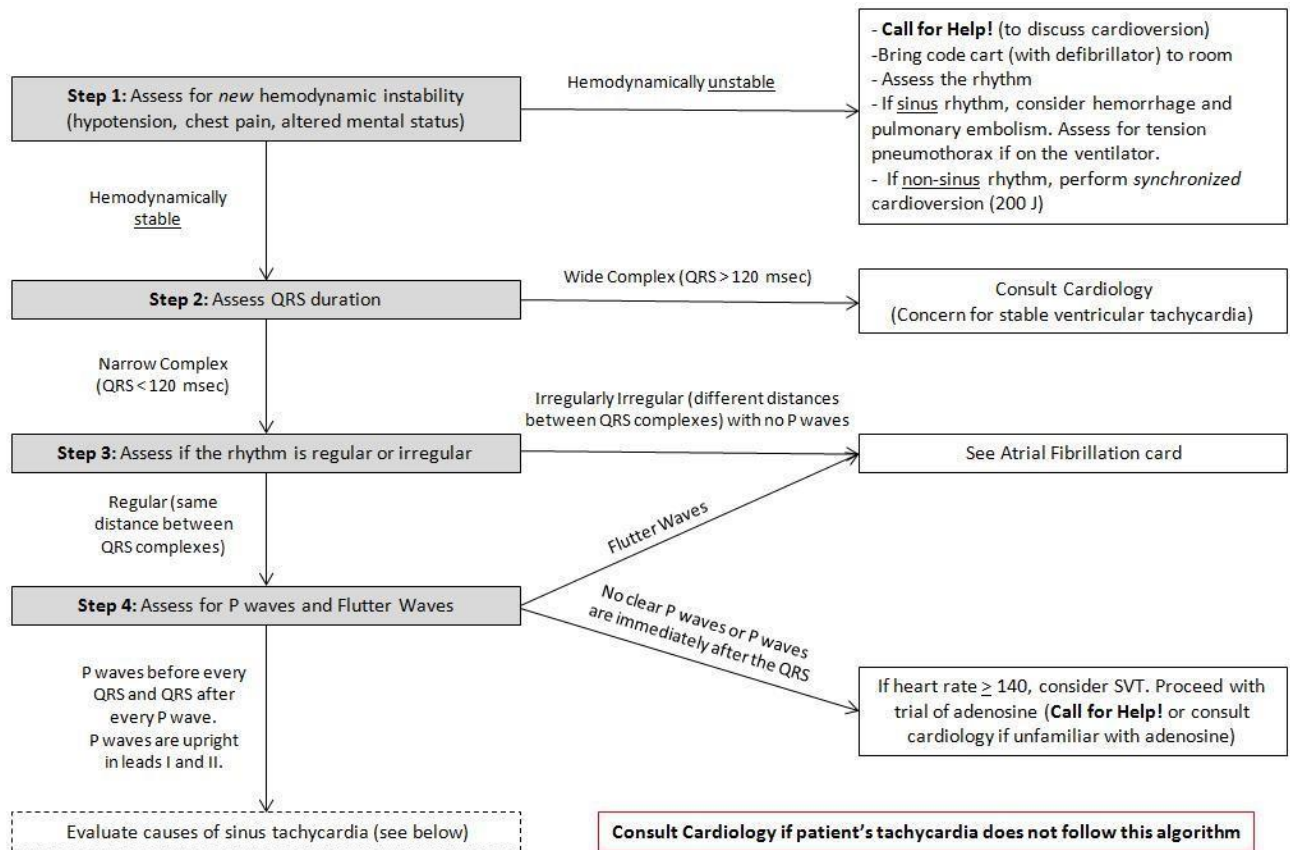
### **e. Next steps:**

- a. Evaluate for sepsis-induced or primary cardiomyopathy with bedside ultrasound or formal echocardiogram, electrocardiogram, and ScvO<sub>2</sub> (provided the patient has a central line)  
  
If echocardiogram consistent with cardiomyopathy or ScvO<sub>2</sub> < 60%:
  - i. Consider inotrope (dobutamine 2.5 mcg/kg/min)
  - ii. Consider repleting calcium to normal (ionized calcium > 1.0 mmol/L)
- b. Consider stress-dose steroids (hydrocortisone 50 mg q6 hours IV). Spot cortisol or ACTH stimulation testing are usually not helpful
- c. Re-evaluate fluid tolerance and responsiveness. Consider judicious 500 mL boluses
- d. Evaluate acid-base status: Consider continuous renal replacement therapy or bicarbonate infusion if the patient has a severe metabolic acidosis (pH < 7.1)

### **f. If vasopressor needs continue to increase, consider Palliative Care with goals of care discussion**

## B. Tachycardia

1. Obtain 12-lead ECG
2. Follow the steps below



### 3. Evaluate for causes of sinus tachycardia

Do not just start a beta-blocker to improve the heart rate. Identify and treat the specific cause of the sinus tachycardia.

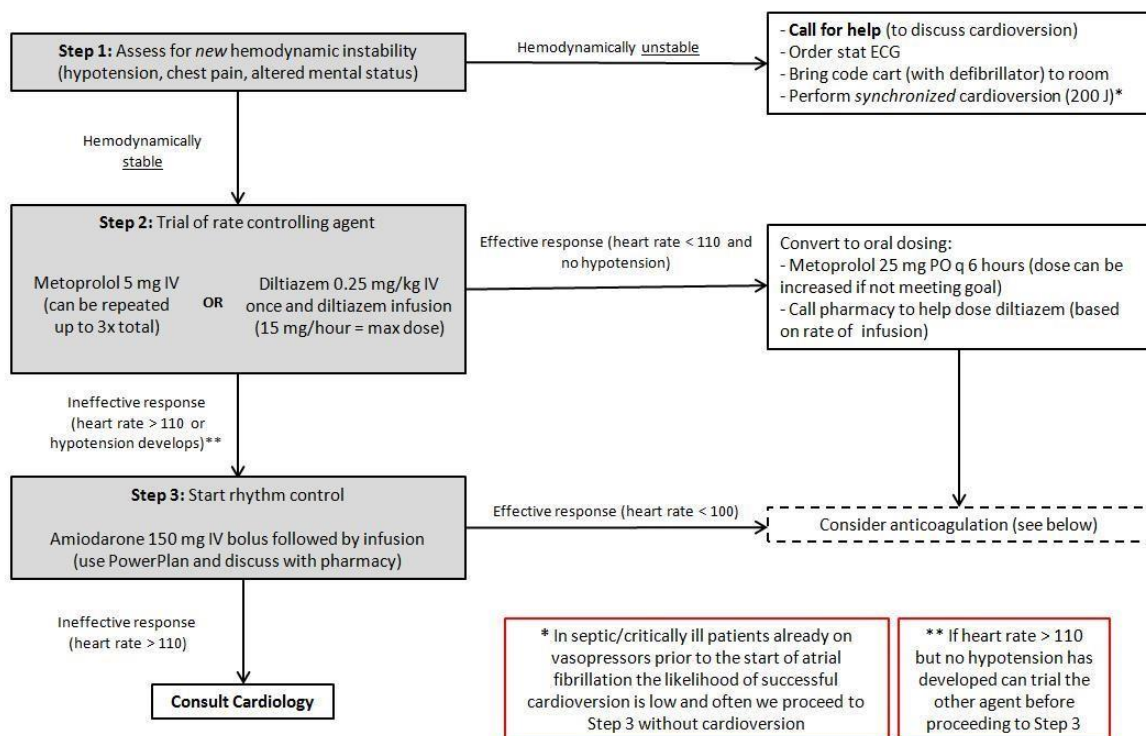
- Pain and anxiety
- Fever / infection
- Hypoxemia
- Hypovolemia (e.g, over-diuresis, vomiting/diarrhea, NPO)
- Blood loss (including non-obvious sources like the retroperitoneum)
- Alcohol withdrawal
- Pulmonary embolism (uncommon cause of sinus tachycardia in absence of hypoxemia, hemodynamic changes, shortness of breath)

### 4. Evaluate for common causes of new onset atrial fibrillation

Sepsis/critical illness (most common cause in the ICU)

- Ischemic heart disease or valvular disease
- Anemia
- Medications (e.g. vasopressors)
- Alcohol withdrawal
- Thyroid disease (typically TSH should not be tested in critically ill patients)
- Pulmonary embolism (uncommon cause, do not automatically order CTPA)

Please follow the steps below



**\*Anticoagulation-** In atrial fibrillation driven by sepsis or respiratory failure, systemic anticoagulation outweighs the benefits.

### C. Hypoxia in non-intubated patients

#### 1. Ensure the pulse oximeter is providing accurate data

Bad pulse oximetry waveforms suggest erroneous data. If unable to rectify the problem, check an arterial blood gas to measure the  $P_{aO_2}$

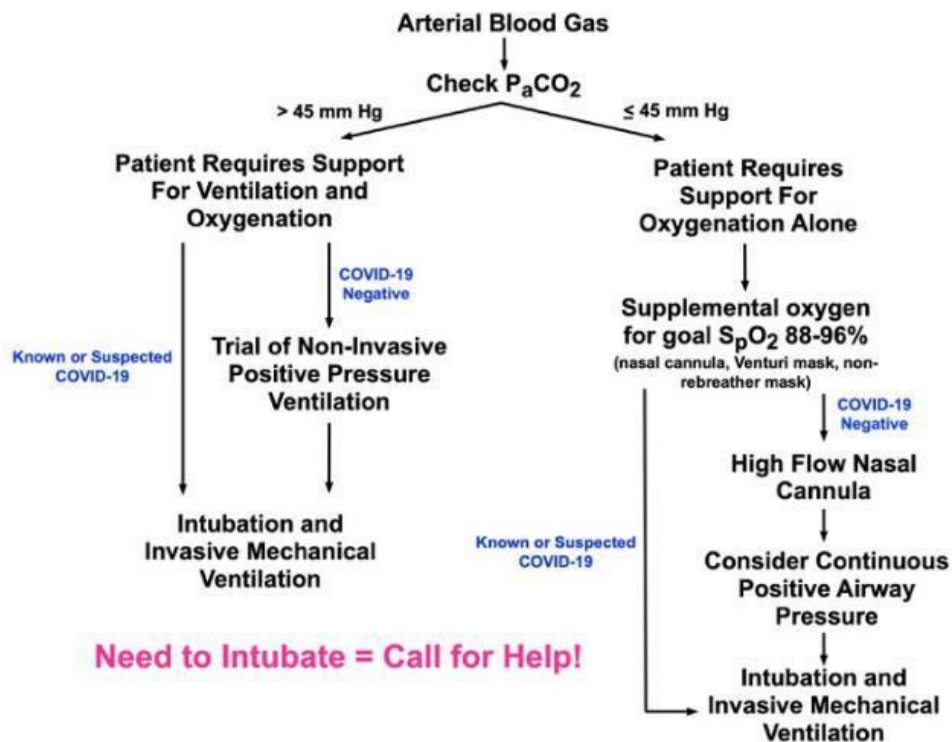
#### 2. Evaluation upon initial presentation

- Plain chest radiograph
- Arterial blood gas



- ❖ Basic laboratory studies (WBC count, Brain natriuretic peptide if available)
- ❖ Electrocardiogram (if indicated)

### 3. Initial management algorithm



**Decision to intubate:** Assessment of overall clinical picture rather than based only on specific SpO<sub>2</sub> or PaO<sub>2</sub> including patient's work of breathing, mental status and hemodynamic instability

### 4. Initiate disease/problem specific interventions

Problem	Intervention
Heart failure and/or volume overload	Diuresis
Large pleural effusions	Diuresis, consider thoracentesis
Pneumonia	Antibiotics
Lobar or whole lung collapse	Chest physiotherapy
COPD / Asthma exacerbation	Corticosteroids, inhaled bronchodilators

Suspected pulmonary embolism	Consider CT pulmonary angiography, lower extremity duplex
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### **Target SpO2 and PaO2**

- i. SpO2: 88-96%
- ii. PaCO2 60-90 mmHg

### **Steps to follow after intubation**

#### **a. Immediate Ventilator settings after intubation**

- i. Mode: VC-AC
- ii. Tidal volume: 8 ml/kg of predicted body weight
- iii. Rate: 18-20/min
- iv. FiO2: 1.0 (to be decreased as per O2 goal)
- v. PEEP: 5 cm of H2O

#### **b. Place orogastric tube**

#### **c. Sedation and pain management**

#### **d. CXR to check position of ET and OG tubes**

#### **e. ABG after 20-30 minutes**

- i. Assess oxygenation
  - ❖ PaO2 < 60: Increase FIO2 and/or increase PEEP
  - ❖ PaO2 > 100: Decrease FIO2 until SpO2 90-96%
- i. Assess and address the acid-base status (see next page)
- ii. All for help if
  - ❖ RR >35/min
  - ❖ Trouble Achieving the Goal pH or PaCO2

### **D. Hypoxemia in intubated patients**

#### **1. Check equipment, consider calling for help.**

Ensure the following:

- i. Patient remains connected to the ventilator circuit and circuit is intact
- ii. No inadvertent changes FiO2, PEEP or other settings
- iii. Endotracheal tube is patent and remains in correct position

## **2. Examine the patient and evaluate their interaction with the ventilator**

- i. Listen for bilateral breath sounds. If breath sounds are asymmetric, consider pneumothorax or lung collapse and evaluate accordingly
- ii. If patient is agitated and having repeated peak pressure alarms, administer intravenous fentanyl bolus

## **3. Obtain diagnostic studies- ABG and CXR**

## **4. Adjust the ventilator to improve oxygenation**

The two parameters on the ventilator that address oxygenation are FiO<sub>2</sub> and PEEP

- Increase FiO<sub>2</sub>
- If problem is not resolved, increase PEEP by 5 cm of H<sub>2</sub>O

### **Cautions:**

- Expect a slow rise in oxygen saturation with increased PEEP
- May cause paradoxical worsening of oxygenation-if so return to previous PEEP
- May cause hypotension- return to previous PEEP

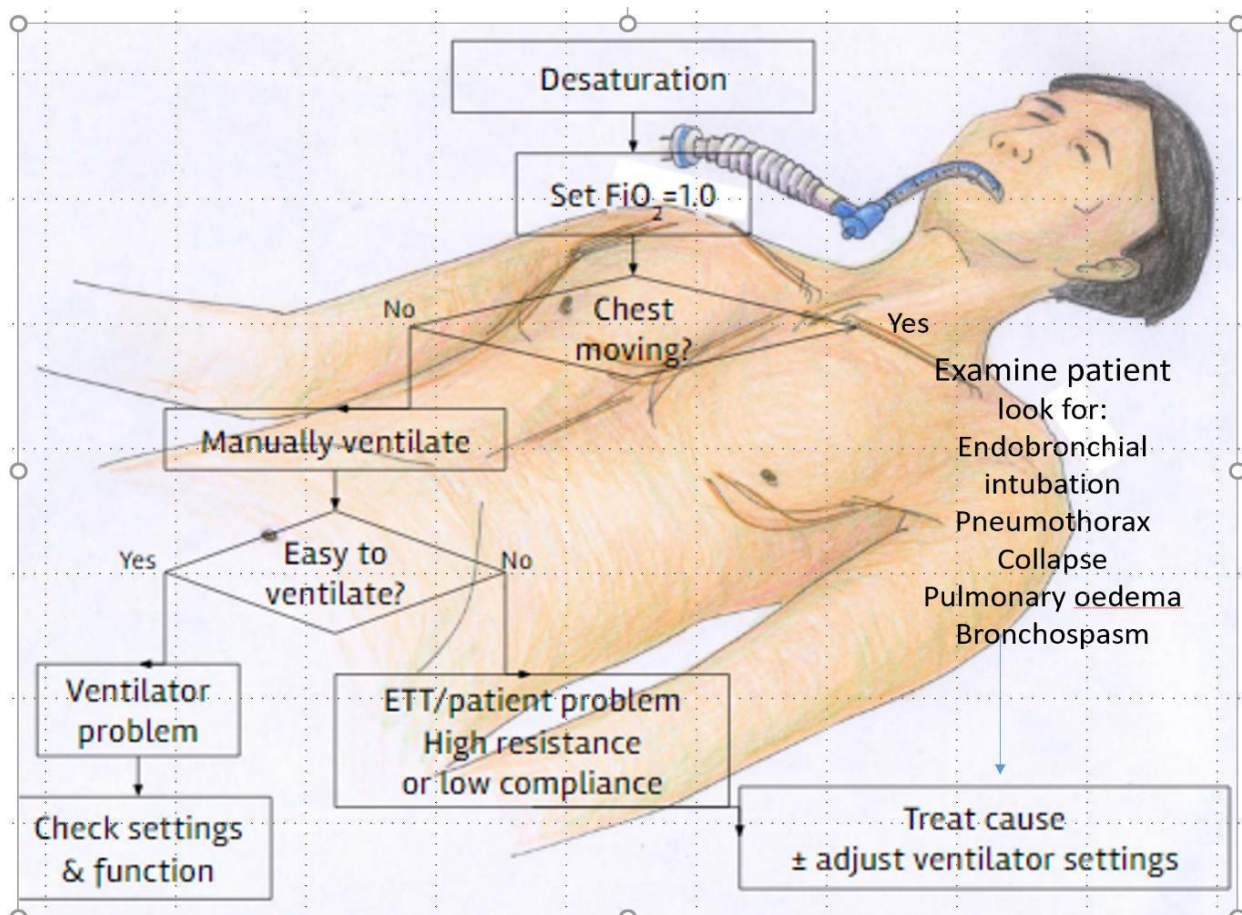
**Call for Help!** if these maneuvers do not resolve the situation.

## **5. Treat reversible causes of hypoxemia if present**

- Suction to clear any mucus in the endotracheal tube or central airways
- If chest radiograph reveals lobar or whole lung collapse, start chest physiotherapy
- If worsening edema pattern on CXR- give diuresis (think ARDS)

## **Optimize other factors that affect oxygen delivery**

- Check Hb and transfuse red blood cells if Hb <7 g/dL
- Review medications that can cause pulmonary vasodilatation (Calcium channel blockers)



## E. Developing ARDS

Evidences are coming up showing that hypoxemia is most likely due to microthrombus in the pulmonary circulation and features on imaging, lung compliance and lung water are not typical of ARDS in COVID-19. Different strategies commonly employed in ARDS are not showing much benefit.

### 1. Confirm the Presence of ARDS and Classify Severity

Patients are deemed to have ARDS if they meet all 4 of the following criteria:

- Acute onset (<7 days) from known cause e.g., COVID-19
- Bilateral opacities on chest radiograph
- PaO<sub>2</sub>/FiO<sub>2</sub> (P/F ratio) < 300 on PEEP of 5 cm of H<sub>2</sub>O or SpO<sub>2</sub>/FiO<sub>2</sub> < 315
- Not entirely due to pleural effusions, volume overload or cardiogenic edema

**Classification of Severity:** (PaO<sub>2</sub> obtained from ABG; FIO<sub>2</sub> expressed as a decimal)

- Mild:  $200 \leq \text{PaO}_2 / \text{FIO}_2 < 300$
- Moderate:  $100 \leq \text{PaO}_2 / \text{FIO}_2 < 200$
- Severe:  $\text{PaO}_2 / \text{FIO}_2 < 100$

**Initiate low tidal volume ventilation (often referred to as lung protective ventilation)**

Change tidal volume (VT) to 6 ml/kg predicted body weight (PBW)

**Goals:**

**a. Plateau Pressure < 30 cm H<sub>2</sub>O**

- If  $P_{\text{plateau}} > 30 \text{ cm H}_2\text{O}$ : consider decreasing VT further, to as low as 4 ml/kg PBW
- If  $P_{\text{plateau}} < 30 \text{ cm H}_2\text{O}$ : maintain 6 ml/kg

**b.  $\text{SaO}_2$  88 – 95% (or  $\text{PaO}_2$  55 – 80 mmHg)**

- Use the PEEP/  $\text{FIO}_2$  ladder. Start with the low ladder (see table below)
- Monitor for hypotension due to increased PEEP
- Call for Help! with persistent or worsening hypoxemia**
- pH > 7.20** (Tolerate increases in  $\text{PaCO}_2$ , “permissive hypercapnia”)

**Table: Combination of PEEP and  $\text{FiO}_2$  for ARDS**

**Lower PEEP/higher  $\text{FiO}_2$**

<b><math>\text{FiO}_2</math></b>	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7
<b>PEEP</b>	5	5	8	8	10	10	10	12

<b><math>\text{FiO}_2</math></b>	0.7	0.8	0.9	0.9	0.9	1.0
<b>PEEP</b>	14	14	14	16	18	18-24

**Higher PEEP/lower  $\text{FiO}_2$**

<b><math>\text{FiO}_2</math></b>	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5
<b>PEEP</b>	5	8	10	12	14	14	16	16

<b><math>\text{FiO}_2</math></b>	0.5	0.5-0.8	0.8	0.9	1.0	1.0
<b>PEEP</b>	18	20	22	22	22	24

Source: [http://www.ardsnet.org/files/ventilator\\_protocol\\_2008-07.pdf](http://www.ardsnet.org/files/ventilator_protocol_2008-07.pdf)

## **2.If PaO<sub>2</sub> / FIO<sub>2</sub> < 150 consider prone positioning**

(Note this requires substantial personnel to safely perform, so consider available resources)

### **Protocol:**

- Prone for 16 hours, then return to supine position
- Repeat daily
- Stop when P/F >150 on PEEP >10 cmH<sub>2</sub>O and FIO<sub>2</sub> < 0.6 or if ineffective

## **3.If PaO<sub>2</sub> / FIO<sub>2</sub> and patient is not synchronous with the ventilator, start neuromuscular blockade and ensure deep sedation (RASS -4 to -5)**

## **4.Call for Help! if hypoxemia persists despite prone positioning and neuromuscular blockade**

### **F. High Peak Inspiratory Pressure (PIP)**

The peak inspiratory pressure (PIP) reflects how hard the ventilator must “work” to deliver a breath and is a function of three variables:

1. the inspiratory flow rate and flow pattern
2. airway resistance (including the endotracheal tube and circuit)
3. the compliance of the respiratory system

A normal value is typically < 40 cm H<sub>2</sub>O. Values above this threshold indicate the patient has high airway resistance and/or low compliance

### **Common Factors That Increase Resistance and Decrease Compliance**

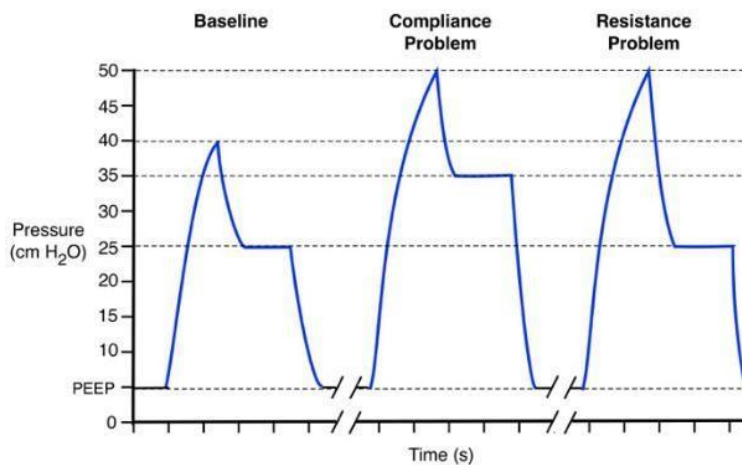
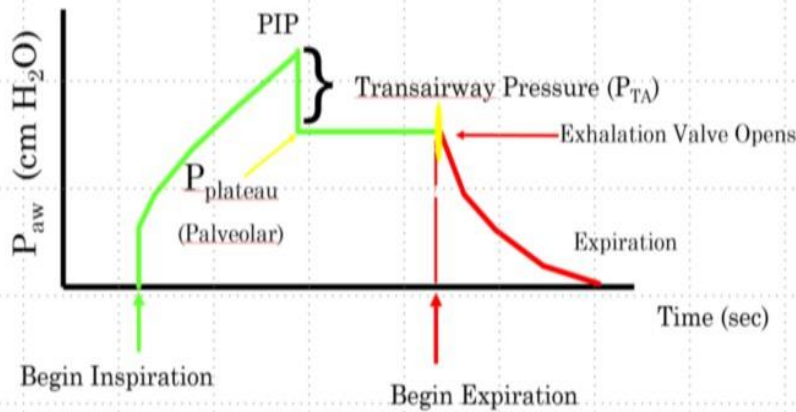
<b>Increased resistance</b>	<b>Decreased compliance</b>
Airway secretions	Abdominal distention
Bronchospasm	Pleural effusion
Kinks in the tubing	Pneumothorax
Patients biting ET tube	Pulmonary edema/ARDS

### **1. How to distinguish between resistance and compliance issues on the ventilator**

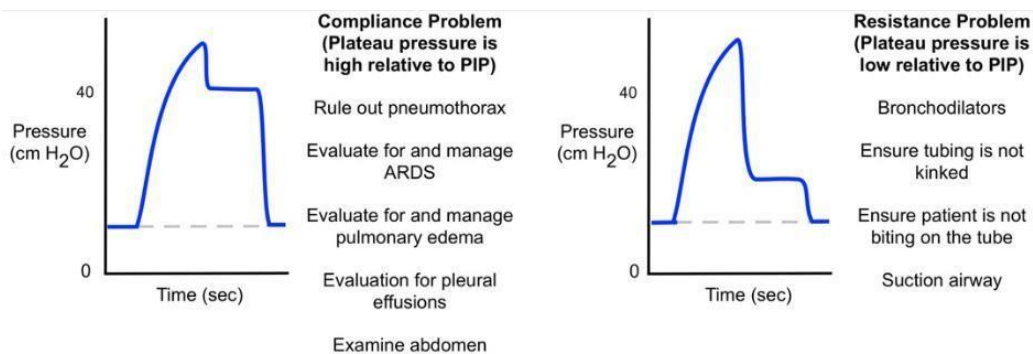
Perform an inspiratory pause maneuver. During the pause, there is no airflow and, therefore, resistance is no longer a factor. The pressure measured during the pause (referred to as the

“plateau” or “static” pressure) is the pressure needed to keep the system open at that volume and reflects the compliance of the respiratory system

## Components of Inflation Pressure



## 2. Management





**a. Resistance Problem:** (Peak pressure increased, plateau pressure unchanged)

- i. Suction the ET Tube
- ii. Bronchodilators
- iii. Check endotracheal and circuit tubing for kinks or patient biting on the tube

**b. Compliance problem** (Peak pressure and plateau pressure increased)

- i. Sudden change: rule out pneumothorax with CXR &/or chest USG
- ii. Less sudden changes:
  - Chest radiograph
  - Review fluid balance
  - Examine the abdomen. Consider bladder pressure measurement if tense

### **G. Auto-PEEP**

Under normal circumstances, the entire delivered tidal volume is expired during exhalation. If expiratory time is insufficient (see below), some portion of the previously delivered breath may remain in the lungs at the time the next breath is delivered. If this happens on a repeated basis, the lungs become hyperinflated. This can lead to increased intrathoracic pressure which decreases venous return and impairs cardiac output. In severe cases patients become hypotensive and can go into pulseless electrical activity

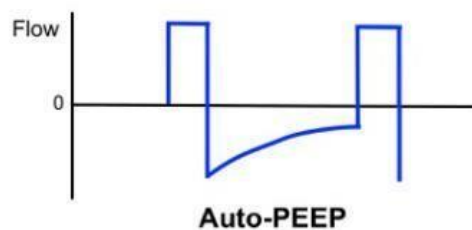
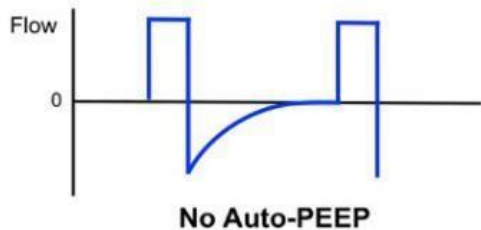
#### **When to Look for This?**

- I. Patients with obstructive lung disease (e.g., COPD, asthma)
- II. Patients requiring a very high respiratory rate to compensate for severe metabolic acidosis
- III. Patients who are spontaneously breathing at a very high rate
- IV. Unexplained hypotension or cardiac arrest while on mechanical ventilation

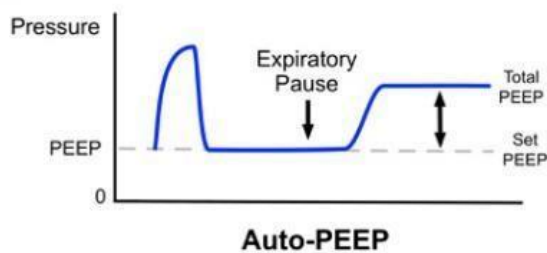
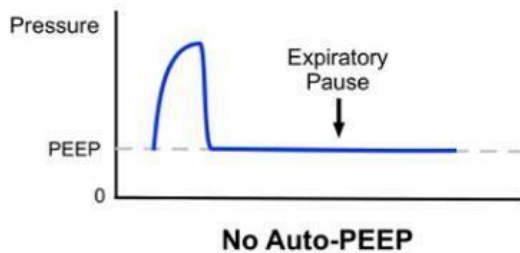


## Recognize Auto-PEEP on Ventilator

**Step 1:** Check the flow vs. time curve. Flow should return to zero before the next breath. This tells you if auto-PEEP is present but does not quantify the magnitude.



**Step 2:** Perform an expiratory pause. The pressure should remain at the set PEEP. A rise in pressure confirms auto-PEEP. The bigger the increase, the more auto-PEEP.



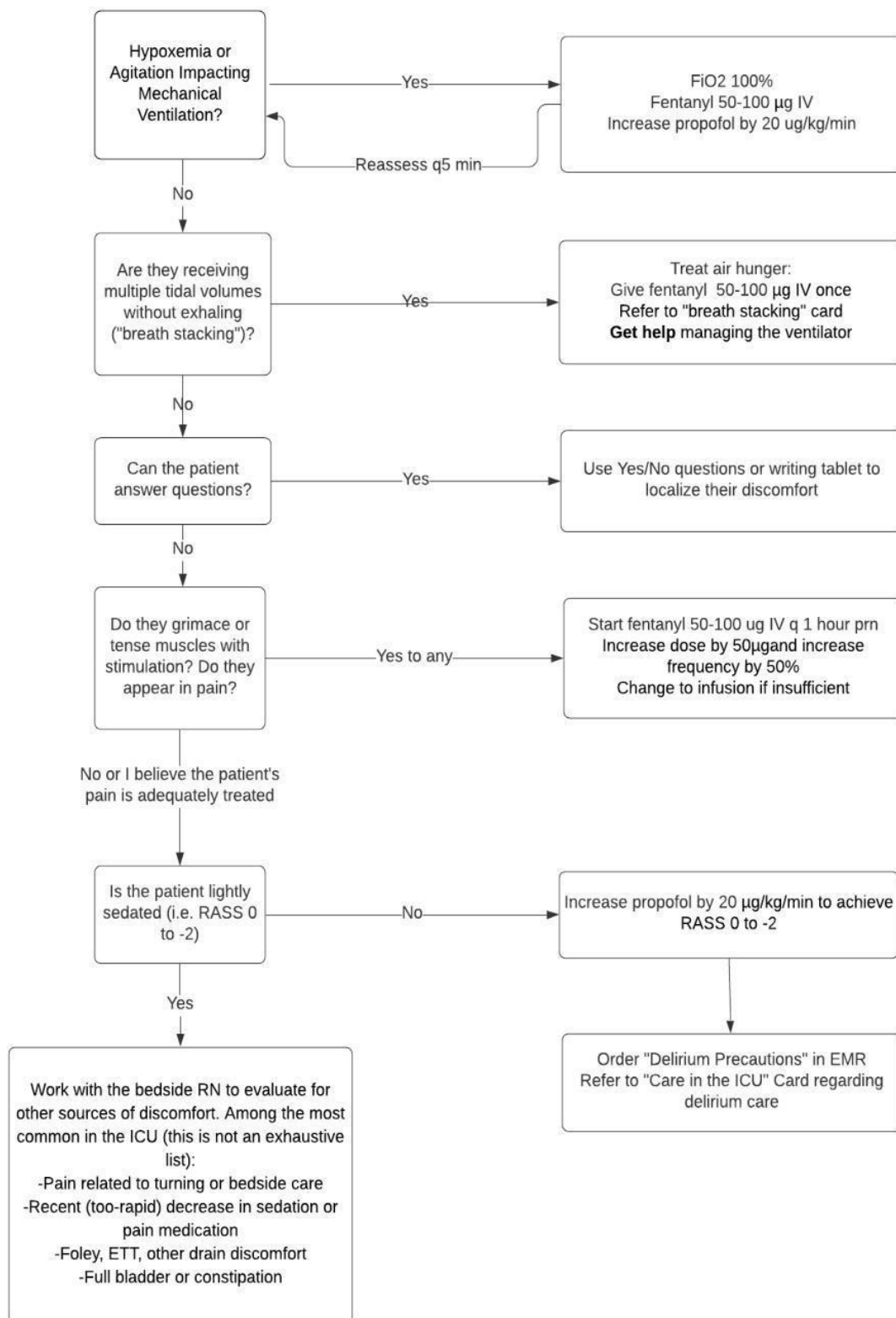
## Management

### Initial Steps:

- Decrease minute ventilation by lowering rate and/or tidal volume (this is ineffective for patients breathing above the set rate on the ventilator)
- Increase the inspiratory flow rate; change to a square wave flow pattern
- Increase sedation
- Initiate bronchodilators and consider steroids for patients with asthma and COPD

**In severe cases,** may need neuromuscular blockade, **(call for help)**

## H. Agitation



## I. Altered mental status

### 1. Initial Assessment

- Check vital signs: assess for shock (hypotension), hypoxemia, or infection (fever)
- Stat fingerstick glucose: if hypoglycemic (FSG < 70), give 1 ampule of D50
- Perform neurologic exam:
  - ❖ Focal neurologic findings: Consult neurology
  - ❖ If history of seizures: Consult neurology
  - ❖ Review medications (opiates, sedative/hypnotics), recent events/procedures

### 2. Laboratory Studies

- Arterial blood gas to rule out hypercarbia
- Serum electrolytes to assess for hypo/hyponatremia, hypercalcemia, BUN
- Evaluate for infection with fever and/or leukocytosis:
  - ❖ Urinalysis with reflexive culture
  - ❖ Blood cultures x 2 (peripheral and central)
  - ❖ Chest radiograph
  - ❖ Consider respiratory viral panel / COVID-19 (if not already checked)

**Note:** Lumbar puncture generally not indicated as risk of meningitis in hospitalized patients is low unless they underwent a neurosurgical procedure with violation of the dura

### 3. Consider Head Imaging

- Primary Indications: focal neurologic findings, increased risk of bleeding, sudden onset severe headache, or sudden change in level of consciousness
- Must weigh benefit of imaging with infection control risk of traveling for imaging

### 4. Management

- Assess ability to protect airway. **Call for Help!** Intubate if airway protection in question
- Consider ventilatory support for patients with hypercarbia not related to opiates
- Suspected opiate overdose: naloxone 0.4 mg IV. May repeat up to 2 mg total
- Discontinue sedating medications
- Address electrolyte disturbances
- Treat identified sources of infection

## Part 7: Operating theatres (where these continue to be used for surgery)

- It is recommended that ventilation in both laminar flow and conventionally ventilated theatres should remain fully on during surgical procedures where patients may have COVID-19 infection. Air can bypass filtration if a respirator is not fitted perfectly or becomes displaced during use. Those closest to aerosol generation procedures are most at risk. The rapid dilution of these aerosols by operating theatre ventilation will protect operating room staff. Air passing from operating theatres to adjacent areas will be highly diluted and is not considered to be a risk.
- Theatres must be informed in advance of a patient transfer of a confirmed or possible COVID-19 positive case
- The patient should be transported directly to the operating theatre and should wear a surgical mask if it can be tolerated
- The patient should be anaesthetized and recovered in the theatre. Staff should wear protective clothing but only those within 2 metres of an aerosol generating procedure, such as performing intubation, need to wear N 95 respirators, long sleeved gowns, gloves and eye protection.
- Instruments and devices should be decontaminated in the normal manner in accordance with manufacturers' advice
- Both laryngoscope handle and blade should either be single use or reprocessed in the Sterile Supply Department. Video laryngoscope blades should be single use and scope/handle decontaminated as per manufacture instructions.
- The theatre should be cleaned as per local policy for infected cases, paying particular attention to hand contact points on the anesthetic machine
- Possible or confirmed cases of COVID-19 should be placed at the end of the list where feasible
- For patients with possible or confirmed COVID-19, any of these potentially infectious **AGPs** should only be carried out when essential. Where possible, these procedures should be carried out in a single room with the doors shut. Only those healthcare staff who are needed to undertake the procedure should be present. Once vacated by staff following an AGP, leave the room for 5 minutes before cleaning.

## Part 8: Pregnant and lactating mother management

- Based on currently available information, there is no evidence that pregnant women are at higher risk or at risk of severe illness.
- So far, there is little evidence of mother -to— child transmission when infection occurs in the third trimester.
- SARS – CoV – 2 has not been identified in breastmilk of the infected mothers.
- All recently pregnant women with COVID – 19 should be counselled on safe infant feeding and appropriate infection prevention measures to prevent COVID – 19 virus transmission.
- Infants born to mothers with suspected, probable or confirmed COVID – 19 should be fed according to standard infant feeding guidelines, while applying necessary precautions for infection prevention and control.
- Symptomatic mothers who are breastfeeding or practicing skin – to – skin contact or kangaroo mother care should practice respiratory hygiene, including during feeding, perform hand hygiene before and after contact with the child, and routinely clean and disinfect surfaces which the mother has been in contact with.

## Part 9: Nursing Management Protocol for COVID – 19 Cases

### **Introduction**

A novel coronavirus (2019-nCoV) is a new strain that has not been previously identified in humans. The infection is spread through respiratory route i.e. respiratory droplets and fomites.

### **Standard Precautions**

Nurses caring for PUI (Patient under investigation) should implement standard infection control precautions. **These include basic hand hygiene, use of personal protective equipment, respiratory etiquettes, and environmental disinfection.**

Patients suspected of having 2019-nCoV infection should be shifted to the isolation facility from the triage area as soon as possible. The health care workers should do this after donning appropriate PPE. The patient should wear surgical mask.

### **Patient Placement:**

- The PUI has to be admitted in an isolation room with negative pressure
- Only essential personnel should enter the room. Implement staffing policies to minimize the number of health care workers who enter the room.
- Facilities should keep a log of all persons who care for or enter the rooms or care area of these patients.
- Use dedicated or disposable noncritical patient-care equipment (e.g., blood pressure cuffs). If equipment will be used for more than one patient, clean and disinfect such equipment before use on another patient according to manufacturer's instructions.
- A nurse entering the room soon after a patient vacates the room should use respiratory protection.

### Use of PPE for Nurses

The following are recommendations for the rational use of personal protective equipment (PPE) at health care facilities. PPE includes gloves, medical masks, goggles or a face shield, and gowns, as well as for specific procedures, respirators (i.e., N95) and aprons. It is intended for HCPs, infection prevention and control (IPC) professionals and health care managers.

- **Hand hygiene remains one of the most important measures** for all persons for the prevention and control of majority of the respiratory viral infections including COVID-19.
- Wear a mask when entering a room where patients suspected or confirmed COVID-19 patients are admitted
- Nurses involved in the direct care of patients should use the following PPE:
  - ❖ gowns,
  - ❖ gloves,
  - ❖ medical mask and
  - ❖ eye protection (goggles or face shield).
- Specifically, for **aerosol-generating procedures** (e.g., tracheal intubation, non-invasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy) nurses should use respirators (N95), eye protection, gloves and gowns; aprons should also be used if gowns are not fluid resistant.

- Respirators (e.g., N95, FFP2 or equivalent standard) have been used for an extended time during previous public health emergencies involving acute respiratory illness when PPE was in short supply. This refers to wearing the same respirator while caring for multiple patients who have the same diagnosis without removing it, and evidence indicates that respirators maintain their protection when used for extended periods. However, using one respirator for longer than 4 hours can lead to discomfort.

## **I. Nursing Care for Patients with Mechanical Ventilation**

### **Intubation Procedures**

- a. The number of the nursing and medical staff should be limited to the minimum number that can ensure the patient's safety.
- b. Wear full PPE.
- c. Before intubation, perform administration of sufficient analgesia and sedative, and use muscle relaxant if necessary.
- d. Closely monitor the hemodynamic response during intubation.
- e. Reduce movement of staff in the ward, continuous purify and disinfect the room with plasma air purification technology for 30 min after completion of intubation.

### **Analgesia, Sedation and Delirium Management**

- a. Determine the target pain management goal every day.
- b. Assess pain every 4 hours (Critical-Care Pain Observation Tool, CPOT),
- c. Assess sedation with every 2 hours (RASS/BISS).
- d. Titrate the infusion rate of analgesics and sedatives to achieve pain management goals.
- e. For the known painful procedures, preemptive analgesia is administered.
- f. Perform CAM-ICU delirium screening in every shift to ensure an early diagnosis of COVID-19 patients.
- g. Apply centralization strategy for delirium prevention, including pain relief, sedation, communication, quality sleep, and early mobilization are used.

## **II. Prevention of Ventilator-Associated Pneumonia (VAP)**

- The ventilator bundle is used to reduce VAP, which includes hand washing; elevating the head end of the patient's bed by 30-45° if no contradiction is presented; oral care every 4 to 6 hours by using a disposable oral mucus extractor; maintain endotracheal tube (ETT) cuff pressure at 30-35 cmH<sub>2</sub>O every 4 hours;
- Enteral nutrition support and monitor gastric residual volume every 4 hours;
- Using washable tracheal tubes for continuous subglottic suctioning combined with 10 mL syringe suctioning, and adjusting the suctioning frequency according to amount of secretions.

### **Sputum Suction**

- Use a closed sputum suction system, including closed suction catheter and closed disposable collection bag, to reduce the formation of aerosol and droplets.
- Collection of sputum specimen: use a closed suction catheter and a matching collection bag to reduce exposure to droplets

### **Disposal of Condensation from Ventilators**

- Use disposable ventilator tubing with heat and moisture exchange filters to reduce the formation of condensation.
- Two nurses should cooperate to dump the condensation promptly into a capped container with chlorine-containing disinfectant (2500 mg/L).
- The container can then be directly put in a washing machine, which can be heated up to 90 °C, for automatic cleaning and disinfection.

## **III. Nursing Care for the Prone Position Ventilation (PPV)**

Routine care and change of position of the patient should be done with full PPE.

## **IV. General Care**

### **1. Monitoring**

- a. Patient vital signs should be regularly monitored as per National Early Warning Score 2 protocol.



- b. Observe symptoms such as cough, sputum, chest tightness, dyspnea, and cyanosis.
  - c. Monitor oxygen saturation closely to identify any deterioration to adjust strategies of oxygen therapy or to take urgent response measures.
  - d. Pay attention to ventilator associated lung injury (VALI) when under high positive end-expiratory pressure (PEEP) and high-pressure support.
  - e. Closely monitor changes in airway pressure, tidal volume and respiratory rate.
2. Implement strategies to prevent catheter-related bloodstream infection and catheter-related urinary tract infection.
3. Prevent pressure-induced skin injuries, including device-related pressure-induced injuries, incontinence-associated dermatitis and medical adhesive-related skin injuries. Identify patients at a high risk with the Risk Assessment Scale and implement preventive strategies.
4. Assess all patients upon admission and when their clinical conditions change with the VTE risk assessment model to identify those who are at a high risk and implement preventive strategies. Monitor coagulation function, D-dimer levels and VTE-related clinical manifestations.
5. Assist eating for patients who are weak, short of breath or those with an obvious fluctuating oxygenation index. Intensify oxygenation index monitoring on these patients during meals. Provide enteral nutrition at early stages for those who are unable to eat by mouth. During each shift, adjust the enteral nutrition rate and quantity according to the tolerance of enteral nutrition.

## **Part 10: Precautions for Handling and Disposal of Dead Bodies**

### **Personal hygienic measures and protective equipment**

- All staff should be trained in the prevention of infections. A high standard of personal hygiene should be adopted.
- When handling of dead bodies:
  - ❖ Avoid direct contact with blood or body fluids from the dead body.
  - ❖ Put on personal protective equipment (PPE) including: Gloves, water resistant gown/ plastic apron over water repellent gown, and surgical mask. Use goggles or face shield to protect eyes, if there may be splashes.

- ❖ Make sure any wounds, cuts and abrasions, are covered with waterproof bandages or dressings.
- ❖ Do NOT smoke, drink or eat. Do NOT touch your eyes, mouth or nose.
- ❖ Observe strict personal hygiene. Hand hygiene could be achieved by washing hands with liquid soap and water or proper use of alcohol-based hand rub.
- ❖ Avoid sharps injury, both in the course of examination of dead body and afterwards in dealing with waste disposal and decontamination.
- Remove personal protective equipment after handling of the dead body. Then, wash hands with liquid soap and water immediately

### **Part 11: Environmental decontamination**

There is evidence for other coronaviruses of the potential for widespread contamination of patient rooms or environments, so effective cleaning and decontamination is vital.

#### **While the patient is in the room**

- Cleaning and decontamination should only be performed by staff trained in the use of the appropriate PPE; in some instances, this may need to be trained clinical staff rather than domestic staff, in which case, clinical staff may require additional training on standards and order of cleaning.
- After cleaning with neutral detergent, a chlorine-based disinfectant should be used, in the form of a solution at a minimum strength of 1,000ppm available chlorine.
- The main patient isolation room should be cleaned at least once a day. Body fluid spills should be decontaminated promptly.
- There should be more frequent cleaning and disinfection of commonly used hand-touched surfaces and of anteroom or lobby areas (at least twice per day).
- It is strongly recommended that cleaning of isolation areas is undertaken separately to the cleaning of other clinical areas.
- Dedicated or disposable equipment (such as mop heads, cloths) must be used for environmental decontamination. Reusable equipment (such as mop handles, buckets) must be decontaminated after use with a chlorine-based disinfectant as described above. Communal cleaning trollies should not enter the room.

### **Cleaning the room once the patient has been discharged or left the room**

- Clearance of aerosols is dependent on the ventilation and air change within the room. Once an end to dispersion can be defined (such as the patient leaving the room), a single air change is estimated to remove 63% of airborne contaminants and similarly with each subsequent air change. After 5 air changes, less than 1% of the original airborne contamination is thought to remain.
- In an isolation room with 10 to 12 air changes per hour (ACH) a minimum of 30 minutes will reduce contamination to less than 1%. In a side room with 6 ACH, one hour would be a pragmatic time, allowing for aerosols settling out as well as being removed by ventilation.
- Following transfer (recovery) and/or discharge of the patient, it is recommended that the room is left vacant with the door closed for 20 minutes in a negative pressure isolation room or one hour for a neutral pressure room prior to performing a terminal clean. Windows to the outside in neutral pressure rooms can be opened. If the room needs to be put back into use urgently, then it is recommended that the room is cleaned as described in above section.
- Before entering the room, perform hand hygiene then put on a disposable plastic apron and gloves. If a risk assessment indicates that a higher level of contamination may be present or there is visible contamination with body fluids, then the need for additional PPE such as a fluid resistant surgical mask, and eye protection should be considered.
- Collect all cleaning equipment and healthcare waste bags before entering the room
- The person responsible for undertaking the cleaning with detergent and disinfectant should be trained in the process
- Remove all healthcare waste and any other disposable items
- Bedding and bed screens, treat as infectious linen. Do not shake linen and avoid all necessary agitation
- Patient care equipment should be cleaned according to manufacturer's instructions, and where possible with chlorine-based disinfectant, 70% alcohol or an alternative disinfectant.
- Clean all surfaces, beds and bathrooms with a neutral detergent, followed by a chlorine-based disinfectant, in the form of a solution at a minimum strength of 1,000ppm available chlorine.
- Dedicated or disposable equipment (such as mop heads, cloths) must be used for environmental decontamination and disposed as clinical waste
- Reusable equipment (such as mop handles, buckets) must be decontaminated after use with a chlorine-based disinfectant as described above
- Communal cleaning trolleys should not enter the room

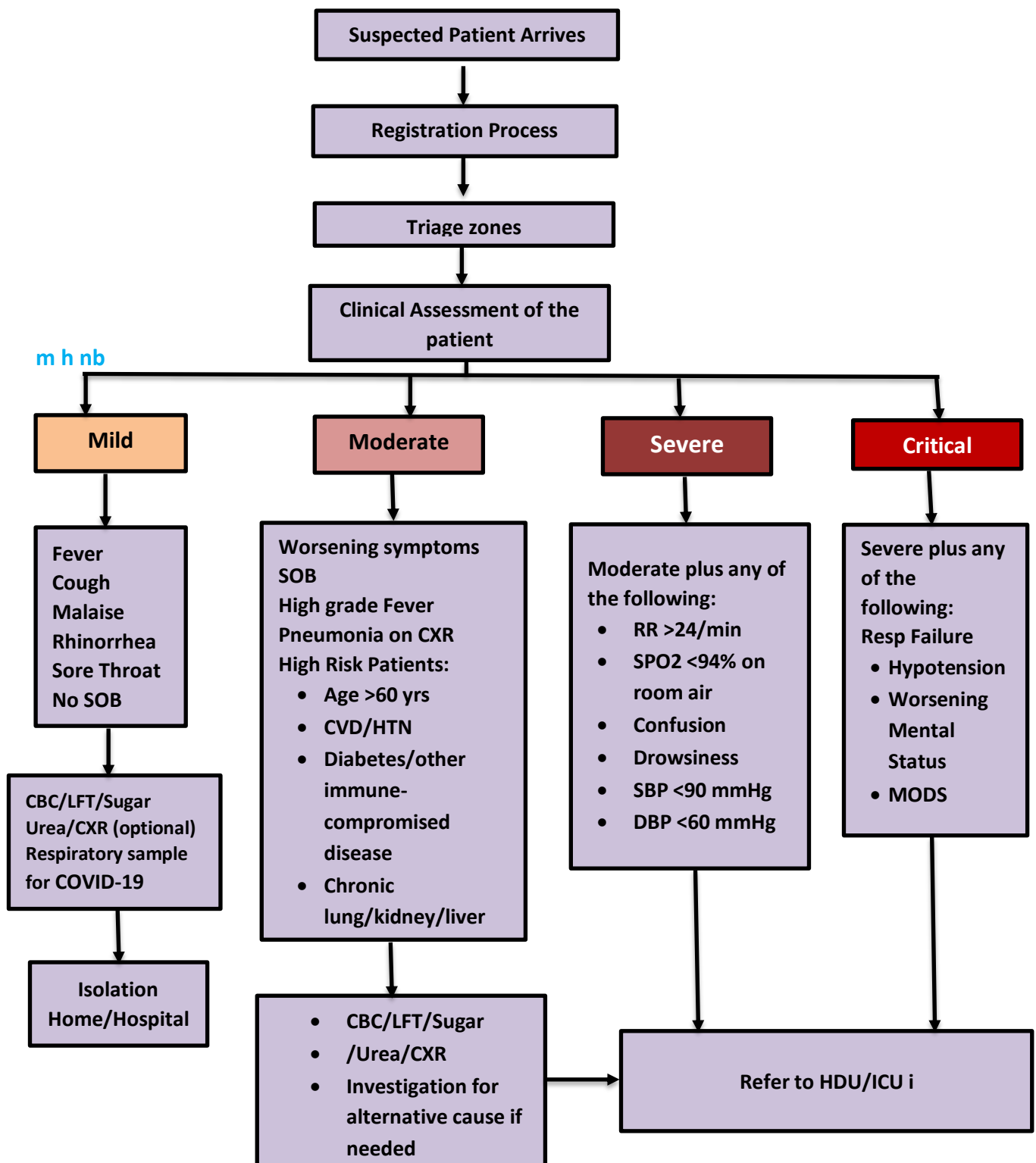
## Part 12: Waste Management Protocol for COVID 19

1. All waste generated from suspected or confirmed patients shall be disposed as of as infected waste.
2. Dispose all generated waste, except sharps in red bucket container which contains double layer plastic bag.
3. Dispose sharps in puncture proof container/ Needle cutter.
4. Spray the container with chlorine containing disinfectant before transferring to treatment area.
5. Transfer the waste to treatment area with the bucket, remove the double layer plastic bag, place directly into the machine and treat the waste immediately.
6. Replace the bucket in the designated area after disinfecting the container.
7. Personal Protective Equipment, PPE (long sleeved gown, gloves, boots, masks and goggles) should be worn at all times while handling and transporting waste from designated area to treatment zone.
8. After handling the waste, individuals should safely remove their PPE and dispose as per the guidelines and perform hand hygiene.

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## Appendix 1: Patient Flow Chart



## Appendix 2: National Early Scoring System

Chart 1: The NEWS scoring system

Physiological parameter	3	2	1	Score 0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO <sub>2</sub> Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO <sub>2</sub> Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Chart 2: NEWS thresholds and triggers

NEWS score	Clinical risk	Response
Aggregate score 0–4	Low	Ward-based response
Red score Score of 3 in any individual parameter	Low–medium	Urgent ward-based response*
Aggregate score 5–6	Medium	Key threshold for urgent response*
Aggregate score 7 or more	High	Urgent or emergency response**

\* Response by a clinician or team with competence in the assessment and treatment of acutely ill patients and in recognising when the escalation of care to a critical care team is appropriate.

\*\*The response team must also include staff with critical care skills, including airway management.

NEWS key				FULL NAME																	
0	1	2	3	DATE OF BIRTH												DATE OF ADMISSION					
				DATE																DATE	
				TIME																TIME	
AD				225														3		225	



**Chart 4: Clinical response to the NEWS trigger thresholds**

NEWS score	Frequency of monitoring	Clinical response
0	Minimum 12 hourly	<ul style="list-style-type: none"> <li>Continue routine NEWS monitoring</li> </ul>
Total 1–4	Minimum 4–6 hourly	Inform nursing in-charge & junior resident to <ul style="list-style-type: none"> <li>Assess the Patient</li> <li>Registered nurse decides whether increased frequency of monitoring and/or escalation of care is required</li> </ul>
3 in single parameter	Minimum 1 hourly	<ul style="list-style-type: none"> <li>Inform nursing in-charge &amp; junior resident who must assess the patient and inform immediately to the medical team caring for the patient, who will review and decide whether escalation of care is necessary</li> </ul>
Total 5 or more Urgent response threshold	Minimum 1 hourly	<ul style="list-style-type: none"> <li>Inform nursing in-charge and junior resident who will inform medical team caring for the patient</li> <li>Request urgent assessment by a senior resident or team with core competencies in the care of acutely ill patients</li> <li>Provide clinical care in an environment with monitoring facilities</li> </ul>
Total 7 or more Emergency response threshold	Continuous monitoring of vital signs	<ul style="list-style-type: none"> <li>Immediately inform the medical team caring for the patient-this should be at least at specialist registrar level</li> <li>Emergency assessment by a team with critical care competencies with advanced airway management skills</li> <li>Consider transfer to HDU or ICU</li> <li>Clinical care in an environment with monitoring facilities</li> </ul>

National Early Warning Score (NEWS) 2 Adapted from [www.replondon.ac.uk](http://www.replondon.ac.uk)

### Appendix 3: Fever Clinic Questionnaire

Name:

Age/ Sex:

Address:

Phone Number:

	Yes	No	Remarks						
Travel history (in 14 days)									
Rhinorrhea									
Fever									
Dry Cough									
Sore throat									
Dyspnea									
Friends/ relatives with history of Fever, Dry cough, flu;									
Exposure with Corona Patient									
Health care worker									
Contact to person with travel history									
Comorbidities <hr/> DM <table border="1"> <tr> <td>HTN</td> </tr> <tr> <td>Heart Disease (specify if possible)</td> </tr> <tr> <td>COAD</td> </tr> <tr> <td>Asthma</td> </tr> <tr> <td>CKD</td> </tr> <tr> <td>Others (specify if possible)</td> </tr> </table>	HTN	Heart Disease (specify if possible)	COAD	Asthma	CKD	Others (specify if possible)			
HTN									
Heart Disease (specify if possible)									
COAD									
Asthma									
CKD									
Others (specify if possible)									

**Vitals**

Temperature:	Pulse :
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<b><u>Danger signs</u></b>	Yes	No	Remarks
Respiratory Rate: >24 breaths/min			
SPO2 <94% (@ RA)			
Confusion/ drowsiness			
SBP <90mmHg DBP<60mmHg			

**Labs**

CBC:	LFT:	RFT:
CXR:	RTPCR:	Urine RE:

**Provisional**

**Diagnosis:** Suspected  
COVID:

<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>	<b>Critical</b>

Other Diagnoses:

**Further Management:**


Discharge

Isolation (Home/ Special)

HDU

ICU

## Appendix 4: Hand Washing

**World Health Organization**

**Patient Safety**  
A World Alliance for Safer Health Care

**SAVE LIVES**  
Clean Your Hands

**0**

Wet hands with water;

**1**

Apply enough soap to cover all hand surfaces;

**2**

Rub hands palm to palm;

**3**

Right palm over left dorsum with interlaced fingers and vice versa;

**4**

Palm to palm with fingers interlaced;

**5**

Backs of fingers to opposing palms with fingers interlocked;

**6**

Rotational rubbing of left thumb clasped in right palm and vice versa;

**7**

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

**8**

Rinse hands with water;

**9**

Dry hands thoroughly with a single use towel;

**10**

Use towel to turn off faucet;

**11**

Your hands are now safe.

## **Appendix 5: Potential therapy**

### **Hydroxychloroquine**

#### **Indications:**

Empiric therapy for hospitalized individuals with moderate illness who are at high risk for decompensation, severe or critical illness

#### **Dose:**

Adult (>18 years): 400 mg PO BID x 2 dose (load) then 200 mg PO BID

Pediatric (<18 years): 10 mg/Kg (max: 600 mg/dose PO BID x2 (load), then 3 mg/kg PO TID (max: 200 mg/dose)

#### **Common side effects:**

Retinopathy, rash, nausea, glucose fluctuations, diarrhoea. GI symptoms can be mitigated by taking with food), QT prolongation

Ocular toxicity may be associated with pregnancy and nursing mother

#### **Duration: 5 days**

#### **Monitor:**

CBC, LFTs and renal function, EKG – initial and throughout therapy for possible QT prolongation

Monitor hypoglycaemia if used with antidiabetic agents.

No dose adjustments in manufacturer labelling but caution recommended in renal and hepatic impairment; Dose adjustments may be needed

#### **Prophylaxis**

(<https://www.mohfw.gov.in/pdf/AdvisoryontheuseofHydroxychloroquinasprophylaxisforSARSCoV2infection.pdf>)

#### **Eligibility criteria and dose**

Asymptomatic HCWs involved in the care of suspected or confirmed cases of COVID-19

Dose: 400 mg BID on day 1 followed by 400 mg once weekly for next 7 weeks

#### **Asymptomatic household contact of laboratory cases**

Dose: 400 mg BID on day 1 followed by 400 mg once weekly for next 3 weeks

**Contraindications**

1. Children < 15 years
2. Known hypersensitivity to HCQs or retinopathy